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Bank Lending Channel in Monetary Policy Transmission: Evidence from Russia

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Abstract

This paper examines whether a bank lending channel exists in monetary policy transmission in Russia, employing Russian bank-level data from 2005 through 2012. The results of specifications suggest that banks with less capital tend to react more sensitively to changes in monetary policy. Furthermore, this study finds that smaller, more liquid and/or better-capitalized banks were likely to have more rapidly growing loan portfolios, and larger banks tended to attenuate the crisis shock.

Keywords: monetary policy transmission, bank lending channel, Russia, panel data, bank-level data

1. Introduction

Several studies have ascertained the existence of a bank lending channel in monetary policy in various countries. This study aims to examine whether the monetary policy of the Central Bank of Russia (CBR) affects banks' loan supply in Russia, where it has long been indicated that banks have not been extending sufficient loans for economic entities (Note 1).

Bernanke and Blinder (1992) show that aggregate bank loans respond significantly after a monetary policy change, using data during the period 1959-1978. However, it is impossible to identify whether the bank loan change is caused by loan demand or loan supply based on aggregate bank data. Loan demand could be affected by macroeconomic shocks including monetary policy changes. Specifically, an expansionary monetary policy would lower interest rates and foster investment, which results in increased loan demand. On the other hand, bank-level data clarify loan changes among each bank, which can be regarded as the differences in the shifts of each bank's loan supply curve.

Empirical studies on U.S. banks found evidence of the existence of a bank lending channel. In particular, Kashyap and Stein (1995) found that the lending volume of smaller banks is more sensitive to monetary policy than the lending volume of large banks based on the U.S. bank-level data from 1976 to 1992. Kashyap and Stein (2000) claim that the impact of monetary policy on lending is stronger for banks with less liquid balance sheets, using bank-level data in the U.S. from 1976 to 1993. Kishan and Opiela (2000) found evidence that small undercapitalized banks are unable to raise alternative funds to continue financing loans during contractionary policy in the U.S. Among recent studies, the results of Kishan and Opiela (2006) suggest that U.S. contractionary monetary policy decreases the loans of the small low-capital banks relative to high-capital banks, and expansionary monetary policy is unable to increase the loan growth of the low-capital banks relative to the high capital banks. Ashcraft (2006) identified a differential response of loan supply to changes in the federal funds rate across banks in the U.S. while the aggregate elasticity of output to bank lending is very small.

With respect to European banks, Favero et al. (1999) found no bank lending channel, using data in France, Germany, Italy and Spain. However, many other studies found evidence of the existence of a bank lending channel. For example, Ehrmann et al. (2003) found that in Europe monetary policy alters the bank loan supply, with the effects most dependent on the liquidity of individual banks, and unlike in the US, the size of a bank generally does not explain its lending reaction. Kakes and Sturm (2002) claim that in Germany, lending by the credit co-operatives, which are on average the smallest banks, declines most, whereas big banks are able to shield their loans portfolio from monetary shocks. Gambacorta (2005) found that in Italy, after a monetary tightening, the decrease in lending is lower for well-capitalized banks while bank size is not relevant. Altunbas et

al. (2002) show that across the EMU systems, undercapitalized banks of any size tend to respond more to change in policy.

Furthermore, one study investigated the effects of monetary policy during the global financial turmoil in 2008-2009. Gambacorta and Marques-Ibanez (2011) used bank level data from 1999 through 2009 in Europe and the U.S., and found that banks with weaker core capital positions, greater dependence on market funding and on non-interest sources of income restricted the loan supply more strongly during the crisis period.

As for studies regarding Russia, Vinhas de Souza (2006) used annual data from 1995 through 2003, and found that the higher the assets and/or capital, the less sensitive a bank is to changes in monetary policy. Juurikkala et al. (2011) claim the level of a bank's capitalization matters for the transmission process of monetary policy based on a comprehensive quarterly dataset on all Russian banks from 1999 to 2007.

This paper uses bank-level data to examine the existence of a bank lending channel in Russia and contributes to the study regarding the bank lending channel in three ways. First, the existence of a Russian bank lending channel is confirmed based on a different data set. Second, the difference in banks' behavior by their size is detected during the global financial turmoil. Third, it is verified that macroeconomic indicators affect bank lending in Russia.

The outline of this paper is as follows. Section 2 provides an overview of the Russian banking environment. After data sources and methodological issues are described in Section 3, empirical results are presented in Section 4. Section 5 examines alternative specifications. The last section concludes the paper.

2. Overview of the Russian Banking Environment

2.1 Indicator for Monetary Policy

The Russian economy recovered rapidly from the damage of the financial crisis in 1998 because of the three-fold depreciation of the Russian ruble, the low dependence of firms on banks in raising funds, and increasing oil prices (OECD, 2000). The average GDP growth rate was 7.2% per annum from 2000 through 2007 (Note 2). However, it has often been indicated that Russia suffered from Dutch Disease because of the increase of energy prices and the appreciation of the Russian ruble (see, World Bank, 2005; Ollus & Barisitz, 2007; Oomes & Kalcheva, 2007) (Note 3). In order to prevent the ruble's sharp appreciation the Central Bank of Russia (CBR) repeatedly intervened in the foreign exchange market.

The 1995 Central Bank Law stipulates that the goal of monetary policy is to defend the currency and control inflation. In addition, the CBR states in its monetary policy strategy document of 2001 that it intends to disallow the Russian ruble to appreciate in nominal terms and accumulate international reserves in order to maintain the competitiveness of the Russian economy (CBR, 2011, No. 1). Under the repetitive intervention in the foreign exchange market, the amount of international reserves increased from 12.6 billion USD at the end of 1999, to 569.0 billion USD at the end of June 2008 (Note 4). The amount of money supply M2 was 554 billion rubles in May 1999 while it increased to 13.5 trillion rubles in October 2008 (Note 5). One of the reasons for the considerable money supply increase is the lack of instruments for sterilized intervention (Tabata, 2009; Uliukaev, 2009; Granville & Mallick, 2010; Ono, 2012).

On the other hand, as indicated by the OECD (2009), interbank money market rates in real terms remained negative in almost all months from 1999 through 2010 when using consumer price changes in comparison with the same month of the previous year as a price indicator. While refinancing rates had been above inflation rates, the rise in the money supply could lower money market interest rates. Therefore, interest rates had not worked as a proper tool for monetary policy although the CBR states in its annual report for the year 2011 that in order to enhance interest rate policy efficiency, the CBR continued to take measures aimed at increasing the flexibility of the rouble's exchange rate (CBR, 2012) (Note 6).

Considering these arguments, this paper concludes that monetary policy in Russia is implemented based on the idea of emphasizing monetary aggregates rather than short-term interest rates.

2.2 Russian Banking System

The number of operating banks in Russia was 1,282 at the end of 2002 while it decreased to 897 after a decade (Note 7). On the other hand, the number of wholly foreign- owned banks was 27 at the end of 2002. A 12 per cent ceiling on the foreign capital share in the banking sector was abolished by the Russian government in 2002 (OECD, 2004). During the following decade the number of foreign banks increased to 73.

Although the number of banks decreased for ten years, bank assets are increasing in the Russian banking system. Specifically, whereas bank assets relative to GDP amounted to 38% at the end of 2002, they increased

dramatically to 79% at the end of 2012. At the same time, the share of state-controlled banks has also been growing. The share of assets of state-controlled banks was less than 40% at the end of 2002. However, it reached 55.8% at the end of 2011 (Vernikov, 2012). In terms of the asset size 6 out of the top 10 banks were state-controlled as of the end of 2012 (Sberbank, VTB, Gazprombank, Rosselkhozbank, Bank Moskvy, and VTB24) according to RBK Reiting (2013). In particular, Sberbank, the largest Russian bank in terms of assets, accounted for 27.4% of total assets and 44.1% of individual deposits at the end of 2012.

Loans outstanding extended by banks and the money supply also increased dramatically. Whereas loans outstanding to non-financial institutions relative to GDP amounted to 16.2% at the end of 2002, they were boosted to 45.8% at the end of 2012. The ratio of money supply M2 to GDP increased from 19.7% at the end of 2002 to 43.8% at the end of 2012.

With respect to the financial structure in Russia, data regarding total bank assets, bank loans to the corporate sector, outstanding debt securities of the non-financial corporate sector and stock market capitalization are reported in Table 1, compared with those of Germany and the U.S. The outstanding debt securities of the non-financial corporate sector and stock market capitalization relative to the GDP in Russia are 5.3% and 43.4% in 2012, respectively, which are almost the same level as Germany. On the other hand, bank loans to the corporate sector relative to the GDP are 33.4% in 2012 in Russia, which is lower than that of Germany, but higher than that of the U.S. Therefore, the corporate sector in Russia more heavily depends on bank loans in fund-raising, although the ratio of total bank assets to the GDP remains 79.1% in Russia.

Table 1. Financial structure in Russia, Germany and the U.S. (% of GDP)

	Russia		Germany		U.S.	
	2010	2012	2010	2012	2010	2012
Total bank assets	73.0	79.1	351.0	336.9	80.8	81.3
Bank loans to corporate sector	31.4	33.4	56.4	58.7	13.9	13.7
Outstanding debt securities of non-financial corporate sector	5.6	5.3	5.3	5.7	35.9	39.6
Stock market capitalization	65.9	43.4	43.3	43.4	114.6	114.9

Source. Website of the World Bank as for stock market capitalization; Website of the Central Bank of Russia as for total bank assets and bank loans in Russia; Website of the BIS as for debt securities in Russia; Website of the European Central Bank as for total bank assets, bank loans and debt securities in Germany; Federal Reserve Flow of Funds as for total bank assets, bank loans and debt securities in the U.S.

3. Data and Methodology

This paper utilizes annual balance sheet data of Russian banks, provided by BankScope. The number of banks, whose loan outstanding data are available, was 90 in 2004, 503 in 2005, 711 in 2006, 924 in 2007, and 929 in 2012. Taking the data availability into account, the analysis period is set to be from 2005 through 2012. As the response of banks to monetary policy could differ by size (S), liquidity (Liq) and capitalization (Cap), this paper employs the following indicators in accordance with former studies:

$$S_{it} = \log S_{it} - \frac{1}{N_t}\sum_i \log S_{it} \tag{1}$$

$$Liq_{it} = \frac{Liq_{it}}{S_{it}} - \frac{1}{T}\sum_i \left(\frac{1}{N_t}\sum_i \frac{Liq_{it}}{S_{it}}\right) \tag{2}$$

Table 2. Descriptive statistics of balance sheet variables

Year	Number of observations	Logarithm of loans outstanding	Logarithm of total assets	Liquid assets / Total assets (%)	Capital / Total assets (%)
2005	470	13.100	13.717	31.478	23.360
		(2.300)	(2.0562)	(17.828)	(16.645)
2006	673	13.294	13.937	31.709	22.049
		(2.202)	(1.928)	(18.898)	(16.271)
2007	880	13.328	14.135	34.459	21.738
		(2.511)	(1.868)	(20.291)	(17.231)
2008	925	13.691	14.474	34.187	20.303

		(2.477)	(1.837)	(20.292)	(15.103)
2009	894	13.775	14.531	32.378	22.138
		(2.539)	(1.852)	(20.781)	(15.822)
2010	951	13.720	14.640	35.943	25.662
		(2.632)	(1.7855)	(21.025)	(18.360)
2011	957	13.961	14.874	33.371	23.516
		(2.534)	(1.744)	(20.236)	(17.689)
2012	928	14.177	15.117	32.691	22.781
		(2.703)	(1.736)	(20.995)	(18.214)
2005-2012	6678	13.837	14.500	33.466	22.697
		(2.090)	(1.879)	(20.294)	(17.072)

Note. Figures and figures in parentheses from the third column through the sixth column are average and standard deviation, respectively.

Table 3. Dynamics of money supply M0, M2, the monetary base (in logarithm), and the MIBOR (in percentage)

Year	M0	M2	Monetary base	MIBOR
2005	7.605	8.705	7.977	3.010
2006	7.932	9.102	8.324	3.691
2007	8.217	9.463	8.615	4.983
2008	8.241	9.471	8.627	6.169
2009	8.304	9.633	8.775	8.737
2010	8.530	9.904	9.011	3.481
2011	8.689	10.106	9.065	4.181
2012	8.769	10.218	9.196	5.763

Source. Website of the Central Bank of Russia.

$$Cap_{it} = \frac{Cap_{it}}{S_{it}} - \frac{1}{T}\sum_i \left(\frac{1}{N_t}\sum_i \frac{Cap_{it}}{S_{it}}\right) \tag{3}$$

with $i = 1, \dots, N$ and $t = 1, \dots, T$ and where N_t denotes the number of banks at time t, and S_{it}, Liq_{it} and Cap_{it} are the total assets, the liquid assets (cash, interbank lending and trading securities) and the capital of Bank i at time t. Banks' size is measured by the log of total assets. Liquidity is calculated as the ratio of liquid assets to total assets. Capitalization is defined as the ratio as the capital to total assets. These three variables are normalized with respect to their sample average. Banks having experienced mergers are treated as single banks in pre-merger dates by aggregating the values of variables for the entities involved in the deals.

Descriptive statistics of balance sheet variables are shown in Table 2. Average loans outstanding continued to grow from 2005 through 2008. After the growth rate slowed down in 2009, it turned negative in 2010. The amount of average loans outstanding increased again compared with the previous year in 2011 and 2012. The amount of average total assets increased consistently even during the financial crisis in 2008 and 2009. While the average capital-asset ratio had a decreasing tendency from 2005 through 2009, it grew to about 22% and about 26% in 2009 and 2010, and it was about 23% in 2012. As for the average liquid asset-total asset ratio, it fluctuated between 31 and 36% during the period 2005-2012.

Table 3 shows the dynamics of monetary policy measures. The growth rate of money supply M0, M2 and the monetary base slowed down in 2008 and 2009. However, it accelerated again after the global financial turmoil. The Moscow interbank offered rate (MIBOR) (overnight, annual average) increased to 8.737%, and it was 5.763% in 2012.

The empirical specifications of this paper are based on the model of a profit-maximizing bank. In order to examine the effects of the global financial turmoil during the period 2008 and 2009, this paper introduces a crisis dummy variable (*CRISIS*), which takes the value of one from 2008 to 2009 and takes the value of zero elsewhere, following Gambacorta and Marques-Ibanez (2011). Furthermore, two dummy variables are added to the specification: a government-controlled bank dummy (*GOVERNMENT*) and a foreign bank dummy (*FOREIGN*). They take the value of one if banks are wholly (100%) or almost wholly (more than 95%) controlled by the government or non-residents, and otherwise take the value of zero, respectively. Moreover, the GDP and CPI data are included in the specification, and refer to t. The regression model is specified as follows:

$$\Delta\log(L_{it}) = a_i + (b + b^*CRISIS)\,\Delta\log(L_{it-1}) + (c + c^*CRISIS)X_{it-1} + (d + d^*CRISIS)X_{it-1}\Delta\,MP_{t-1} + e\Delta\log(GDP_t) + f\Delta\log(CPI_t) + gTIME_t + hGOVERNMENT_t + jFOREIGN_t + \varepsilon_{it} \quad (4)$$

where L_{it} is the log of loans outstanding of Bank i at time t, a_i is a bank-specific fixed effect, and *TIME* is a time dummy variable. This equation is based on the interactive one-step regression approach of Kashyap and Stein (2000).

The following four questions are mainly examined in this paper: (1) Does the loan supply differ by bank-specific characteristics? (2) Do monetary policy shocks on bank lending differ by bank-specific characteristics? (3) Does the loan supply change during the financial crisis? and (4) Does the loan supply differ by bank ownership? With respect to the first question, larger-sized, more highly liquid, and/or better-capitalized banks are expected to extend more loans. As for the second question, smaller-sized, lower liquid, and/or lower-capitalized banks are expected to be more sensitive to changes in the money supply in providing loans. In relation to the third question, smaller-sized, lower liquid, and/or lower-capitalized banks are expected to decrease lending more during the financial crisis. With respect to the fourth question, government-controlled banks are expected to supply more loans in accordance with, for example, a government's loan extending program, whereas nonresident-controlled banks are also expected to supply more loans in compliance with the demand from nonresident firms, including trade finance. The above-mentioned argument is summarized in Table 4.

Because of the inclusion of a lagged dependent variable in the model, the transformation necessary for eliminating fixed effects causes a correlation between the lagged dependent variable and the transformed error term. Therefore, this method does not guarantee unbiasedness and consistency for the ordinary least square estimator. To solve this problem, Arellano and Bond (1991) transformed the model into first differences and used the generalized method of moments (GMM), suggested by Hansen (1982), which is referred to as the difference GMM. This paper applies the difference GMM and in the estimation the Sargan test and Arellano-Bond test are implemented for over-identifying restrictions and second-order serial correlation, respectively (Note 8).

Table 4. Expected sign in the estimations

Independent variable: growth rate of loans		
	Implication	Expected signs
S	Larger banks tend to extend more loans.	+
Liq	Banks with high liquidity tend to extend more loans.	+
Cap	Well-capitalized banks tend to extend more loans.	+
*S * M0*	Larger banks could attenuate monetary policy shocks	−
*S * M0 * CRISIS*	In the crisis period	−
*Liq * M0*	Banks with high liquidity could attenuate monetary policy shocks	−
*Liq * M0 * CRISIS*	In the crisis period	−
*Cap * M0*	Well-capitalized banks could attenuate monetary policy shocks	−
*Cap * M0 * CRISIS*	In the crisis period	−
GDP	Economic growth fosters bank lending	+
CPI	Price increases hinder bank lending	−
GOVERNMENT	Government-controlled banks are likely to supply more loans.	+
FOREIGN	Nonresident-controlled banks are likely to supply more loans.	+

4. Empirical Results

The results of the baseline estimation are summarized in Table 5. The first column demonstrates the outcomes without the crisis dummy variable. As for the first question, the variables of liquidity and capital have the expected positive sign, whereas the coefficient of assets is negative with statistical significance contrary to the expectations (Note 9). The estimation indicates larger Russian banks are likely to have a lower loan growth rate. The results are not consistent with Vinhas de Souza (2006), who claims that larger banks tended to extend more loans and banks with more liquidity and/or with more capital tended to extend fewer loans in the period 1995-2003. One of the reasons for this inconsistency could be attributed to the different analysis period.

With respect to the second question, the interaction term of capital-asset ratio and the money supply is significantly negative whereas those of total assets and the money supply, and liquidity and the money supply are

not statistically significant. The results suggest that better-capitalized banks tend to adjust their lending portfolios to a lesser extent in the face of monetary policy changes.

Table 5. Baseline estimation results

Independent variable: growth rate of loans					
	(1)	(2)	(3)	(4)	(5)
Growth rate of loans $(t-1)$	-0.0200	-0.0153	-0.0184	-0.0208	-0.0187
Growth rate of loans $(t-1)$ * Crisis					0.0095
S	-0.2463*	-0.1111**	-0.2539*	-0.2566*	-0.2673**
*S * CRISIS*					0.0412*
Liq	0.0180***	0.0172***	0.0179***	0.0180***	0.0181***
*Liq * CRISIS*					0.0009
Cap	0.0145***	0.0170***	0.0148***	0.0152***	0.0160***
*Cap * CRISIS*					-0.0001
*S * M0*	0.0088	0.0742	0.0118	0.0200	0.1143
*S * M0 * CRISIS*		-0.0453	-0.0149	-0.0001	-0.1353
*Liq * M0*	0.0038	0.0049	0.0027	0.0027	0.0038
*Liq * M0 * CRISIS*		-0.0027	0.0004	0.0011	-0.0027
*Cap * M0*	-0.0137*	-0.0205**	-0.0209***	-0.0215**	-0.0216*
*Cap * M0 * CRISIS*		0.0125	0.0152	0.0154	0.0148
GDP	84.5906*		91.0972*	91.2937*	85.6458*
CPI	-0.9682**		-1.0258**	-1.0294**	-0.9795*
GOVERNMENT	0.3186	-0.1607		-0.1213	0.3804
FOREIGN	0.3669	3.8726		4.6175	3.9165
J-Statistic (p-value)	0.9690	0.8787	0.9456	0.9195	0.8960
MA(2) (p-value)	0.4082	0.5589	0.4661	0.4227	0.3664

Note. Superscripts ***, ** and * indicate statistical significance at the 10%, 5% and 1% level, respectively.

Table 6. Alternative estimation results with the data of the monetary base

Independent variable: growth rate of loans					
	(1)	(2)	(3)	(4)	(5)
Growth rate of loans $(t-1)$	-0.0195	-0.0162	-0.0171	-0.0205	-0.023
Growth rate of loans $(t-1)$ * Crisis					0.022
S	-0.2384*	-0.1128**	-0.2557**	-0.2588**	-0.267**
*S * CRISIS*					0.041*
Liq	0.0180***	0.0170***	0.0178***	0.0179***	0.018***
*Liq * CRISIS*					0.001
Cap	0.0139***	0.0158***	0.0137***	0.0138***	0.015***
*Cap * CRISIS*					0.000
*S * Base*	-0.0427	0.0881	0.0521	0.0401	0.117
*S * Base * CRISIS*		-0.0465	-0.0361	-0.0110	-0.122
*Liq * Base*	0.0019	0.0043	0.0027	0.0024	0.002
*Liq * Base * CRISIS*		-0.0014	0.0006	0.0017	-0.001
*Cap * Base*	-0.0110*	-0.0118*	-0.0109*	-0.0119*	-0.014
*Cap * Base * CRISIS*		0.0086	0.0103	0.0108	0.011
GDP	87.3278*		87.1004*	89.4097*	85.500*
CPI	-0.9916**		-0.9945**	-1.0180**	-0.981*
GOVERNMENT	-2.7162	-1.6741		-1.0253	-1.021
FOREIGN	4.7377	5.3687		4.9363	6.041
J-Statistic (p-value)	5.4550	0.9043	0.9450	0.9183	0.913
MA(2) (p-value)	0.8363	0.8055	0.4647	0.5461	0.473

Note. Superscripts ***, ** and * indicate statistical significance at the 10%, 5% and 1% level, respectively.

Table 7. Alternative estimation results with the data of the money supply M2

Independent variable: growth rate of loans					
	(1)	(2)	(3)	(4)	(5)
Growth rate of loans $(t-1)$	-0.0207	-0.0176	-0.0179	-0.0209	-0.019
Growth rate of loans $(t-1)$ * Crisis					0.009
S	-0.2367*	-0.0903*	-0.2417*	-0.2465*	-0.273***
*S * CRISIS*					0.055
Liq	0.0180***	0.0172***	0.0183***	0.0182***	0.019***
*Liq * CRISIS*					0.001
Cap	0.0142***	0.0168***	0.0150***	0.0149***	0.020***
*Cap * CRISIS*					-0.004
*S * M2*	-0.0467	-0.0276	-0.0392	-0.0342	0.129
*S * M2 * CRISIS*		0.0010	0.0053	0.0063	-0.143
*Liq * M2*	0.0018	0.0021	0.0001	0.0002	0.001
*Liq * M2 * CRISIS*		-0.0006	0.0014	0.0016	0.000
*Cap * M2*	-0.0111*	-0.0185***	-0.0177***	-0.0175***	-0.030**
*Cap * M2 * CRISIS*		0.0115	0.0127	0.0128	0.024
GDP	87.9767*		94.1689**	95.3648**	88.213*
CPI	-0.9955**		-1.0426**	-1.0559**	-0.978**
GOVERNMENT	4.2447	-2.2385		0.3182	0.263
FOREIGN	-2.9580	3.8887		0.3394	4.227
J-Statistic (p-value)	0.9455	0.8948	0.9469	0.9577	0.914
MA(2) (p-value)	0.9189	0.9300	0.4496	0.4441	-0.019

Note. Superscripts ***, ** and * indicate statistical significance at the 10%, 5% and 1% level, respectively.

Table 8. Alternative estimation results with the data of MIBOR

Independent variable: growth rate of loans					
	(1)	(2)	(3)	(4)	(5)
Growth rate of loans $(t-1)$	-0.0166	-0.0143	-0.0124	-0.0205	-0.0290
Growth rate of loans $(t-1)$ * Crisis					0.0297
S	-0.2463*	-0.1128**	-0.2478*	-0.2575*	-0.2692*
*S * CRISIS*					0.0115
Liq	0.0183***	0.0166***	0.0177***	0.0173***	0.0172***
*Liq * CRISIS*					0.0019
Cap	0.0123***	0.0117***	0.0109***	0.0101***	0.0099***
*Cap * CRISIS*					0.0035
*S * MIBOR*	0.0035	-0.0038	0.0001	-0.0006	-0.0004
*S * MIBOR * CRISIS*		0.0127	0.0072	0.0084	0.0049
*Liq * MIBOR*	-0.0001	-0.0006	-0.0005	-0.0005	-0.0005
*Liq * MIBOR * CRISIS*		0.0008	0.0008	0.0008	0.0004
*Cap * MIBOR*	0.0002	-0.0006	-0.0005	-0.0005	-0.0006
*Cap * MIBOR * CRISIS*		0.0015	0.0014	0.0015	0.0007
GDP	85.9554*		91.5637*	93.9046*	101.1182**
CPI	-1.0042**		-1.0064**	-1.0326**	-1.1095**
GOVERNMENT	6.1595	-4.3215		-3.8955	-3.4711
FOREIGN	-3.4992	3.2283		4.0561	7.8152
J-Statistic (p-value)	0.9318	0.9063	0.9535	0.9326	0.8611
MA(2) (p-value)	0.9985	0.6837	0.4155	0.8465	0.9289

Note. Superscripts ***, ** and * indicate statistical significance at the 10%, 5% and 1% level, respectively.

Furthermore, the extent to which monetary policy has an effect on credit accommodation is calculated by multiplying an estimated coefficient on each interaction term by the standard deviation of the corresponding balance sheet variable (Note 10). The effects regarding bank assets, liquidity and capital are 1.65%, 0.08% and -0.23%, respectively, of which only the coefficient of capital is statistically different from zero at the 10% level.

This means that when the money supply increases by 1%, a bank with a capital ratio one standard deviation below the average will increase loans by 0.2 percentage points more than a bank with an average capital-asset ratio. In other words better-capitalized banks are less sensitive to monetary policy changes.

These findings are consistent with those of Juurikkala et al. (2011), which suggest that in the face of monetary contraction, well-capitalized banks are likely to react much less than other banks. Some of the results of Vinhas de Souza (2006), who claim that the higher the assets and/or capital, the less sensitive a bank is to changes in monetary policy, are also consistent with this paper's findings. Juurikkala et al. (2011) explain their findings as follows: banks with lower capitalization, which they claim have rapidly growing loan portfolios, are more likely to react to changes in monetary policy because they are more dependent on outside funding. On the other hand, the results of this paper demonstrate that well-capitalized banks are more likely to have more rapidly growing loan portfolios. Therefore, this explanation is not applicable.

Another possible explanation relates to the bank capital channel. The main idea proposed by Van den Heuvel (2002) is as follows. As banks have a maturity mismatch between assets and liabilities, interest rate changes might reduce their profits and capital. Banks could reduce lending in order to avoid failing to meet capital requirement regulations. The bank capital channel theory could explain the effects of monetary policy on Russian banks' behavior; that is, well-capitalized banks tend to have more rapidly growing loan portfolios while they are less sensitive to monetary policy changes than banks with less capitalization (Note 11). However, the existence of a bank capital channel in Russia cannot be econometrically confirmed due to the lack of data.

As for the fourth question, the coefficients of the dummy variables of *GOVERNMENT* and *FOREIGN* are not statistically significant, which indicates that bank ownership does not explain the differences of lending activities among banks.

Moreover, the coefficients of macroeconomic indicators are statistically significant. Specifically, the coefficient of GDP growth rate is positive with statistical significance at the 10% level and that of CPI is significantly negative at the 5% level. This means that economic growth fosters bank lending while the increase in prices hampers credit accommodation.

Next, specifications with the crisis dummy variable were estimated (see from the second column through the fifth column). The main results have almost no difference regarding statistical significance and coefficient signs even if GDP and CPI are excluded, or the government and foreign bank dummies are eliminated. With respect to the third question, only the coefficient of *S * CRISIS* is significantly positive at the 10% level in Specification 5. This suggests that larger banks could attenuate the influence of the crisis.

5. Robustness of Results

This section assesses alternative specifications by changing the monetary policy indicator M0 to the monetary base or the money supply M2. The specification results reported in Table 6 and Table 7 indicate that almost the same implication as the baseline model was obtained. In particular, in Table 6 the coefficients of assets, liquidity, capital and the interaction of capital with the monetary base except for the fifth column as well as the GDP and CPI are statistically significant at least at the 10% level. On the other hand, in Table 7 the same coefficients as in Table 5 show statistical significance except for the interaction of assets with the crisis dummy.

Furthermore, the MIBOR was used in the specification. The results in Table 8 show that the coefficients of assets, liquidity and capital are positive, positive and negative with statistical significance, respectively, as in the baseline specification, while the interaction of capital with the MIBOR is not statistically insignificant. This means that interest rates could not be a monetary policy indicator.

6. Conclusions

This paper examines the bank lending channel, employing Russian bank-level data from 2005 through 2012. Specifically, the following four questions are examined in this paper: (1) Does the loan supply differ by bank-specific characteristics? (2) Do monetary policy shocks on bank lending differ by bank-specific characteristics? (3) Does the loan supply change during the financial crisis? and (4) Does the loan supply differ by bank ownership?

As for the first question, smaller, more liquid and/or better-capitalized banks were likely to have more rapidly growing loan portfolios. With respect to the second question, banks with less capital tended to react more sensitively to the changes in the money supply. In relation to the third question, larger banks tended to attenuate the crisis shock. Finally, banks' loan supply does not differ by bank ownership.

The results of this paper show that well-capitalized banks are more likely to have more rapidly growing loan

portfolios while they are less sensitive to monetary policy changes than banks with less capitalization. The bank capital channel theory could explain the effects of monetary policy on Russian banks' behavior. The main idea is as follows. As banks have a maturity mismatch between assets and liabilities, interest rate changes might reduce their profits and capital. Banks could reduce lending in order to avoid failing to meet capital requirement regulations.

Future studies should address the question of whether the development of a securities market could change the effects of Russian monetary policy.

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Notes

Note 1. See, e.g., OECD (2004), which claims that the levels of financial intermediation remained extremely low in Russia, compared to both developed western economies and the more advanced transition economies, indicating that bank credits financed only about 4.8 per cent of fixed investment in 2003.

Note 2. Calculated based on the data derived from the website of the Rosstat.

Note 3. Ono (2014) claims that there is Granger causality from oil prices to the exchange rate from 2002 through 2012.

Note 4. Data are available at the website of the Central Bank of Russia.

Note 5. IMF, International Financial Statistics, line 59mb.

Note 6. The empirical results of Ono (2013) indicate that the impact of interest rates on real output is very weak.

Note 7. Data regarding the banking sector were obtained from the website of the CBR unless otherwise indicated.

Note 8. The estimator of Blundell and Bond (1998) developed Arellano and Bond's model by adding the assumption that the first differences of instrument variables are uncorrelated with the fixed effects, improving

efficiency in estimation (the system GMM). The system GMM estimator combines moment conditions for the model in first differences with moment conditions for the model in levels. However, the Sargan test for over-identifying restrictions rejected this paper's estimations at the 1% level.

Note 9. According to the data used in this study, larger banks tend to have lower capitalization, which is in line with the findings of Fungáčová and Solanko (2009). Specifically, R-squared between bank assets and capitalization was over 0.9 based on the ordinary least square method.

Note 10. Hosono (2006) was referenced for the calculation.

Note 11. The current minimum bank equity capital adequacy ratio is 10% in Russia. For details, see instruction No. 139 on the bank regulation procedure by the CBR as of December 3, 2012.

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The Interaction Effects of Globalization and Institutions on International Capital Flows

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Abstract

This paper examines how globalization and institutional quality affect international capital inflows. Using the KOF globalization index and its single dimensions (economic, social and political), we show that globalization and institutional quality not only individually have a significant positive impact on international capital flows, their interaction effects are also significant. In particular, the partial effect of globalization on capital inflows is decreasing with higher levels of institutional quality. As globalization expands and institutional quality improves, the return in capital flows increases at a decreasing rate. By decomposing globalization into its single dimensions, we find that social and economic globalization drive these results. Among components of social globalization, cultural proximity plays an important role in attracting capital inflows.

Keywords: capital flows, institutional quality, globalization

1. Introduction

Why are some countries richer and enjoying a higher level of standard of living? How can poor countries achieve long run economic growth? Growth theory predicts that capital accumulation and technological progress are the two major driving forces of economic growth. Capital flows not only directly increase capital accumulation in a host country, they also promote productivity through technology transfer. Capital flows therefore play a very important role in economic growth. A natural question to ask then is where does capital flow? A standard neoclassical production function with diminishing marginal productivity of capital suggests that capital should flow from capital-abundant rich countries to capital-scarce poor countries. However, Lucas (1990) shows that capital predominantly flows to the rich countries. The inconsistency between the theoretical prediction and the data is referred as the *Lucas Paradox*.

Many theoretical explanations to the Lucas Paradox have been proposed but relatively few empirical studies exist (Note 2). Alfaro, Kalemli-Ozcan and Volosovych (2008), in an empirical investigation of the paradox, found that institutional quality is an extremely important factor in determining capital flows. When controlling for institutional quality in a regression of gross domestic product (GDP) on capital flows, they found a negatively significant relationship between capital flows and GDP. This negative coefficient on GDP suggests that when institutional quality is taken into consideration, the Lucas Paradox no longer exists (Alfaro, Kalemli, & Volosovych, 2008). Snyder (2012) qualified this finding by showing that different measures of institutional quality have different impacts on capital flows; moreover, the effect of institutional quality on capital flows is different in poor countries than in rich countries. Snyder's finding implies that institutional quality's impact on capital flows varies with the level of economic development. His finding also raised questions about whether institutional quality is truly a solution for the Lucas Paradox, as the positive and significant relationship between GDP and capital flows was maintained in several regression specifications (Synder, 2012). Okada (2013) further expanded on this literature by showing that institutional quality's relationship to capital also has an important interaction effect with financial openness. Specifically, Okada (2013) finds that the partial effect of financial openness on capital flows is increasing with higher levels of institutional quality. Okada's finding suggests that perhaps the solution to the Lucas Paradox lies somewhere in the relationship between a country's institutional quality and its openness to trade.

In this study, we examine the role of globalization and institutional quality in attracting capital flows, treating globalization as a complex, multi-faceted term. Globalization is most commonly referred to strictly as an economic path, but it really is an ambiguous term with multiple dimensions (Rodrik, 2000; Vamvakidis, 2002; Aramberri, 2009). To study the several aspects of globalization, we employ a broad index developed by Dreher (2006), called the KOF index. The KOF index of globalization not only includes measurement on economic globalization, but also social and political dimensions of globalization (Note 3). By examining globalization more broadly, we show the interaction effects of globalization and institutions on international capital flows differ depending on the definition of globalization employed. Our results show that institutions and globalization (and its components) are individually positive and significant on capital flows, but their partial effect suggests decreasing capital flows with higher levels of institutional quality. By decomposing globalization into its single dimensions, we find that the social and economic aspects of globalization drive this relationship. Additionally, we find that controlling for the interaction effects between aspects social and economic globalization and institutional quality removes the significant and positive relationship between GDP and capital flows. This finding suggests that social and economic globalization and their interactions with institutional quality are two important factors to consider in solving the Lucas Paradox.

Globalization means many different things for different people (Note 4). In general, it means countries are becoming more integrated in terms of economic, social, informational, and technological exchanges, but it can also mean cultural and political convergence (Li & Rueveny, 2003; Dreher, 2006). For example, McDonald's restaurants are now a global chain, with locations in over 100 countries (Note 5). Globalization has enabled the restaurant to go from an item in one nation's culture to an international symbol of cultural convergence. In terms of political convergence, Simmons and Elkins (2004) show that international policy diffusion can influence the decision making of domestic policy makers. Policy successes elsewhere, communicated through cultural linkages and information networks, can be a learning experience for domestic leaders (Axelrod, 1997). Leaders implement policies that are proven to be effective, and due to increased exchanges from globalization, policies across countries are less diverse.

In addition to having multiple dimensions, globalization does not occur in a vacuum. Like most macro-variables, globalization interacts with various aspects of a country's growth and values. For example, Chang and Lee (2010) find that social and political aspects of globalization specifically, along with globalization overall, have a long-run unidirectional impact on economic growth. Moreover, Granato, Inglehart, and Leblang (1996) show that cultural values can have an important impact on economic development. As globalization affects certain cultures, it has an indirect impact on development. Considering globalization as strictly economic is missing a large portion of the concept's identity, and also missing a portion of the concept's impact on economic outcomes. To examine the relationship between globalization and capital flows, therefore, we need to consider this multi-layer perspective of globalization.

This paper contributes to the literature in several ways. Primarily, we explore the hypothesis that globalization and institutional quality combined could be a solution to the Lucas Paradox. We start by estimating the interaction effect of broad indices representing globalization and institutional quality on capital flows. First, we test the independent relationship of capital flows to each of the broad indices, then we add the interaction term of globalization and institutional quality and find a significant relationship. Next, we explore the interaction effect in terms of the three sub-dimensions of globalization: economic, social, and political (Note 6). Upon finding that economic and social globalization have significant interaction effects with institutional quality, we examine the sub-components of each dimension in turn. The sub-component variables representing trade restrictions (component of economic globalization) and cultural proximity (component of social globalization) maintained the significant relationship. Finally, we unbundle the institution index and examine the interaction effects of the components of institutions with cultural proximity, finding that the social globalization component of cultural proximity has the strongest impact on capital flows when combined with strong regulatory and legal institutions (Note 7).

The paper continues as follows. Section 2 discusses empirical analysis, Section 3 describes the data. Section 4 presents and discusses regression results, and section 5 concludes.

2. Empirical Strategy

As mentioned above, this paper follows an empirical strategy similar to Alfaro, Kalemli-Ozcan, and Volosovych (2008). Instead of using panel data that varies across countries and time (like Synder, 2012; Okada, 2013), our dataset consists of country-level averages from 1970 to 2010 (Note 8). Using averaged variables over several years is a good way to study institutional quality and capital flows as they are both variables that are unlikely to

change dramatically over time (Alfaro, Kalemli-Ozcan, & Volosovych, 2008). Primarily, we are interested in understanding the interaction effect of institutional quality and globalization on capital flows, and particularly in the effects of globalization. We estimate the following equation (Note 9),

$$logCapflows_i = \alpha + \beta_0 logGDP_i + \beta_1 Institutions_i + \beta_2 Globalization_i + \beta_3 Institutions_i \times Globalization_i + \varepsilon_i \quad (1)$$

where i represents variation across countries, α is a constant term, and ε is an independently and identically distributed error term. *LogCapflows,* is the log of average capital flows per capita per year, measured as the sum of foreign direct investment and portfolio equity flowing into a country in a particular year. *LogGDP* is the log of real GDP per capita in the base year, 1970, and *Institutions* and *Globalization* are both indexes representing the level of institutional quality and social, political, and economic globalization. The regression is estimated using a standard OLS specification in STATA 13.

We start by estimating the interaction effect of globalization and institutional quality at the broadest level by using the summary indexes of globalization and institutional quality. After first testing the independent relationship of capital flows to these broad indices, we add the interaction term and find a significant relationship. Next, we explore the interaction effect in terms of the three sub-dimensions of globalization: economic, social, and political. Upon finding that economic and social globalization have significant interaction effects with institutional quality, we examine the sub-components of each dimension in turn. The component variables representing trade restrictions and cultural proximity maintained the significant relationship. Finally, we unbundle the institution index and examine the interaction effects of the components of institutional quality with cultural proximity.

Table 1. Summary statistics

	Obs.	Mean	Std. Dev.	Min.	Max.
log(Capital Flows per capita)	111	3.89	2.21	-2.46	8.67
log(GDP per capita) in 1970	101	8.17	1.18	5.85	10.29
Institutional Quality	113	59.07	9.60	36.55	82.03
Legal Property	113	53.87	16.60	18.35	85.42
Tariffs	112	58.09	17.50	0.00	91.11
Monetary Inst.	113	66.76	15.99	13.98	96.08
Regulations	113	58.39	10.84	29.45	83.30
Globalization	113	50.42	16.00	21.87	84.46
Economic Globalization	113	50.40	17.28	15.98	92.26
Trade Openness	112	52.34	18.50	12.15	93.15
Trade Restrictions	112	49.06	21.84	8.80	91.37
Social Globalization	113	42.73	20.37	8.49	83.79
Personal Contact	111	48.64	21.51	8.42	88.52
Info. Flows	113	51.23	21.25	10.95	88.28
Cultural Prox.	113	28.03	23.97	1.00	86.75
Political Globalization	113	61.38	17.60	24.74	96.39
Education	108	2.03	1.13	0.20	5.15
Agriculture Value Added (% of GDP)	109	16.45	13.60	0.37	54.33
Roads Paved (% of Total)	112	48.82	32.19	0.82	100.00
Inflation (GDP Deflator)	111	6.92	11.34	-3.71	102.33

3. Data Description

The capital flows data come from the IMF's International Financial Statistics database (2013). Once downloaded, data are deflated to 1996 U.S. dollars using the U.S. Consumer Price Index available from the St. Louis Federal Reserve's data service, FRED. The real capital flows are then divided by each country's population, and averaged over the available time period. The average country in our sample received an average of $48.91 dollars of capital inflows per capita per year from 1970 to 2010.

LogGDP comes from the Penn Tables and is the only variable that is not averaged over the period studied. Instead, GDP is the value of a country's gross domestic product per capita in the base year (1970). We use the base year primarily to avoid the inevitable endogenous relationship between capital inflows and gross domestic product (Alfaro, Kalemli-Ozcan, & Volosovych, 2008). In theory, GDP should show a negative relationship to

capital flows; however, empirically it shows a positive relationship as established in Lucas (1990). If any of our estimated equations do show a negative relationship, we could argue that the additional variables have explained the Lucas paradox; however, we do not find a robust negative relationship (Alfaro, Kalemli-Ozcan, & Volosovych, 2008; Synder, 2012). We do find a few circumstances where GDP is not significant, which could be an indication that the other factors included in the regression equation have more influence on capital than initial GDP.

Our two explanatory variables of interest are globalization and institutional quality. To represent globalization, we use the 2013 KOF Index of Globalization. The KOF Index is constructed using 23 variables that cover aspects of economic, political, and social globalization. The index is built by organizing 23 variables into the three sub-indices, then principal components analysis is used to combine the sub-indices into an overall globalization index (Dreher, 2006). The creators developed the index to reflect the process of developing extensive networks of people, information, capital, ideas, and physical goods across multiple continents (Dreher, 2006). We use all levels of the index in our analysis, starting with the broadest index of economic globalization, then examining the sub-indices of economic, political, and social dimensions of globalization, and finally looking at the component variables of social globalization.

The institutional quality data are chain-linked indices from the *Economic Freedom of the World 2013 Annual Report*. These indices are built using a standard process to standardize raw data from 0 to 10 scores. The raw data come from a variety of sources, including survey and quantitative data (for more information, see Free the world, Appendix). The annual report download includes sub-indices evaluating the size of government, legal system and property rights, sound money, freedom to trade internationally, and regulation. Our paper focuses on the summary index that includes all five sub-categories. We do include one set of regressions using individual sub-indices to address the precedent set in Snyder (2012) that says different forms of institutional quality might have different relationships with capital flows.

Other explanatory variables are included as control variables and are drawn from prior published datasets and the World Bank world development indicators. Education level is represented by the average years of secondary schooling in the population above 15 years of age, found in the Barro and Lee education database. Agriculture value added as a percent of GDP is drawn from the World Bank World Development Indicators (2013), along with paved roads as a percent of total roads (used as an infrastructure proxy), the population used to put GDP and capital flows in terms of per capita, and our measure of inflation (measured as the implicit growth of the GDP deflator).

Table 1 presents the summary statistics for the data used in our analysis. Log GDP per capita in the base year 1970 has a statistical average of 8.16, representing an average GDP per capita of about $3,500. In 2013, the World Bank considered countries with per capita incomes below $4,085 to be low or lower middle income (Note 10). By this measure, a little over half of the countries included in our analysis are considered low or lower middle income. The countries in our sample have a mean score of 59 points on the institutional quality index (out of 100 possible). Values closer to zero represent poor institutions, while values closer to 100 represent better institutions. Institutional data measuring legal property, tariffs, and legal regulations are overall below the institutional quality average for the countries in our sample, while monetary institutions are above average. The measure of institutional quality with the largest variance is tariffs, likely because some countries do not have tariffs at all, while others employ them extensively.

The statistical average of the overall index of globalization is 50.42. The economic globalization dimension of the index is distributed similarly to the overall index, although with a slightly larger variance. The social globalization dimension is distributed quite differently, with a lower overall average and higher variance. This large discrepancy likely comes from the component variables of social globalization—the information flows variable has a higher average, while cultural proximity is notably lower and has the lowest minimum value of all the globalization variables. Political globalization has the highest average value, meaning the countries in our sample are more globalized on a political dimension than on a social or economic one, confirming the necessity to research globalization as a multi-faceted term instead of strictly economic.

The additional control variables for our analysis are summarized in the bottom of Table 1. Education, or the average years of secondary schooling in the population older than 15, has a statistical average of 2.03 years. On average, 16.45% of GDP for the countries in our sample comes from agricultural production, and the average country has 50% of its roads paved. Implicit inflation averages 6.92% per year.

4. Results

Table 2 presents the initial estimations of institutional quality's and globalization's effects on capital flows. The

first column of Table 2 shows that our data, like many other studies, exhibits a positive relationship between capital flows and GDP per capita, or increasing returns to capital. According to the regression in column 1, a one percent increase in 1970 GDP per capita across countries leads to 1.54 percent higher capital inflows per capita without considering additional factors. As additional factors are included, the magnitude of positive returns declines but the relationship remains positive. In columns 2 and 3 of Table 2, institutions and globalization are each added separately to the regression in column 1. Both yield a positive and significant relationship to capital flows. In column four, the variables are included simultaneously and coefficients remain positive and significant.

In column 5 of Table 2 we estimate the interaction effect of institutional quality and globalization on capital flows. We find that the partial effect of overall globalization on capital flows is decreasing with the level of institutional quality. In other words, the negative coefficient shown on the interaction term in column 5 of Table 2 implies that globalized countries with strong institutions receive lower capital inflows than globalized countries with weaker institutions, holding other factors constant (Note 11). For example, the average country in our sample is predicted to receive about $167,000 dollars of capital inflows per year. Holding other factors constant, increasing globalization one unit still increases the overall amount of capital flows to $186,000, but the magnitude of the increase is lowered by the interaction effect (equal to 0.226+ -0.002*Institutional Quality). Also in column 5 we see that the coefficient on log GDP remains positive and significant. This finding implies that the interaction effect of globalization and institutional quality measured at their broadest levels is not enough to solve the Lucas Paradox.

The sign of the interaction effect between institutional quality and globalization is somewhat different than expected. Okada (2013) finds that the partial effect of financial globalization on capital flows is increasing with institutional quality. There are a few possible explanations for this difference. First, financial globalization is not necessarily the same as overall globalization. In fact, financial globalization as measured in Okada (2013), would be just one component of our measure of globalization. Moreover, many developing countries that rank low on measures of financial globalization could still rank high on broader measures that include factors like interpersonal contact. It is reasonable that a broader measure of globalization may yield a different relationship than a measure of just financial globalization. This finding could be evidence of capital seeking out corrupt or underdeveloped societies to increase profitability. Some leaders may be pressured to lower their labor standards or tax rates to draw in more capital—a key indication of weak institutions. If this is the case, between two countries with similar levels of globalization, the less-institutionalized country would bring in more capital.

Table 3. Institutions and components of globalization

Independent Variable is Log(Capital Flows per capita)				
	(1)	(2)	(3)	(4)
log(GDP per capita)	0.273	0.432**	0.196	0.582***
	(0.191)	(0.166)	(0.213)	(0.211)
Institutions	0.174***	0.078**	0.104**	0.196***
	(0.051)	(0.039)	(0.040)	(0.065)
Institutions x Globalization	-0.002***			
	(0.001)			
Globalization	0.227***			
	(0.060)			
Institutions x Economic Globalization		-0.001*		
		(0.001)		
Economic Globalization		0.153***		
		(0.043)		
Institutions x Social Globalization			-0.001*	
			(0.001)	
Social Globalization			0.141***	
			(0.052)	
Institutions x Political Globalization				-0.002*
				(0.001)
Political Globalization				0.101*
				(0.056)
Education	-0.135	0.055	-0.133	0.051

	(0.172)	(0.152)	(0.184)	(0.200)
Agriculture (% of GDP)	-0.013	-0.009	-0.031*	-0.036*
	(0.017)	(0.015)	(0.017)	(0.018)
Roads Paved (% of total)	-0.004	-0.002	-0.004	0.0004
	(0.004)	(0.004)	(0.005)	(0.005)
Inflation	-0.033*	-0.050***	-0.031	-0.039*
	(0.018)	(0.016)	(0.019)	(0.020)
Constant	-11.992***	-7.686***	-5.284*	-12.137**
	(3.563)	(2.739)	(2.881)	(4.609)
R^2	0.82	0.85	0.79	0.76
Observations	90	90	90	90

Note. * p<0.1; ** p<0.05; *** p<0.01. Standard Errors in Parentheses.

Table 4. Institutions and components of economic and social globalization

Independent Variable is Log(Capital Flows per capita)				
	(1)	(2)	(4)	(5)
log(GDP per capita)	0.596***	0.356*	0.305	0.484**
	(0.182)	(0.203)	(0.218)	(0.206)
Institutions	0.060	0.124***	0.078	0.121***
	(0.039)	(0.043)	(0.050)	(0.029)
Institutions x Trade Openness	-0.0003			
	(0.001)			
Trade Openness	0.057			
	(0.039)			
Institutions x Trade Restrictions		-0.001**		
		(0.001)		
Trade Restrictions		0.134***		
		(0.048)		
Institutions x Info. Flows			-0.0001	
			(0.001)	
Info. Flows			0.046	
			(0.050)	
Institutions x Cultural Prox.				-0.002**
				(0.001)
Cultural Prox.				0.120***
				(0.045)
Education	0.137	-0.066	-0.099	0.009
	(0.169)	(0.181)	(0.191)	(0.197)
Agriculture (% of GDP)	-0.019	-0.031*	-0.033*	-0.037**
	(0.016)	(0.017)	(0.018)	(0.017)
Roads Paved (% of total)	0.003	-0.003	-0.003	0.001
	(0.004)	(0.005)	(0.005)	(0.005)
Inflation	-0.048***	-0.045**	-0.033*	-0.033*
	(0.018)	(0.019)	(0.020)	(0.020)
Constant	-6.399**	-7.426**	-4.186	-6.886***
	(2.759)	(3.055)	(3.461)	(2.359)
R^2	0.82	0.8	0.78	0.77
Observations	90	89	90	90

Note. * p<0.1; ** p<0.05; *** p<0.01. Standard Errors in Parentheses.

To test the robustness of this finding, the first column of Table 3 adds in education, agriculture as a percent of GDP, paved roads, and inflation as control variables. The results for the interaction effect of institutional quality and globalization are unchanged; however, with the addition of these variables log GDP is no longer significant. This regression suggests that the interaction effect of institutions and globalization, along with the selected control

variables, are important factors to consider in solving the Lucas paradox.

Table 5. Cultural proximity and components of institutional quality

Independent Variable is Log(Capital Flows per capita)				
	(1)	(2)	(3)	(4)
log(GDP per capita)	0.500**	0.597***	0.487**	0.498**
	(0.198)	(0.223)	(0.211)	(0.211)
Cult. Proximity	0.079***	0.07	0.059*	0.114***
	(0.030)	(0.046)	(0.031)	(0.039)
Cult. Proximity x Legal Property	-0.001**			
	(0.000)			
Legal Property	0.079***			
	(0.015)			
Cult. Proximity x Monetary Inst.		-0.001		
		(0.001)		
Monetary Inst.		0.012		
		(0.019)		
Cult. Proximity x Tariffs			-0.001	
			(0.000)	
Tariffs			0.056***	
			(0.014)	
Cult. Proximity x Regulation				-0.001**
				(0.001)
Regulation				0.083***
				(0.023)
Education	-0.011	0.091	0.017	0.008
	(0.188)	(0.224)	(0.196)	(0.199)
Agriculture (% of GDP)	-0.037**	-0.044**	-0.036**	-0.044**
	(0.017)	(0.019)	(0.018)	(0.017)
Roads Paved (% of total)	-0.003	0.002	0.002	0.003
	(0.005)	(0.005)	(0.005)	(0.005)
Inflation	-0.040**	-0.053**	-0.042**	-0.043**
	(0.018)	(0.021)	(0.020)	(0.020)
Constant	-3.806*	-1.735	-2.997	-4.888**
	(1.972)	(2.398)	(1.991)	(2.179)
R^2	0.80	0.73	0.77	0.76
Observations	90	90	89	90

Note. * p<0.1; ** p<0.05; *** p<0.01. Standard Errors in Parentheses.

Because the index of globalization is an extremely broad measure with several sub-components, the rest of Table 3 and Table 4 regress the components of the globalization index on capital flows. Each regression includes log GDP per capita, a component of globalization, the summary index of institutional quality, and the interaction term between globalization and institutional quality. The globalization index is first broken into economic, social, and political globalization sub-groups, then broken down into the component metrics that make up each of the subgroups. The control variables added to the first regression in column 1 of Table 3 are included in every subsequent estimation.

The economic, social, and political subgroups are presented in columns 2-4 of Table 3. Similar to the results found for the broad index, the partial effects of economic, social, and political globalization on capital flows are all found to be decreasing with institutional quality. The relationships are all remarkably similar, institutions and globalization are individually positive and significant, and their partial effect suggests decreasing capital flows with higher levels of institutional quality. The similarity further confirms the results found in Table 2. The results also confirm the need to study globalization as more than a strictly economic variable. Columns 3 and 4 of Table 3 show that even when economic aspects of globalization are not considered, it is still an important factor in determining capital flows. Out of all three sub-components, the regression including social globalization is the

only one without a significant coefficient on log GDP, suggesting the social component of globalization could be the most important factor to resolving the paradox.

In an attempt to isolate the factor responsible for the results in Table 3, Table 4 runs the same regressions with the sub-components of economic and social globalization. Columns 1 and 2 present economic globalization's components, while columns 3 and 4 present those for social globalization. Although the coefficient on log GDP remains positive and significant on most regressions (Note 12), trade restrictions and cultural proximity have the same significant interaction effects with institutions as found in Tables 2 and 3 (Note 13). These findings suggest that becoming more culturally accessible to westernized countries and decreasing trade restrictions are both key actions that can bring capital into a country. Additionally, the significance of these sub-factors of the globalization index confirms that the results found in Tables 2 and 3 are not based on a spurious interaction between the broad measures of institutions and globalization. The results for trade restrictions are, again, largely expected and pre-established in Okada (2013); however, the results for cultural proximity are an addition to the literature.

Table 5 further analyzes these results by unbundling the institutional quality variable. Several prior studies have proposed that institutional quality indexes could be too broad to capture the effect of institutions on the Lucas Paradox. Both Okada (2013) and Snyder (2012) investigate the effects of sub-components of institutional quality on capital flows. We investigate four sub-components of the broad measure of institutional quality: sanctity of legal property, quality of monetary institutions, degree to which tariffs are used, and regulation of established policies. The only significant interaction effects of cultural proximity and the unbundled institutions are with legal property (column 1) and regulation (column 4), suggesting the enforcement and regulation of institutions along with the sanctity of property are both important factor for international capital flows.

4. Conclusions

Examining the relationship between three dimensions of globalization and capital flows reveals a positive relationship between globalization (and its components) and capital flows. In addition to the main result, our analysis generates several additional findings worthy of further investigation. First, when looking at the interaction term between globalization and institutional quality, the partial effect suggests decreasing capital flows with higher levels of institutional quality. An extension of this study could divide the sample into developed and developing countries and see if the results would remain the same. Second, among the components of economic and social globalization, trade restrictions and cultural proximity play a very important role. These findings suggest that becoming more culturally accessible to westernized countries, and decreasing trade restrictions are both key actions that can bring capital into a country. Finally, social and economic globalization interact with institutional quality in a way that could provide a solution to the Lucas Paradox, although more evidence is needed to conclude the existence of a robust relationship.

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Notes

Note 1. The views expressed in this article are those of the individual authors and do not necessarily reflect the views of the Federal Reserve Bank of St. Louis, the Board of Governors, or the Federal Reserve System.

Note 2. For explanations based on differences in fundamentals, see King and Rebelo (1993), Razin and Yuen (1994), Gomme (1993), and Tornell and Velasco (1992); for international market imperfections, see Gertler and Rogoff (1990) and Gordon and Bovenberg (1996).

Note 3. The acronym KOF from Konjunkfurforschungsstelle, the institute where the index is published and can be downloaded: http://kof.ethz.ch/

Note 4. See Kacowicz (1999).

Note 5. See McDonald's "Getting to Know Us" Webpage http://www.aboutmcdonalds.com/mcd/our_company.html

Note 6. When we break down the globalization index into its component variables, we drop the broader level of the index and employ its sub-components in our regression model instead. For example, we start with the broadest level of globalization, then instead of including the broad index, we include the sub-indexes of economic, political, and social globalization.

Note 7. For a study of the interaction effects between economic globalization and the sub-components of institutional quality, see Okada (2013).

Note 8. Alfaro, Kalemli-Ozcan, and Volosovych (2008) give several reasons why panel data may be inappropriate for studying institutional quality and capital flows. Primarily, institutional quality and capital flows are thought to change slowly over time, and using averages in place of panel data helps reduce concerns of endogeneity.

Note 9. We use log averages of capital flows per capita and GDP because 1) the level of average capital flows per capita is very skewed and taking logs makes it more normal; 2) Only two countries have negative average capital flows over the years (Libya and Mauritania) and we drop them from the analysis.

See http://data.worldbank.org/news/new-country-classifications for more information on country income classifications.

Note 10. See http://data.worldbank.org/news/new-country-classifications for more information on country income classifications.

Note 11. To verify the robustness of this finding, the analysis in Table 2 was repeated with an alternative measure of institutional quality. The results were unchanged so they are not presented here, but are available from the authors upon request.

Note 12. Although the coefficient on GDP is not significant in column 3 of table 4, we don't focus on this regression because the interaction effect of information flows and institutional quality is not significant.

Note 13. Because trade restrictions is used in an index to represent economic globalization, it is calculated as an inverse variable to be positively correlated with globalization. In other words, higher levels represent lower trade restrictions. Cultural proximity includes factors like the number of McDonald's Restaurants per capita, and the Number of Ikea per capita. For more information, see http://globalization.kof.ethz.ch./media/filer_public/2014/04/15/definitions_2014.pdf.

Appendix A1. Countries Included (113)

Albania	Ecuador	Kuwait	Romania
Argentina	Egypt, Arab Rep.	Sri Lanka	Russian Federation
Australia	Spain	Lithuania	Rwanda
Austria	Estonia	Latvia	Senegal
Burundi	Finland	Morocco	Singapore
Belgium	Fiji	Madagascar	Sierra Leone
Benin	France	Mexico	El Salvador
Bangladesh	Gabon	Mali	Slovak Republic
Bulgaria	United Kingdom	Malta	Slovenia
Bahrain	Ghana	Myanmar	Sweden
Bahamas, The	Greece	Mauritius	Syrian Arab Republic
Belize	Guatemala	Malawi	Chad
Bolivia	Guyana	Malaysia	Togo
Brazil	Honduras	Niger	Thailand
Barbados	Croatia	Nigeria	Trinidad and Tobago
Botswana	Haiti	Nicaragua	Tunisia
Canada	Hungary	Netherlands	Turkey
Switzerland	Indonesia	Norway	Tanzania
Chile	India	Nepal	Uganda
China	Ireland	New Zealand	Ukraine
Cote d'Ivoire	Iran, Islamic Rep.	Oman	Uruguay
Cameroon	Iceland	Pakistan	United States
Congo, Rep.	Israel	Panama	Venezuela, RB

Colombia	Italy	Peru	South Africa
Costa Rica	Jamaica	Philippines	Zambia
Cyprus	Jordan	Papua New Guinea	Zimbabwe
Germany	Japan	Poland	
Denmark	Kenya	Portugal	
Algeria	Korea, Rep.	Paraguay	

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Does Entrepreneurship and Corporate Social Responsibility Act as Catalyst towards Firm Performance and Brand Value?

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Abstract

This paper aims at exploring the influence of corporate social responsibility (CSR) on firm performance and brand value for the companies covered within the top list of 50 U.S. companies for Social Responsibility drawn up by the Boston College Center for Corporate Citizenship and Reputation Institute, over the period 2008-2011. Moreover, this paper attempts to relate CSR with entrepreneurship, respectively Corporate Social Entrepreneurship and Corporate Entrepreneurship. Firm performance was measured both through accounting-based (return on assets and return on equity) and market-based firm performance measures (earnings per share). Brand value was proxied through Brand Finance data. CSR was reflected through the index developed by Carroll School of Management's Center for Corporate Citizenship at Boston College in conjunction with the Reputation Institute. By employing panel data regression models, there resulted a positive and statistically significant relationship between CSR and firm performance as proxied by return on assets. However, we notice the lack of any statistically significant relationships between CSR and return on equity, as well as CSR and earnings per share. Furthermore, there was found no association between CSR and brand value.

Keywords: entrepreneurship, corporate social responsibility, firm performance, brand value, panel data regression models

1. Introduction

The increased attention of the concept of corporate social responsibility (hereinafter 'CSR') determined many scholars and researchers to study this notion both empirical and theoretical (e.g. McWilliams & Siegal, 2000; Hillman & Keim, 2001; Tsoutsoura, 2004; Porter & Kramer, 2006). CSR has a long history and it is also well known under many different concepts such as 'corporate philanthropy, corporate citizenship, business ethics, stakeholding, community involvement, corporate responsibility, socially responsible investment, sustainability, triple bottom line, corporate accountability, and corporate social performance' (Silberhorn & Warren, 2007, p. 353). The role of business is to make profit and to maximize its shareholders wealth (Friedman, 1970), to create or to increase company value not only for its shareholders, but for the society as well, in such way win-win proposition will manifest for both companies and society. And this is actually CSR - a long term business development and an innovative strategy where opportunities are ready to be discovered. Through CSR practices, including the entrepreneurship, companies benefit from competitive advantages (Porter & Kramer, 2006), increase their market share and shareholder value, enhance reputation and brand value (Schaltegger & Burritt, 2006), reduce risk and costs of operations (Heal, 2005), increase employees productivity, moral, and recruitment (Turban & Cable, 2003), differentiation within the competitive markets, consumer perception on products and services (Sen & Bhattacharya, 2001), company reputation, and corporate financial performance (Waddock & Graves, 1997; Tsoutsoura, 2004; Dumitrescu & Simionescu, 2014). These benefits are related with stakeholder satisfaction such as shareholders (or companies owners), employees, NGOs, customers, suppliers, local community, companies competitors, government, mass media, and society-at-large (Carroll, 1991).

However, nowadays companies face many challenges within very competitive markets trying to develop sustainable and renewal businesses. In the last years, many companies have adopted CSR practices on a voluntary basis to strengthen and to promote the company brand value, to increase their performance, and to benefit from other CSR advantages. The company activity footprint in a society need to be seen as a responsibility and an integral part of the business decision processes. CSR could be considered a pillar of the

company since through its practices it represents a commitment to its stakeholders, being with an ear on the ground, and with the other one on company all needs. Therefore, CSR became a guide for entrepreneurs, since entrepreneurship seeks opportunities, potential new markets, innovation, and new strategies, trying to make the most of it, thus answering withal at company and stakeholders' needs. The link between CSR and entrepreneurship became essential, as well as the CSR concept to be narrowed and to be better controlled in order not to fall into the cost trap and step more into the light the concept of CSR. In this paper, we propose the split of CSR into Corporate Social Entrepreneurship (for CSR activities) and Corporate Entrepreneurship (for strategies).

A survey made by McKinsey (2010) showed that 76% of companies executives consider that CSR positively influences their companies financial performance and shareholder value in the long run and 55% agreed that sustainability supports their companies to build a strong(er) brand (McKinsey, 2010). A company brand value represents a leverage for the competitive advantage on the market where it operates, thus allowing for the company to increase its capital and the quality or the number of trading partners. A company brand represents its uniqueness, as well as its identification on the market. By the instrumentality of CSR activities customer's loyalty toward a brand increases and reputation improves, as well as the company financial performance (Maignan et al., 1999). These benefits had been considered in many studies important key factors towards development of different CSR concepts. Researchers have tried to examine in their studies the effect of CSR on brand and failed or found inconclusive results (Torres et al., 2012). We argue that once a company integrates CSR activities in its core business strategies and is taken seriously, not as a fashion, CSR becomes a part of the company's brand, therefore increasing it.

The aim of this study is to empirically analyze the companies covered within the top list of 50 U.S. companies for Social Responsibility drawn up by the Boston College Center for Corporate Citizenship and Reputation Institute, over the period 2008-2011, by employing panel data regression models. We expect to find no relation between brand and CSR because CSR itself became part of companies brand value, but we expect to find a positive and significant relation between CSR and company performance. However, as markets evolve rapidly, we notice the fact that the stakeholder's preferences, demands, and trends as regards products and/or services are changing all the time. Thus, CSR became a valuation framework for companies being able to respond their stakeholders' needs which broaden over time, with broadening the concept of CSR. As mentioned in the literature, CSR 'has grown from a narrow and often marginalized notion into a complex and multifaceted concept' (Cochran, 2007). Although there is not yet a general accepted definition and framework of CSR, it (the CSR) 'won the battle of ideas' (Crook, 2005) and many companies have included CSR practices in their business strategies, thereby realizing the importance of it. In order to narrow CSR and to control much better CSR activities and strategies, as it was mentioned previously, we propose the split of CSR into Corporate Social Entrepreneurship (hereinafter 'CSE') for CSR activities and Corporate Entrepreneurship (hereinafter 'CE') for strategies. Therefore, this two types of concepts are addressed to entrepreneurs that make company's business strategies during which they (the companies) grow and became profitable (respectively CE) and to entrepreneurs that apply the strategies of CE and answer at stakeholders needs, requirements and also they promote company brand and add value to it (respectively CSE). In fact, from our knowledge this is the first paper that attempts this subject.

This paper continues to describe in the next section the two concepts of CSE and CE, connecting them with CSR and brand, their limitations and applicability; section 3 presents the data and the methodology of the study, whereas in section 4 the empirical results are discussed. Final section concludes the paper.

2. Literature Review

The point of tension within literature on CSR is due because of lack of a clear definition, standards, framework, and principles of CSR. Although researchers have examined CSR outcomes in many studies using different models and variables, their results were either criticized or supported by other researchers. Through all this research there has been tried to find a common ground regarding CSR methodology, framework, and definition. Even today there is not a consensus (Hopkins, 2004). Therefore, companies may well start to rise the question 'why bother?'. CSR is a commitment to its stakeholders, is a concept through which companies incorporate social and environmental issues into their business strategies, furthermore reflecting the relations with companies stakeholders on a voluntary basis. CSR became a necessary strategy and a guide also for entrepreneur to develop a sustainable and renewal business.

As mentioned earlier, stakeholders needs, demands, and trends as regards products and/or services evolve and change over time, as well as the companies need to satisfy their stakeholders. Therefore, CSR activities have

been extended on widespread agreement between companies and its stakeholders. The increase of CSR activities through which companies are trying to satisfy their stakeholders will not bring responsible changes if through these activities the needs of both companies and stakeholders will not be satisfied. CSR activities may bring benefits to the companies, but once these activities are covering extended areas and companies will try to answer them might fall into the cost trap. So that to avoid this trap, to satisfy both stakeholders and companies, and to answer each needs, we propose that CSR should be split into CSE and CE. CSE and CE are not different forms of CSR, but rather process in approaching and accelerating toward CSR journey which will advance CSR development, thus bringing it more to the light. In order to understand the importance of CSE and CE and how these links in the chain of CSR activities, there will be described one by one, alongside their use.

Dees (1998b) defined CSE as the 'innovative activity with a social purpose in either the private or nonprofit sector, or across both' and 'CSE are one special breed of leaders, and they should be recognized' because 'we need social entrepreneurs to help us find new avenues toward social improvement as we enter the next century' (Dees, 1998b). Hohnen (2007) refers to CSE as a 'radar' through which CSR is being successful because CSE has the capacity to solve complex problem, it is credible, committed to a collective purpose (Waddock & Post, 1991), builds long-term relations with clients (Leadbeater, 1997), seeks new opportunities and everlasting innovation (Dees, 1998a), and is creative (Shaw et al., 2002).

Besides, the aims of CSE are to *create social value* through innovation and entrepreneurial business models, its purpose is to comprehensive understand, prevent, and predetermine how companies can continue to operate whenever an important transformation or change occurs. The potential market for CSE is vast because of the broad variety of social needs remained unsatisfied by the existing markets and institutions. CSE generates great value when it provides the basic of the humanitarian needs (for example *medicines, provisions, helping people with special disabilities or food*, etc.) whenever the state doesn't provide these services (Smallbone et al., 2001). By means of CSE, the companies *can discover new* and efficient ways to generate *products, services, or structures* that can both satisfy the community social needs and company to achieve sustainable development. Therefore, CSE relates to philanthropic activities directed to external stakeholders such as community, environment, NGO, customers, employees, suppliers, and government. Thus, CSE *integrates continuously social and business value of the company as central principle*, communicates with stakeholders in such ways it is understood how social activities are related with their needs and interests, the key focus is on company brand value, it is fundamental for advancing CSR, and ensures that the words 'social responsibility' are translated into action.

Corporate Social Entrepreneurship are neither managers nor Corporate Entrepreneurship, they are in between in order for the company entrepreneurship to be innovative and go further than traditional managerial approach, as well as to be linked with external stakeholders. They are the external entrepreneurs as they link the company with the innovation (products and/or services) and potentially new markets through external stakeholders. CSE is with the ear on the ground, while CE is a catalyst for change, for innovation, and based on CSE social activities new business models are created or renewed. According to Zarah (1996), CE 'includes radical product innovation, risk taking, and pro-activeness [...], includes business venturing and intrapreneuring'. CE is more toward companies leverage through innovation and renewal business strategy. In the case of CE, innovation is about creating and introducing new products and/or services on the market and CSE innovation regards the external stakeholders social needs. Therefore, both of them are innovative and as Campbell (2007) said, CSR integrates social activities (CSE) in the company business operations (CE) in such (innovative) way stakeholders will not be affected. As mentioned above, CSE and CE are not different forms of CSR, they 'push' CSR to the next level of development. For CSR to step more into the light, the link between CSE and CE needs to recognized.

Both CSE and CE, like all entrepreneurship, are about innovation, changes, identifying new ways of doing business, new strategies, but are combined on a voluntary basis (being a characteristic of CSR) with the company willingness and stakeholders economic and social needs, such that both stakeholders and company can benefit. It is a redesign entrepreneurship. As some markets became saturated and others are not yet explored or not enough explored by companies or institutions, many companies turn their attention toward corporate venture. Corporate venturing is a process through which new businesses are created in the existing markets where the company is already competing or in a new market. Innovation and corporate venturing create and introduce new products and/or services on the market, but corporate venturing implies CE effort to create new or/to rethink the strategy business model. Strategic renewal of the company business model relies on the identification of opportunities and their exploitation in such ways company value is created and a sustained competitive advantage is achieved. But, in order to manifest this fact, the company needs to have a strong relation with all its stakeholders,

especially with the external ones, to be with an ear on the ground, and with the other one on company all needs (increase company financial performance, competitive advantages, market share, create value, company brand, reputation, and image, etc). Thus, CE scope is wide in a corporation and in order to not lose control and for the company to survive, to become transparent, to succeed in an increasingly competitive market, the relation with CSE is crucial.

The CE are the internal entrepreneurs and are innovative, down to business and risk taking, they create value for the company, but they don't do legwork as CSE does through social activities with external stakeholders. CSE relation with external stakeholders is strong as mentioned above. CSE spots the trend and needs in the existing market or new market, whereas CE acts as catalyst by rethinking or changing the company strategy, innovative strategies. CE is a combination of managers and researchers of the company products and/or services portfolios. Taken together, CE and CSE can lead the company to innovative strategies, renewal business models, in such ways the company will differentiate from its competitors and will achieve sustainable developement (see Figure 1).

CSR success relies on CSE which in turn depends on CE. For CSR to gain momentum, the bridge should be built between CSE and CE. Innovation drives CSE and CE. CSR with this two innovative links in the chain will move toward advanced development and will become a 'lethal weapon', furthermore generating sustained brand for the company and growth in general. Some companies have already integrated into their business strategies either CSE or CE under the label of CSR activities, whilst some of it even linked both of them to CSR. Companies like Cisco, Motorola, and Philips successfully integrated CE into their business models, while Timberland Company and Starbucks Coffee are already considered pioneers in the CSE practice (Austin & Reavis, 2002). For this reason we selected for our sample all the companies covered within the top list of 50 U.S. companies for Social Responsibility drawn up by the Boston College Center for Corporate Citizenship and Reputation Institute.

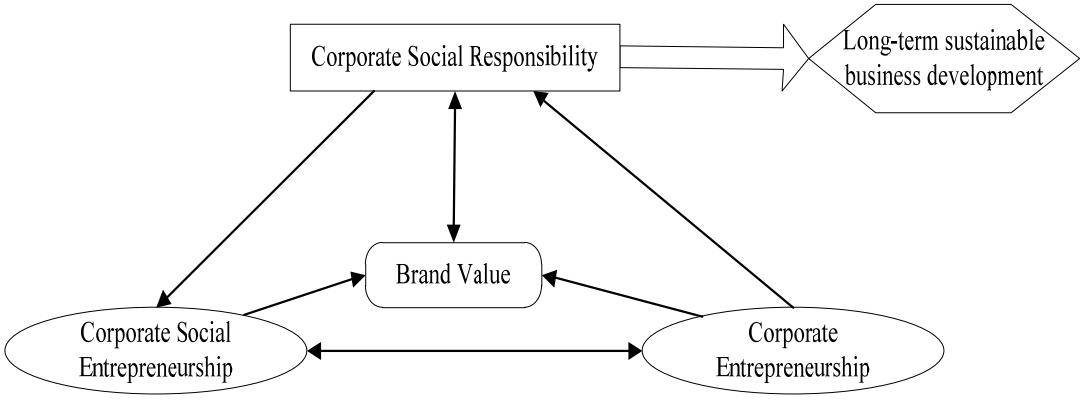

Figure 1. Corporate social responsibility, corporate social etreprenership and corporate entrepreneurship

Source: Authors' processing.

Therefore, as mentioned above, CSE and CE are not different forms of CSR. Taking into consideration that the key focus of CSE is company brand value, expressed into action of the words 'social responsibility' and CE focuses through innovative business and strategies on company performance, the following hypotheses are made:

H_0 There is no relation between CSR and company brand value.

H_1 There is a positive relation between CSR and company financial performance.

3. Data and Empirical Research Methods

3.1 Sample Selection and Variables' Description

Our initial dataset included all the companies covered within the top list of 50 U.S. companies for Social Responsibility drawn up by the Boston College Center for Corporate Citizenship and Reputation Institute, over the period 2008-2011, respectively 55 distinct companies. However, we dropped four companies from the primary sample due to non-listing on the New York Stock Exchange (NYSE) or on the National Association of Securities Dealers Automated Quotations (NASDAQ Stock Market). Therefore, our final sample comprises 51

companies with the following distribution: 38 companies in 2008, 45 companies in 2009, 38 companies in 2010, respectively 32 companies in 2011, summing up 153 statistical observations. Moreover, the selected companies belong to a wide range of activity sectors as follows: consumer cyclical, consumer defensive, consumer goods, financial services, healthcare, industrials, services, technology.

Table 1 provides the definitions and measurement of all the variables employed within the empirical research.

Table 1. Definitions and measurement of variables

Variables	Definition and measurement
Variables regarding firm performance	
ROA	Return on assets. The calculation is net income divided by average total assets.
ROE	Return on equity. The calculation is return on assets times financial leverage.
EPS	Earnings per share. The calculation is the difference between net income and preferred dividends divided by weighted average number of common shares outstanding.
Variables regarding brand value	
Brand	Brand value according to Brand Finance.
Variables regarding corporate social responsibility	
CSRI	Corporate Social Responsibility Index (CSRI), developed by Boston College Center for Corporate Citizenship and Reputation Institute.
Firm-level control variables	
Size	Firm size, as annual average number of employees (logarithmic values).
Lev	Leverage ratio, as total debt to total assets.
Gr	Sales growth, as the relative increase of sales from the previous year (%).
Years	Number of years since listing on the New York Stock Exchange (NYSE) or on the NASDAQ Stock Market (logarithmic values).

Source: Authors' processing.

Thus, we have selected the following categories of variables: variables regarding firm performance, variables regarding brand value, variables regarding corporate social responsibility, and firm-level control variables. Firm performance is proxied both through accounting-based (return on assets and return on equity) and market-based firm performance measures (earnings per share). In fact, Schaltegger et al. (2006) noticed that there is a little consensus about the best way to capture firm financial performance. Accordingly, accounting measures emphasize past performance, whereas market measures are forward-looking and are viewed as pointing out estimates about the net present value of expected future earnings. ROA reveals how much profit a company produces on its asset base; the better the company, the more profit it engenders as a percentage of its assets. ROE shows how much profit a firm generates on the amounts shareholders have invested in the company. EPS depicts the company's net income expressed on a per share basis, otherwise how much profit a firm has registered per share. The source of financial data is represented by the website of Morningstar, Inc., leading provider of independent investment research in North America, Europe, Australia, and Asia.

As proxy for brand value we have collected for our selected companies the values provided by Brand Finance through its website. However, there are seven companies for which we did not find data for brand value for neither year of research. Moreover, there are cross sections for which we did not gather data for brand value corresponding to all years of research due to lack of data. Founded in 1996, Brand Finance Plc is the world's leading brand valuation consultancy which give advice to strongly branded organisations on how to maximise their value through the effective management of their brands and intangible assets. Brand Finance computes brand value based on the Royalty Relief methodology which determines the value a company would be willing to pay to license its brand as if it did not own it. The previously mentioned approach assumes the estimation of the future revenue assigned to a brand and computing a royalty rate that would be charged for the use of the brand. Thus, there are passed the following steps in this process:

- Compute brand strength on a scale of 0 to 100, this score being known as the Brand Strength Index. This calculation is made by using a balanced scorecard of a number of relevant attributes such as emotional connection, financial performance and sustainability, among others;
- Establish the royalty rate range for the respective brand sectors by examining comparable licensing agreements sourced from Brand Finance's extensive database of license agreements and other online

databases;

- Compute the royalty rate by applying the brand strength score to the royalty rate range;
- Set the brand specific revenues estimating a proportion of parent company revenues attributable to each specific brand and industry sector;
- Determine forecast brand specific revenues based on a function of historic revenues, equity analyst forecasts and economic growth rates;
- Establish the implied royalty charge for use of the brand by appling the royalty rate to the forecast revenues;
- Discount post tax the forecast royalties to a net present value which represents current value of the future income attributable to the brand asset.

We gathered the values related to the Corporate Social Responsibility Index (CSRI) as proxy for CSR, developed by researchers at the Carroll School of Management's Center for Corporate Citizenship at Boston College in conjunction with the Reputation Institute. Founded in 1985, the Carroll School of Management Center for Corporate Citizenship at Boston College is a membership-based knowledge center. Besides, established by Dr. Charles Fombrun and Dr. Cees van Riel in 1997, Reputation Institute is the world's leading reputation-based advisory firm.

The CSRI ranking is determined by how the public perceives a firm as regards three dimensions: *citizenship*, the firm being a good corporate citizen which supports good causes and does not harm the environment (Does the company contribute positively to its surrounding community in a socially and environmentally responsible fashion?), *governance*, the firm being a responsibly-run firm which behaves ethically and is open and transparent in its business dealings (Is the company business run in a fair and transparent fashion? Do stakeholders associate the company with high ethical business standards?), *workplace*, the firm being an appealing place to work which treats its employees well (Are employees treated fairly and paid a decent wage? Does the company invest in developing employee skill sets and career opportunities?). The scores fall between 0-100, moreover there existing the following tiers: *excellent/top tier* (above 75), *strong/robust* (66-75), *average/moderate* (56-65), *weak/vulnerable* (45-55), *poor/lowest tier* (below 45).

Furthermore, several control variables which may influence firm performance are included in the empirical research. To account for firm size we took the annual average number of employees (logarithmic values). Firm size is an important control variable because size may affect the firm ability to undertake CSR actions. According to Crisóstomo et al. (2011), smaller companies register lower capacity of sustaining a more active behavior towards CSR relative to bigger companies that usually have more infrastructure as well as higher cash flow levels. However, as a company expands it becomes more visible and more responsible with different stakeholders' demands. Besides, size is thought to enhance a firm's ability to sustain a competitive advantage when economies of scale, economies of scope, or learning effects are present (Roberts & Dowling, 2002). The firm' risk is another factor that may influence corporate social activities. Based on previous studies (Sharfman & Fernando, 2008; El Ghoul et al., 2011) a good CSR performance lessen the cost of capital determined by the reduction of the firm's risk and a larger firm's investor base. In addition, the companies with a good CSR performance decrease information asymmetry (Dhaliwal et al., 2011; Cho et al., 2012). Company's leverage (Lev), measured by the ratio of total debt over total assets, is used as an approximation for risk. We also control for sales growth, as the relative increase of sales from the previous year since customers are more likely to purchase products of firms that employ CSR, assuming that they are aware of it, thus leading to increased sales growth (Servaes & Tamayo, 2013). Also, we will control for the age of the company measured through the number of years since it has been listed on the NYSE or on the NASDAQ Stock Market (logarithmic values) because more recently listed firms are likely to be faster-growing and perhaps more intangible asset-intensive (Black et al., 2006).

3.2 Econometric Models

In order to examine the relationship between CSR and firm performance, as well as CSR and brand value, we will employ panel data regression models. Previous researchers (Gujarati, 2003) noticed that there are several advantages of panel data over cross-section or time series data as follows: the techniques of panel data estimation can take such heterogeneity explicitly into account by allowing for individual-specific variables; panel data give 'more informative data, more variability, less collinearity among variables, more degrees of freedom and more efficiency'; panel data are better suited to study the dynamics of change; panel data can better detect and measure effects that simply cannot be observed in pure cross-section or pure time series data; panel data enables

us to study more complicated behavioral models; panel data can minimize the bias that might result if we aggregate individuals or firms into broad aggregate.

However, a panel data regression is different than a regular time-series or cross-section regression since it has a double subscript on its variables (Baltagi, 2005):

$$y_{it} = \alpha + X'_{it}\beta + u_{it}\ i = 1, \ldots, N;\ t = 1, \ldots, T \quad (1)$$

where i emphasizes the companies from the final sample, whereas t denotes the time, respectively the period 2008-2011. Otherwise, the i subscript describes the cross-section dimension, whilst t depicts the time-series dimension. Furthermore, α is a scalar, β is K × 1 and X_{it} is the it^{th} observation on K explanatory variables.

Besides, most of the panel data applications employ a one-way error component model for the disturbances, therefore considering:

$$u_{it} = \mu_i + \nu_{it} \quad (2)$$

where μ_i describes the unobservable individual-specific effect, whereas ν_{it} depicts the remainder disturbance.

Specifically, the estimated equations are as follows:

$$Firm\_performance = constant_1 + \alpha_{i1}CSRI_i + \beta_{i1}X_i + u_{i1} \quad (3)$$

$$Brand\_value = constant_2 + \alpha_{i2}CSRI_i + \beta_{i2}Z_i + u_{i2} \quad (4)$$

where the variables regarding firm performance (ROA, ROE, EPS) and the variables regarding brand value (Brand) denotes the dependent variables. The term labeled 'constant' (often labeled the 'intercept') denotes the expected mean value of the measured variable when all the explanatory variables equals zero. The terms X_i and Z_i are the control variables, whilst $u_{i1}$and u_{i2} are error terms.

4. Empirical Results

4.1 Descriptive Statistics

Table 2 presents the descriptive statistics of all the variables covered within empirical research. We notice the fact that the mean value corresponding to CSRI is 73.8. Thus, the selected companies are in mean strong/robust as regards CSR, based on the tiers established by Carroll School of Management's Center for Corporate Citizenship at Boston College and Reputation Institute.

Table 2. Descriptive statistics

Var	Valid N	Mean	Median	Minimum	Maximum	Std.Dev.
ROA	153	8.1	7.28	-32.230	26.0	7.6
ROE	151	22.7	18.69	-213.070	107.4	30.7
EPS	153	106.0	2.19	-278.260	6215.0	705.4
CSRI	153	73.8	73.70	66.400	82.7	2.9
Brand	109	14178.7	10171.00	1421.000	45441.0	11732.1
Size	153	105001.9	79800.00	1152.000	426000.0	104340.9
Lev	153	0.6	0.62	0.111	1.5	0.2
Gr	153	0.1	0.04	-0.621	1.0	0.2
Years	151	44.3	39.00	1.000	118.0	27.9

Source: Author's computations.

Note. The description of the variables is provided in Table 1.

Table 3 reveals the correlation matrix. The Pearson product-moment correlation coefficient denotes the strength of the linear relationship between two variables. We distinguish the fact that CSRI is positively correlated with ROA (p = .006) and sales growth (p = .003), as well as negatively correlated with leverage (p = .003). Furthermore, brand value is positively correlated with ROA (p = .000), firm size (p = .001), and sales growth (p = .012). From the strength of correlation point of view, we notice the lack of very high correlations (0.90 to 1.00) or high correlations (0.70 to 0.89) between the selected variables. We remark a moderate correlation (0.50 to 0.69) between ROA and ROE (p = .000), but these measures of firm performance will be used as dependent variables within distinct regression models. However, the most variables are low correlated (0.30 to 0.49) or there is a little correlation (0.00 to 0.29). Therefore, the undesirable situation of collinearity or multicollinearity is lessened since the correlations among the independent variables are not strong.

Table 3. Correlation matrix

Var	ROA	ROE	EPS	CSRI	Brand	Size	Lev	Gr	Years
ROA	1	**0.579**	-0.107	**0.263**	**0.352**	**-0.237**	**-0.334**	**0.373**	-0.057
		(.000)	(.269)	**(.006)**	**(.000)**	**(.013)**	**(.000)**	**(.000)**	(.558)
ROE	**0.579**	1	-0.090	0.104	0.080	-0.064	**0.302**	0.104	**0.214**
	(.000)		(.353)	(.282)	(.409)	(.511)	**(.001)**	(.284)	**(.026)**
EPS	-0.107	-0.090	1	0.046	-0.075	0.139	-0.001	0.145	-0.090
	(.269)	(.353)		(.638)	(.440)	(.151)	(.993)	(.134)	(.351)
CSRI	**0.263**	0.104	0.046	1	0.103	-0.039	**-0.283**	**0.284**	-0.120
	(.006)	(.282)	(.638)		(.285)	(.689)	**(.003)**	**(.003)**	(.212)
Brand	**0.352**	0.080	-0.075	0.103	1	**0.304**	-0.187	**0.240**	0.027
	(.000)	(.409)	(.440)	(.285)		**(.001)**	(.051)	**(.012)**	(.779)
Size	**-0.237**	-0.064	0.139	-0.039	**0.304**	1	**0.309**	-0.071	0.152
	(.013)	(.511)	(.151)	(.689)	**(.001)**		**(.001)**	(.461)	(.114)
Lev	**-0.334**	**0.302**	-0.001	**-0.283**	-0.187	**0.309**	1	**-0.200**	**0.458**
	(.000)	**(.001)**	(.993)	**(.003)**	(.051)	**(.001)**		**(.037)**	**(.000)**
Gr	**0.373**	0.104	0.145	**0.284**	**0.240**	-0.071	**-0.200**	1	-0.091
	(.000)	(.284)	(.134)	**(.003)**	**(.012)**	(.461)	**(.037)**		(.345)
Years	-0.057	**0.214**	-0.090	-0.120	0.027	0.152	**0.458**	-0.091	1
	(.558)	**(.026)**	(.351)	(.212)	(.779)	(.114)	**(.000)**	(.345)	

Source: Author's computations.

Note. The description of the variables is provided in Table 1. Marked correlations are significant at $p < .05000$. N=109 (Casewise deletion of missing data).

4.2 Regression Results

Table 4 reports the results of panel data regression models. The first estimated model have ROA as dependent variable, being found a positive relationship between CSRI and ROA.

Table 4. Regression results

Independent Var → Dependent Var ↓	**ROA**	**ROE**	**EPS**	**Brand**
Constant	-17.40457	-68.17449	-1458.267	-26163.18
	(-1.154562)	(-0.996039)	(-0.926010)	(-0.838203)
CSRI	**0.395239**†	1.135169	2.627972	-55.78258
	(1.969247)	(1.242439)	(0.125339)	(-0.146442)
Size	0.176391	-0.942685	**130.4983***	**4469.997*****
	(0.365768)	(-0.423568)	**(2.590355)**	**(3.813887)**
Lev	**-14.42659*****	10.58938	191.4177	**-16209.89****
	(-5.251102)	(0.794129)	(0.666950)	**(-2.729273)**
Gr	**7.599944***	13.32854	270.6689	**14070.09***
	(2.539634)	(0.980754)	(0.865812)	**(2.328787)**
Years	**0.060041****	**0.235979***	**-4.488104**†	48.41771
	(2.730063)	**(2.367619)**	**(-1.953509)**	(1.186501)
F-stat	**10.51357*****	**2.213614**†	**1.958129**†	**5.346289*****
R-sq	0.266075	0.071839	0.063251	0.206052
Adj R-sq	0.240767	0.039386	0.030949	0.167511
DW stat	0.748000	1.654632	0.141268	0.325983
VIF	1.362537	1.077399	1.067522	1.259528
N	151	149	151	109

Source: Authors' computations.

Note. The description of the variables is provided in Table 1. $^{\dagger}p < 0.10$. $^{*}p < 0.05$. $^{**}p < 0.01$. $^{***}p < 0.001$. The t-statistic for each coefficient is reported in parentheses.

The coefficient for CSRI is 0.395239, being statistically significant at 10% ($p < 0.10$). Therefore, by holding all other factors constant, a 1% increase in CSRI will lead to a 39.5239% increase in ROA.

The F-stat is the ratio of the explained variability, as reflected by R-squared and the unexplained variability, as reflected by 1-R-squared, each divided by the corresponding degrees of freedom. Also, the F-test is employed as a test of all of the regression coefficients jointly being 0. An ANOVA-F test is employed in order to test the overall fit of the linear regression model. Therefore, we acknowledge that the F-test is statistically significant, which means that the first model is statistically significant ($p < 0.001$). The adjusted R-squared compares the explanatory power of regression models that comprise different numbers of explanatory variables. Adjusted R-squared is used to compensate for the addition of variables to the model. Unadjusted R-squared will increase, but will never decrease, as more explanatory variables are included in the regression model, even when extra variables do insignificant to support explain the dependent variable. In fact, adjusted R-squared is corrected for the number of independent variables in the model. Moreover, the adjusted R-squared can be negative, and its value will always be less than or equal to that of R-squared. The adjusted R-squared of 0.240767 means that approximately 24.0767% of the variance of ROA is accounted for by the model.

The second and the third panel data regression models have ROE and EPS as dependent variable, but there was not established any statistically significant relationship between CSRI and firm performance. However, these econometric models are statistically significant for $p < 0.10$. Also, the explanatory power of these regression models is reduced: approximately 3.9386% of the variance of ROE is accounted for by the model, whilst 3.0949% of the variance of EPS is accounted for by the model. The fourth model has brand value as dependent variable. However, even if the model is statistically significant for $p < 0.001$, we notice the lack of any statistically significant relationship between CSRI and brand value. Howsoever, approximately 16.7511% of the variance of brand value is accounted for by the model.

As regards the statistical significance of the control variables, the results out of Table 4 provide support for a positive relationship between firm size and EPS (the third model), as well as between firm size and brand value (the fourth model), supporting the view that bigger companies tend to invest more in CSR, thus registering increased CSRI and increased brand value. Also, there was found a negative relationship between leverage and ROA (the first model), as well as between leverage and brand value (the fourth model). In addition, sales growth positively influences ROA (first model) and brand value (the fourth model). As regards the number of years since listing on the NYSE or on the NASDAQ Stock Market, we notice a mixed association with firm performance: positive association with ROA (the first model) and ROE (the second model), whilst negative association with EPS (the third model). However, the adjusted R-squared is quite low which means that about 76% of the dependent variable cannot be explained by the first model, 96% by the second model, 97% by the third model, and 84% by the fourth model.

Moreover, we performed the Durbin Watson test (DW stat) in order to capture the potential autocorrelation in the residuals out of the statistical regression analysis. The DW stat is always between 0 and 4: a value of 2 means that there is no autocorrelation in the selected sample; values approaching 0 indicate positive autocorrelation, whereas values toward 4 indicate negative autocorrelation. Therefore, only within the second model the DW stat is near 2, reflecting the lack of autocorrelation. In fact, the presence of autocorrelation emphasizes that the rest of the estimated models are missing a useful predictor variable or that it should include a time series component, such as a trend or a seasonal indicator.

Table 5. Centered variance inflation factors

Independent Var → **Dependent Var ↓**	**ROA**	**ROE**	**EPS**	**Brand**
CSRI	1.114538	1.121249	1.114538	1.156983
Size	1.097524	1.119266	1.097524	1.069415
Lev	1.282322	1.251444	1.282322	1.425994
Gr	1.166202	1.158603	1.166202	1.106509
Years	1.261303	1.234013	1.261303	1.271809

Source: Authors' computations.

Note. The description of the variables is provided in Table 1.

We used the centered variance inflation factor (VIF) as an indicator of multicollinearity, reported in Table 5. VIF is computed as 1/(1-R-squared). There is recommended a maximum VIF value of 5 (Rogerson, 2001) or even 4 (Pan & Jackson, 2008). The results shows a value of VIF near 1 fact which means the lack of multicollinearity.

5. Concluding Remarks

Since several companies, successfully integrated either corporate social entrepreneurship or corporate entrepreneurship through CSR activities into their business models, the current research examined the relationship between CSR and brand value, as well as CSR and firm performance, for the companies covered within the top list of 50 U.S. companies for Social Responsibility drawn up by the Boston College Center for Corporate Citizenship and Reputation Institute, over the period 2008-2011. Our results revealed no statistically significant relationship between CSR and brand value, thus reinforcing the conclusions of Torres et al. (2012). Therefore, for our selected companies that implemented CSR activities could became difficult to determine whether CSR influences brand value or vice-versa.

Furthermore, we found a positive and statistically significant relationship between CSR and firm performance as measured through return on assets (ROA). Thus, our results are in line with previous studies which also found a positive association between CSR and firm performance (Waddock & Graves, 1997; Tsoutsoura, 2004; Dumitrescu & Simionescu, 2014).

Further research should be employed to deeply understand the relation between CSR and entrepreneurship, respectively the bridge between corporate social entrepreneurship and corporate entrepreneurship in the chain of CSR activities.

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Systematic Risk Shift and Post-Merger Performance

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Abstract

This paper derives a theoretical model to compute the systematic risk of the acquiring firms in merger and acquisition (M&A) transactions, then examines the effects of systematic risk variation on the accuracy of estimating short-term stock performance. Using a sample of 606 US acquisitions in the period 2004-2013, I provide evidence that there exists a positive (negative) risk shift when the equity beta of the acquirer is smaller (larger) than the target's beta. Cumulative abnormal returns are negative and statistically significant in first five and ten days after the announcement date, but quickly vanish when abnormal returns are estimated with beta adjustments.

Keywords: event study, acquisition, beta, stock return, market efficiency

1. Introduction

The traditional method of event-study in economics and finance normally has a three-step procedure. First, an asset pricing model is selected to generate normal returns. Second, abnormal returns are computed as the difference between the realized returns and the expected returns without conditioning on the event taking place. Finally, the statistical significance of the null-hypothesis test is computed to judge the stock performance around the event announcement. Although the methodology is recognized as robust and valuable, many researchers have argued that the model within the traditional approach focuses mainly on the pre-event estimation, while ignoring the importance of event characteristics. For example, some event studies about the announcement effect of M&A have documented changes in the systematic risk of the acquiring firms (e.g., Frame & Lastrapes, 1998; Cyree & DeGennaro, 2002; Hackbarth & Morellec, 2008; Bozos, Koutmos, & Song, 2013). Thus, the practice of using the estimated systematic risk from the estimating window to predict normal returns in the study window without risk adjustments should be revised, especially in the event study of M&A in which the systematic risk of the acquirer changes because of the M&A characteristics.

Extensive literature advocates the existence of market inefficiency after the announcement date of an M&A and find supports for non-zero and statistically significant abnormal returns. Some researchers find significant negative abnormal performance of the acquiring firms around the announcement date of M&A (e.g., Andrade, Mitchell, & Stafford, 2001; Hackbarth & Morellec, 2008), while others document positive wealth effects (e.g., Mulherin & Boone, 2000; Moeller, Schlingemann, & Stulz, 2005; Croci, Petmezas, & Vagenas-Nanos, 2010; Duchin & Schmidt, 2013). Given these conflicting results on the performance of acquiring firms, there is an ongoing debate regarding how the aforementioned changes in systematic risk affect the conclusion about abnormal performance. In this paper, I propose a simple methodological framework that takes effects of synergy, leverage, and financing structure of the M&A deal into account when estimating the systematic risk of the acquiring firm after the announcement date. I expect that correcting for the systematic risk shifts from the estimating window to the event window will solve the problem of over-rejecting the null hypothesis that the M&A announcement has no effect on the stock performance of the acquiring firm.

Using a sample of 606 mergers of publicly traded U.S. firms from January 2004 to January 2013, I find the existence of beta shift after the announcement date; i.e., a run-up (run-down) in the beta of the acquiring firm when it has lower (higher) pre-announcement beta than its target. I also find evidence of negative and statistically significant average cumulative abnormal returns (ACAR) in first five and ten days after the announcement date, and when the systematic risk is adjusted, ACAR increase significantly from -2.7% to -1.8% in first five days, and from -6.2% to -1.6% over ten days. The null hypothesis that the event announcement has

no influence on stock returns 10 days after the announcement date is rejected only when the systematic risk of the acquiring firm is not adjusted. The suggested model clearly cannot explain the market inefficiency in first ten days; however, in a longer period, it successfully captures the reversal pattern of stock returns. This evidence highlights the exaggeration of the traditional event-study in measuring abnormal performance of the acquiring firm's stocks.

This paper contributes to the existing literature on the event study of M&A in two important dimensions. First, I derive a simple model to estimate the beta of the acquiring firm after the announcement date, which incorporates the capital structure of the merging firms, the financing structure of the deal and the expected synergy. Second, I extend the standards of the event study methodology of M&A by taking systematic risk shifts between the estimating window and the study window into account. This new approach helps to correct the stock abnormal returns recognized in the traditional approach.

The rest of the paper is organized as follows. Section 2 presents the importance of adjusting systematic risk in event studies of M&A. Section 3 derives a simple model of the acquiring firm's beta and reviews the traditional event study methodology. The data and selection criteria are described in Section 4. Section 5 reports and discusses the empirical findings. The final section offers some conclusions.

2. Literature Review

Event studies in economics and finance using a market model are pioneered by Fama et al. (1969), then MacKinlay (1997) standardizes the methodology, providing a comprehensive procedure to study event effects and solve statistics problems. The method proposed by MacKinlay is widely used in practice; however, the approach that the equity betas of securities remain fixed during the estimation window and the study window may not be appropriate in the case of M&A, where the capital structure of merging firms, the financing structure of the deal and the synergy effect of the transaction can affect the beta of the acquiring firm, distorting the conclusion about its post-event performance.

The instability of the systematic risk of the acquiring firm and its variation due to M&A characteristics are frequently discussed in the literature. Evidence of systematic risk dynamics is significantly found in the acquiring firms of merger deals within financial industry (e.g., Mishra, Prakash, Karels, & Peterson, 2005; Baele, De Jonghe, & Vander Vennet, 2007; Stiroh, 2006). Chatterjee and Lubakin (1990) posit the view that M&A transactions should reduce the systematic risk of the acquiring firm because using resources more efficiently at a larger scale will reduce its sensitivity to the systematic (macro) risks. Focarelli, Pozzolo and Salleo (2005) classify M&A deals into two groups based on their strategies, focusing versus diversifying, which have not only influences on total value but also effects on systematic risk. On one hand, if a merger deal is motived by refocusing strategy, the merged firm will dispose of the assets of the target that are not consistent with its chosen core business. As a result, the beta of the merged firm will converge to the bidder's. On the other hand, if a merger deal is motivated by diversifying strategy, the bidder's beta will be significantly affected by its mix products, assets and liabilities. Particularly, the portfolios of the assets and liabilities of the merging firms are likely to be uncorrelated, so by merging, the bidder should have lower volatility. A merger, therefore, can have different effects on the correlation between the acquirer's stock returns and the market portfolio's depending on the strategic choice of the bidder. Tucker and Guermat (2013) support that corporate events convey news to investors, and the changes of equilibrium stock price during the announcements reflect their revision about firm's future earnings.

Of course, practitioners using traditional methods to measure wealth effects around event announcement could not measure wealth changes correctly because they does not control for the changes in systematic risk properly (Cyree & DeGennaro, 2002; Phin, Reeves, & Saxena, 2013). As a results, this practice can lead to measurement biases of abnormal performance and distort the conclusion about the abnormal effects of M&A announcement. Therefore, I propose a methodological framework to compute the beta of the merged firm which takes features of M&A into account, and then to adjust its stock performance afterwards.

A few researchers consider the effect of the systematic risk shift of a firm on its stock performance after an event announcement date. In the event study of financial reform, Sorokia, Booth and Thornton (2013) add a dummy variable to capture the changes in systematic risk, as measured by beta. Their model observes a significant increase in percentage of correct event-effect recognitions when allowing for changes in systematic risk, but using many dummy variables to separate effects in pre-event, event, and post-event periods can be expensive in degrees of freedom which is needed to conduct sufficiently powerful statistical tests. In addition, the model will be plagued with collinearity problems, when short-run stock returns can have a close relation with long-run returns. The model I derive, however, is free of dummy variables, and does not require a clear separation

between short-run and long-run stock returns.

In the event study of M&A, Cyree and Degenaro (2002) generalize the traditional event approach by incorporating event-induced parameter changes, dynamic variances and firm specifics. Using EVARH to measure the changes of systematic risk before, during and after the M&A event, they show an increasing pattern of systematic risk during the event period at a decreasing rate of 1.8 then exiting the event at a new and permanent level of 1.1. Bozos et al. (2013) build a dynamic market model which allows the bivariate EGARCH characterizing the variance and covariance matrix of the error terms in estimating returns of the market and the acquirer. They find that the systematic risk of the acquiring banks rises significantly immediately after the M&A announcement and remains at a relative high level two years afterwards. They suppose that the increase of systematic risk implies a greater exposure to market movements rather than providing diversification benefits. These dynamic models can properly capture the dynamics of systematic risk, but they impose the restriction that the beta of the acquiring firm has no relation to the beta of the target, while the portfolio theory suggests that the beta of the acquirer adjusts towards the weighted average of its beta and the target's beta.

Hackbarth and Morellec (2008) develop a theoretical model of systematic risk that predicts negative (positive) shifts when the acquiring firm has a higher (lower) pre-announcement systematic risk than its target. The model describes a consistent relation between variation of systematic risk and realistic stock return behaviors; however, it highly depends on parameter calibration and does not form an empirical method to predict the beta of the acquirer or to compute the abnormal performance after the announcement date. The model I derive, however, will help to compute the systematic risk of the acquirer consistent with the portfolio theory and form an empirical methodology to test where the M&A announcement can have effects on the stock returns of the acquiring firm.

3. Methodology

3.1 Model Formulation

The model I derive is motivated by the conditional asset pricing model of Choi (2009) and the portfolio theory of Markowitz (1952), but it has some improvements because it incorporates interesting characteristics of M&A. Choi theorizes the relation between a firm's time-varying equity beta and its asset beta in his conditional CAPM model. Given that debt riskiness is abstracted, the relation between the equity beta and the asset beta of a firm is:

$$\beta_t^E = \frac{A_t}{E_t}\beta^A = (1+l_t)\beta^A \tag{1}$$

where l_t is debt-to-equity ratio (leverage ratio) at time t, β_t^E and β^A are the time-varying equity beta and asset beta of a firm, respectively. According to the portfolio theory, one can write the relation between the post-merger equity beta and the pre-merger equity beta as

$$\frac{\hat{\beta}_{mt}^E}{1+l'_{mt}} = \frac{w_1\hat{\beta}_{1t}^E}{1+l_{1t}} + \frac{w_2\hat{\beta}_{2t}^E}{1+l_{2t}}, \tag{2}$$

where $\hat{\beta}_{it}^E$ is the estimated equity beta of firm $i, i = 1,2$, $\hat{\beta}_{mt}^E$ is the predicted equity beta of the merged firm, l_{1t} represents the leverage ratio of firm i, and l'_{mt} presents the leverage ratio of the merged firm directly after the merger. The static version of equation (2) is widely applied in practice to estimate the discount rate of the acquiring firm, but it has some limitations. First, combining two firms is not equivalent to forming a portfolio of two securities. Helfat and Teece (1987) analyze a large sample of US vertical mergers and find a significant difference between the predicted beta on a portfolio basis and the real observed beta post-announcement. This finding means that vertical mergers reduce riskiness of firms by more than the portfolio diversification effects. Second, M&A could incorporate some factors that could alter the systematic risk of the acquirer; for example, synergies or tax benefits of leverage. Thus, I derive a simple model based on two propositions of Modigliani and Miller (1958) to remove these limitations.

There are two assumptions, namely that both firms have no debts, and that they will merged strategically with 100% certainty. Two firms start at time $t = 0$ and have positive payoffs $V_j^1(t)$ and $V_j^2(t)$ in state j at time t. $Y_j(t)$ denotes a vector of synergistic effects, and it is assumed to be uncorrelated with the market dynamics. If K is the number of possible states of nature at time t, then, under the absence of arbitrage opportunities, there exists a strictly positive vector $\psi \in R^K$ such that, the pre-merger discounted value of firm i with $i = 1, 2$ are:

$$V_i^{u,\tau} = (1-\tau)\sum_{j=1}^{K}\psi_j V_j^i(t) \tag{3}$$

and the discounted value of synergy gain is:

$$Y = (1-\tau) \sum_{j=1}^{K} \psi_j Y_j(t) \tag{4}$$

The pre-merger expected return of firm i and the expected synergistic rate are

$$R_i^u = \frac{E[V_j^i(t)]}{V_i^{u,\tau}} \tag{5}$$

$$R_Y = \frac{E[Y_j(t)]}{Y} \tag{6}$$

If two firms are merged, the merged firm will have a payoff of $\sum_{i=1,2} V_j^i(t) + Y_j(t)$ in the state j at time t before tax, and from (3) and (4), the discounted value of the merged firm can be written as

$$V_m^{u,\tau} = \sum_{i=1,2} V_i^{u,\tau} + Y \tag{7}$$

The expected return of the merged firm is:

$$R_m^u = \frac{\sum_{i=1,2} E[V_j^i(t)] + E[Y_j(t)]}{V_m^{u,\tau}} \tag{8}$$

Substituting (5), (6), and (7) into (8), we can write the expected return of the merged firm as

$$R_m^u = \frac{\sum_{i=1,2} R_i^u V_i^{u,\tau} + E[Y_j(t)]}{\sum_{i=1,2} V_i^{u,\tau} + Y} \tag{9}$$

According to Modigliani and Miller (1958), under the assumption of complete markets, there is a portfolio θ^* such that its expected return is $E[R^*]$, allowing us to write:

$$R^u = R + \beta_e^u (E[R^*] - R), \tag{10}$$

where β_e^u is the unlevered equity beta of firm *i*. Substituting equation (10) into (9), we can write the unlevered equity beta of the merged firm as

$$\beta_e^{um} = \frac{\sum_{i=1,2} \beta_e^{ui} V_i^{u\tau} + \frac{E[Y_j(t)]-RY}{E[R^*]-R}}{\sum_{i=1,2} V_i^{u\tau} + Y} \tag{11}$$

However, it is assumed that the synergistic rate is not correlated with the market premium *R*, so the term $\frac{E[Y_j(t)]-RY}{E[R^*]-R}$ is equal to zero. Thus, equation (11) becomes

$$\beta_e^{um} = \frac{\sum_{i=1,2} \beta_e^{ui} V_i^{u\tau}}{\sum_{i=1,2} V_i^{u\tau} + Y} \tag{12}$$

The net present value (NPV) of the merger is calculated as $NPV = V_m^{u\tau} - \left(\sum_{i=1,2} V_i^{u\tau}\right) - Z \geq 0$, where Z is the merger premium. If the acquirer does not take advantage of the target, then the NPV of the transaction is equal to 0, and

$$NPV = V_m^{u\tau} - \left(\sum_{i=1,2} V_i^{u\tau}\right) - Z = 0 \tag{13}$$

$$V_m^{u\tau} + Y - V_m^{u\tau} - Z = 0 \tag{14}$$

$$Y = Z \tag{15}$$

Substituting equation (15) into (12), the unlevered equity beta of the merged firm becomes

$$\beta_e^{um} = \frac{\sum_{i=1,2} \beta_e^{ui} V_i^{u\tau}}{\sum_{i=1,2} V_i^{u\tau} + Z} \tag{16}$$

Now, the assumption that both firms have no debts is relaxed by applying MM proposition 1 with taxes (See the Appendix A). The value of the unlevered firm with respect to the equity (E_i) and debt (D_i) of the levered firm, firm (1) and firm (2), are

$$V_i^{u\tau} = E_i + (1-\tau) D_i, \text{with } i = 1,2 \tag{17}$$

If $\beta_e^{\tau 1}$, $\beta_e^{\tau 2}$ and $\beta_e^{\tau m}$ are equity betas of the levered firms, then the equity betas of unlevered firms according to MM proposition 2 (See the Appendix B) are

$$\beta_e^{ui} = \frac{\beta_e^{\tau i}}{1 + (1-\tau)\, D_i/E_i}, i = 1,2 \tag{18}$$

$$\beta_e^{um} = \frac{\beta_e^{\tau m}}{1 + (1-\tau)\,(D_1 + D_1')/(E_1 + E_1')} \tag{19}$$

where D_1' and E_1' are the newly issued debt and equity for financing the M&A transaction. Substituting (17), (18), and (19) into (16) allows us to write:

$$\begin{aligned}\beta_e^{\tau m} = \beta_e^{\tau 1} \frac{1+(1-\tau)((D_1+D_1')/(E_1+E_1')}{1+(1-\tau)D_1/E_1} \frac{E_1+(1-\tau)D_1}{E_1+E_2+(1-\tau)(D_1+D_2)+Z} \\ + \beta_e^{\tau 2} \frac{1+(1-\tau)((D_1+D_1')/(E_1+E_1')}{1+(1-\tau)D_2/E_2} \frac{E_2+(1-\tau)D_2}{E_1+E_2+(1-\tau)(D_1+D_2)+Z}\end{aligned} \tag{20}$$

It is obvious that if the effective tax rate and the transaction premium are equal to zero, the equation (20) simply becomes the equation (2). However, there is always a case that $Z, \tau, D_1'$and E_1' change the weights of $\beta_e^{\tau 1}$ and $\beta_e^{\tau 2}$, and affect the prediction of the merged firm's beta. For example, when the transaction premium is relatively large in comparison with the debt and equity of the merging firms, the weights used in equation (2) will be biased upward.

3.2 The Application of Beta Adjustment in the Event Study of M&A

In order to estimate the equity beta of the merging firms in the estimating window, I use the CAPM model which is developed by Sharpe (1964) and Lintner (1965) and adjusted by Black (1972). The model assumes a linear relationship between the expected returns of a risky asset and its beta:

$$E(r_{i,t}) = r_f + \beta_i(E(r_m) - r_f) \tag{21}$$

As expected returns cannot be observed, the model is estimated based on ex post data. Following Jensen (1969), the historical risk premium for an asset can be typically regressed on the risk premium of the market portfolio to get its estimated beta:

$$r_{i,t} - r_f = \alpha_i + \beta_i(r_{m,t} - r_f) + \varepsilon_{i,t} \tag{22}$$

It is apparent that the estimated beta in equation (22) is consistent with the suggested beta in the equation (10) when the portfolio θ^* is the market portfolio. Log returns are used instead of simple returns to alleviate the skewness of the simple return distribution, which is a major statistical problem proposed by Knif, Kolari, and Pynnonen (2013). With the assumption that the firm specific return $\varepsilon_{i,t}$ is unrelated to the overall market returns and has a zero expected value, the normal returns, which are defined as the expected returns without conditioning on the event taking place, are equivalent to

$$E(r_{i,t}|X_t) = r_f + \beta_i(E(r_m) - r_f) \tag{23}$$

Adjusting the observed returns $r_{i,t}$ by subtracting the conditional expected returns yields abnormal returns:

$$ar_{i,t} = r_{i,t} - r_f - \hat{\beta}_i(E(r_m) - r_f) \tag{24}$$

If the changes in systematic risk are properly controlled with respect to the adjusted beta in equation (20), then the abnormal returns in equation (24) should be:

$$ar_{i,t} = r_{i,t} - r_f - \hat{\beta}_e^{\tau m}(E(r_m) - r_f) \tag{25}$$

Equation (25) suggests that if the beta of the acquirer is biased upward (downward), then the abnormal returns will be negatively (positively) biased. According to MacKinlay (1997) and the null-hypothesis that the post-merger beta of the acquiring firm is equal to its pre-merger beta, the abnormal returns will be jointly normally distributed with the variance equal to:

$$\sigma^2(ar_{i,t}) = \sigma_{\varepsilon_i}^2 + \frac{1}{L_1}\left(1 + \frac{(r_{m,t} - \hat{\mu}_m)^2}{\hat{\sigma}_m^2}\right) \tag{26}$$

where $\sigma_{\varepsilon_i}^2$ is the disturbance variance in equation (25), and $\hat{\mu}_m$ and $\hat{\sigma}_m^2$ are the average and the variance of the market returns in the estimation window, L_1. When L_1 becomes large, $(ar_{i,t}) \sim \sigma_{\varepsilon_i}^2$. In order to make a robust conclusion about the short-run effects of M&A, average cumulative abnormal returns (ACAR) should be computed as:

$$\overline{car}(t_1, t_2) = \frac{1}{N}\sum_{i=1}^{N} car_i\,(t_1, t_2), \tag{27}$$

where $car_i(t_1, t_2) = \sum_{t=t_1}^{t_2} ar_{i,t}$. Assuming that there is no overlapping case, inferences about cumulative abnormal returns can be based on $\overline{car}(t_1, t_2) \sim N(0, \bar{\sigma}^2(t_1, t_2))$ to test the null hypothesis that the abnormal returns are zero. $\bar{\sigma}^2(t_1, t_2)$ can be computed as $\bar{\sigma}^2(t_1, t_2) = \frac{1}{N^2}\sum_{i=1}^{N} \sigma_i^2(t_1, t_2) \sim \frac{1}{N^2}(t_2 - t_1 + 1)\,\sigma_{\varepsilon_i}^2$. Though $\sigma_{\varepsilon_i}^2$ is unknown, the sample variance can represent its unbiased estimator.

4. Data

I examine the short-term performance of all successful M&A transactions in the United States of America with definitive agreement dates announced between January 2004 and January 2013. The sample is drawn from the S&P Capital IQ database, using the following filter criteria:

- The transaction is listed as successfully completed, and its participants are publicly-owned American firms from various industries.
- The participants must have share-price information available on the S&P Capital IQ database three years prior to and one year after the announcement date.
- The debt, market capitalization, and effective tax rate of the merging firms, as well as financial structure of the transaction must also be available on S&P Capital IQ database.

The collecting sample can have a double counting problem when one firm has multiple M&A transactions during the sample period. However, since the study period is short, the problem will not be significant, so I assume that the multiple M&A transactions within one firm are not related to each other. With this assumption, the collected sample consists of 606 M&A transactions, representing nearly the entire population of successful M&A over the period 2004-2013. The transaction premium mentioned in the model formulation part can be estimated as the product of total shares outstanding of the target and the difference between the offer price and the target stock price which are available on S&P Capital IQ database one day prior the announcement date.

5. Empirical Results

5.1 Risk Shifts

I use the large-sample Wilcoxon Signed-Rank Test (See the Appendix C) to determine whether the systematic risk of the acquiring firm shifts after the announcement date. The test statistics is based on the difference between two beta series, series (1) representing the estimated beta of the acquiring firm from three-year monthly stock returns, and series (2) representing the adjusted beta according to the equation (20). I form a hypothesis:

$$H_0\text{: median of } \beta_1 - \beta_e^{\tau m} = 0$$

$$H_1\text{: median of } \beta_1 - \beta_e^{\tau m} \neq 0$$

The p-value of the two-tailed Wilcoxon signed rank test is 0.015, so the null-hypothesis H_0 is rejected, indicating that the acquiring firm has a significant systematic risk shift after the announcement date.

Table 1. Risk shift directions

	Group criteria	Alternative hypothesis	One-tailed test p-value
Group 1	$\beta_1 > \beta_2$	$\beta_e^{\tau m} < \beta_1$	0.000
Group 2	$\beta_1 < \beta_2$	$\beta_e^{\tau m} > \beta_1$	0.001

Note. The table represents the results of the large sample Wilcoxon Signed-Rank Test for the risk shift directions of the two groups, group (1) and group (2). Group (1) includes all transactions in which the beta of the acquirer is greater than the target's beta, and group (2) consists all deals in which the beta of the acquirer is equal or less than the target's beta. The pre-merger betas, β_1 and β_2, are estimated from the monthly stock returns for three years prior to the announcement date according to equation (25), and the predicted beta of the acquiring firm is estimated by equation (23). The alternative hypotheses are formed based on theoretical suggestions of Hackbarth and Morellec (2008).

According to the theoretical suggestions of Hackbarth and Morellec (2008), I form two transaction groups to test for the direction of the systematic risk shift. Group (1) includes all transactions satisfying the condition that beta of the acquiring firm is greater than beta of the target, and group (2) has the remaining transactions. The results of the one-tailed Wilcoxon signed rank test for the risk shift direction are reported in the Table 1. The one-tailed

p-value for group (1) and group (2) show that there is a statistically significant negative risk shift in group (1) and a statistically significant positive risk shift in group (2), indicating a strong consistency with the propositions of Hackbarth and Morellec (2008).

5.2 Average Cumulative Abnormal Returns (ACAR)

Table 2 compares the ACAR of the acquiring firms when systematic risk is and is not adjusted over a short period of 25 days after the announcement date. The capitalization-weighted market index S&P 500 is used to generate abnormal returns. Regardless of beta adjustments, the ACAR are significantly negative for the holding periods of five and ten days, -1.8% and -2.7%, and -1.6 % and -6.2%, respectively. However, after ten days, the stock prices of

Table 2. Short-run average cumulative abnormal returns

	Adjusted beta		Non-adjusted beta	
Period(days)	ACAR	z-stat	ACAR	z-stat
ACAR(0, +5)	-0.018	-2.22[b]	-0.027	-2.37[b]
ACAR(0, +10)	-0.016	-2.06[b]	-0.062	-5.33[a]
ACAR(0, +15)	-0.014	-1.77	-0.095	-8.16[a]
ACAR(0, +20)	-0.009	-1.23	-0.121	-10.38[a]
ACAR(0, +25)	-0.012	-1.54	-0.145	-12.46[a]

Note. The table describes the short-run average cumulative abnormal returns after the announcement date of all firms that proclaimed merger deals from January 2004 to January 2013. It represents 20-day security performance of the acquiring firm after the announcement date at each small interval of 5 days with two classifications: (1) beta is not adjusted: $ar_{i,t} = r_{i,t} - r_f - \hat{\beta}_i(E(r_m) - r_f))$ and (2) beta is adjusted: $ar_{i,t} = r_{i,t} - r_f - \hat{\beta}_e^{TM}(E(r_m) - r_f))$. z-statistics generated based on equation (30) and (31) are also reported corresponding to the ACAR of each study period, a and b representing statistical significance in 2-tailed test at 1% and 5% levels, respectively.

The acquiring firm reverse to their fundamental value as suggested by the new equilibrium. ACAR over 15, 20 and 25 days are negative, but not significant when the beta is controlled while ACAR keep decreasing and statistically significant if the beta of the acquiring firm is not adjusted; ACAR remain statistically significant at 1% in the study periods of 15, 20 and 25 days, showing an decreasing trend from -9.5% to -14.5 %, which is statistically significant and far less than the -1.4% and -1.2% for ACAR after 10 and 25 days with risk adjustments. The existence of significantly negative abnormal returns within first 10 days indicates the failure of the new equilibrium in explaining the short-run market inefficiency after M&A announcement, but the performance comparison after 10 days proves that the new model successfully captures the measurement biases of the traditional event study method in a period longer than 10 days.

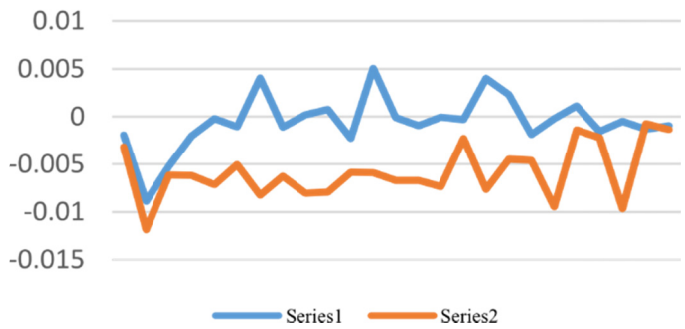

Figure 1a. Average abnormal returns 25 days after announcement of M&As

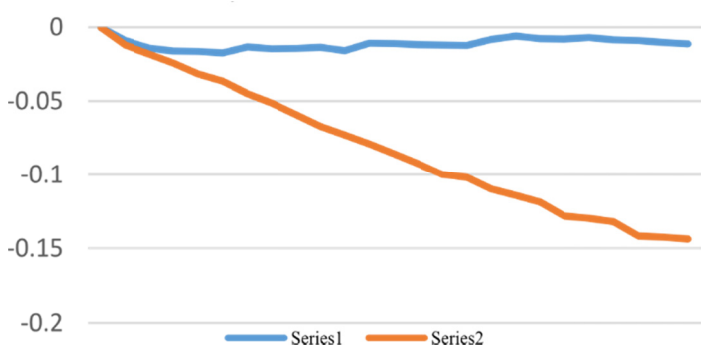

Figure 1b. Average cumulative abnormal returns 25 days after announcement of M&As

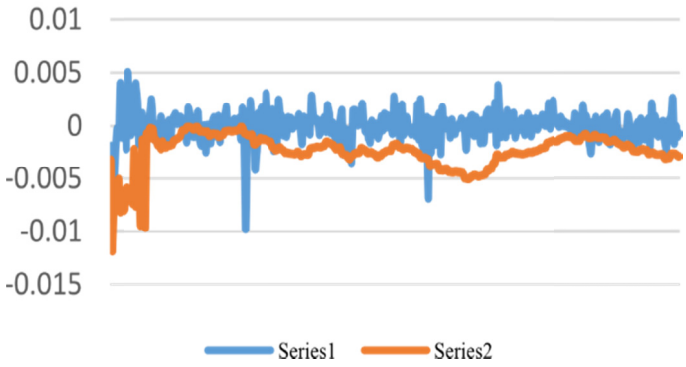

Figure 1c. 1 year after announcement of M&As

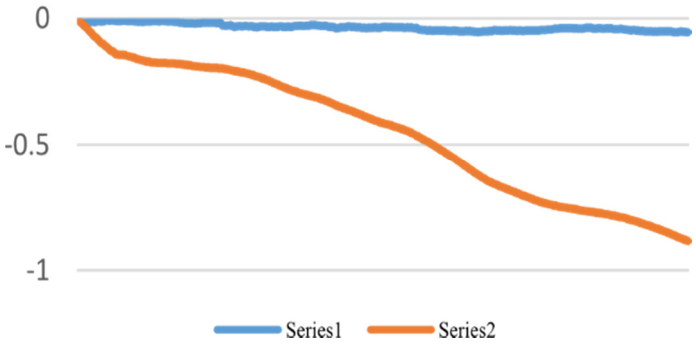

Figure 1d. 1 year after announcement of M&As

Figure 1. Average abnormal returns and average cumulative abnormal returns

Note. The figure represents overall trends of average and cumulative performance of 606 merger transactions over 25 days and one year from the announcement date during the period 2004-13, evaluated using the CAPM model with two classifications: (1) beta is not adjusted: $ar_{i,t} = r_{i,t} - r_f - \hat{\beta}_i(E(r_m) - r_f))$, and (2) beta is adjusted: $ar_{i,t} = r_{i,t} - r_f + \hat{\beta}_e^{\tau m}(E(r_m) - r_f))$, where $\hat{\beta}_e^{\tau m}$ is the new adjusted beta of the acquiring firms after the announcement date.

The overall trend of average abnormal returns (AAR) and ACAR for the acquiring firms over a 25-day and one year period after the announcement is represented in Figure 1. Figure 1b and Figure 1d show that without controlling for beta shifts, ACAR have a persistent downward drift pattern rather than a reversal pattern, which, if methodologically accurate, will contradict the market efficiency theory. The misleading estimation may be explained by changes in the equilibrium of the CAPM after the announcement date; in other words, the CAPM without risk adjustments may exaggerate the abnormal returns of the acquiring firm over a short-run period of 25 days (Figure 1b), and to an even greater degree after one year.

The beta's run-up and run-down of the acquiring firm obviously cause biases in the estimation of abnormal returns. In Figure 1a, when the beta is adjusted, AAR are quickly corrected within 25 days, and as a result, the ACAR rapidly vanish and approach zero. Additionally, over one year, most AAR with adjusted beta tend not to be statistically significant while AAR without beta adjustment remain to a large part unexplained (Figure 1c). The measurement biases accumulated in one year by traditional event study method could be as large as 80% which is, of course, not reasonable and should not be used to form investment decisions.

6. Conclusion

This paper derives a theoretical model to estimate the beta of the acquiring firm immediately after the announcement date of an M&A transaction and evaluate the effects of beta adjustments on the accuracy of estimating short-term stock returns. To my best knowledge, this is the first paper that considers the most important characteristic of M&A, synergistic effect, in computing systematic risk of the acquiring firm. Based on a sample of 606 mergers of publicly traded US firms from January 2004 to January 2013, I find significant variation in the systematic risk of the acquiring firms after M&A announcement dates. Controlling for the systematic risk shifts, the ACAR significantly increase from -2.7% to -1.8%, and from -6.2% to -1.6% in the first five and ten days, respectively. ACAR after 10 days quickly vanish when beta is adjusted, otherwise they can be exaggerated as large as 80% after one year. The model I suggest clearly cannot explain the market inefficiency after an M&A announcement; however, it raises a question about the long run abnormal performance of M&A that is extensively documented in literature, and stock investors would have another way to estimate the absolute magnitude of the abnormal returns to form a better investment strategy.

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Appendix A

MM proposition 1: Under the assumption that there is no arbitrage opportunity and the presence of taxes, the value of a firm increases with the level of debts as:

$$V_l^{\tau} = V_u^{\tau} + \tau D, \tag{A1}$$

where V_l^{τ}, V_u^{τ} are values of the levered firm, and unlevered firm.

Appendix B

MM proposition 2: The expected return on equity is equal to the expected return R_e^u for a pure equity stream, plus a premium related to the financial risk, which is equal to the debt-to-equity ratio times the spread between R_e^u and R_d.That is to say,

$$R_e^{\tau} = R_e^u + (R_e^u - R_d)\frac{D}{E^{\tau}}(1-\tau) \tag{B2}$$

Given the absence of default, the systematic risk of equity is:

$$\beta_e^\tau = \beta_e^u \left[1 + \frac{D}{E^\tau}(1-\tau)\right], \tag{B3}$$

where D/E is the debt-to-equity ratio and β_e^τ, β_e^u are equity betas of the levered firm, and the unlevered firm, respectively .

Appendix C

Inferences about risk shift in M&A can be drawn using nonparametric approach. The Wilcoxon signed ranks test is computed as the sum of positive ranks:

$$W = \sum_{i=1}^{n\prime} R_i^{(+)} \tag{C1}$$

The hypothesis H_0 , that firm risk does not change after M&A event, can be tested using the large-sample Wilcoxon Signed-Rank Test:

$$Z_{stat} = \frac{W - \frac{n\prime(n'+1)}{4}}{\frac{n\prime(n'+1)(2n'+1)}{24}} \tag{C2}$$

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Did Board of Directors Have an Impact on MENA Bank Performance?

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Abstract

This paper examines the impact of board of directors on the variability of bank performance in the Middle East and North Africa (MENA) region. Based on a sample of 38 banks during 2004-2011, we examine the impact of board characteristics on performance. Our results show that as the size of a bank's board of directors decreases its performance increases. However, the presence of CEO duality, independent and institutional directors in the board of directors is not significant in explaining performance differences between MENA banks. In addition, the results highlight the fact that state directors undermine the performance while foreign directors are relevant to strengthen the performance in MENA banks. Indeed, our findings highlight the importance of foreign members in enhancing banks performance.

Keywords: banks, board structure, performance, MENA

1. Introduction

The late 2000s financial crisis has highlighted the critical importance of sound corporate governance for banking organizations. According to Nout Welling (Note 1), ex-president of the Basel committee and the Netherlands Bank, the crisis has highlighted the importance of good governance in the banking system. In this vein, the Basel committee on banking supervision has advocated the need to understand and improve the corporate governance in the financial entities. The committee believes that effective corporate governance practices are necessary to achieving and maintaining public trust and confidence in the banking system, which are critical to the proper functioning of the banking sector and economy as a whole. The board of directors has a crucial role in managing and controlling the activity of the banks. It is considered as a mechanism which allows the resolution of agency problems arising from the separation between ownership functions and decision-making. Good corporate governance standards are imperative to every bank and important to investors and other stakeholders (Al-Amarneh, 2014). The bank board is even more important as a governance mechanism than its non–bank counterparts (Pathan, 2009) because directors solely serve the shareholders, depositors and regulators (Macey & O'Hara, 2003). The divergence of interests between managers, shareholders and depositors-may surface. Consequently, monitor managers' behavior is necessary. In this context, Ultimate responsibility is typically placed with the board of directors (Macey and O'Hara, 2003; Datar, 2004; Levine, 2004). Bank board's play an important role in bank governance, either monitoring managers or advising them in the design and implementation of strategies (Andres & Vallelado, 2008). Thus, the bank board structure is relevant to bank performance (Adams & Mehran, 2008; Andres & Vallelado, 2008; Pathan, 2009).

There is a little research effort devoted to investigating the effect of board characteristics on banks performance in MENA region as most empirical studies are focused on American, European and Asian countries (Pi & Timme, 1993; Belkhir, 2009; Staikouras et al., 2007; Zulkafli & Samad, 2007; Adams & Mehran, 2008; Alexandre & Bouaiss, 2008; Pathan & Faff, 2013). Our study focuses on banking governance in MENA countries. This choice is dictated by the role played by banks in the development of this region (Creane et al., 2004).

The contribution of this study is twofold: First, it aims to fill the gap in banking literature by focusing on the banking sector in the MENA region. Indeed, there are few country-level studies that examine the relationship between the board structure and the MENA bank performance (Bektas & Keymak, 2009 for Turkey; Chahine &

Safieddine, 2009 for Lebanon; Trabelsi, 2010; Rachdi & Ghazouani Ben Ameur, 2011 for Tunisia; Al-Amarneh, 2014 for Jordan). Second, it aims to gain an understanding of a significant determinant, board of directors, which is associated with bank performance by tracing the board structure details of 38 banks in 10 MENA countries. In this paper, we are interested in the governance mechanisms that can influence the performance of MENA banks. We apply a dynamic panel data approach to examine the determinants of performance of banks in MENA region during 2004-2011. Particularly, we focus on the characteristics of the board of directors. We show that board structure is particularly relevant for MENA banks performance. We find that as the size of a bank's board of directors decreases its performance increases. However, the presence of CEO duality, independent and institutional directors on the board are not significant in explaining performance differences between MENA banks. In addition, the results highlight the fact that state directors undermine the performance while foreign directors are relevant to explaining the performance in MENA banks. Indeed, our findings highlight the importance of foreign members in enhancing banks performance.

The remainder of this paper is structured as follows. The second section presents a review of the literature on the topic and presents our hypotheses. The third section investigates the impact of governance on the performance of banks through a study of a sample of MENA banks. We provide the results of our empirical analysis in the fourth section. We conclude in the fifth section.

2. Related Literature

For the agency theory, the board of directors has the responsibility to monitor the management decisions (Sumner & Webb, 2005). However, agency conflicts may exist within the board. Then the board structure seems to influence the performance. In our study we are interested by the size of the board, and the composition of bank's board of directors (CEO/chairman duality, the presence of independent, state, institution and foreign directors)

2.1 The Board Size

The principal functions of the board of directors are monitoring and advising managers (Jensen, 1993). The board size is mainly used as indicator of the effectiveness of the board. According to the resource dependence theory (Pfeffer & Salancik, 1978), large board size facilitates manager monitoring and brings more management skills and experiences that makes it difficult for the CEO to manipulate the board (Zahra & Pearce, 1989). However, the proponents of agency theory (Jensen, 1993) argue that large board size can lead to problems of coordination, control and flexibility in decision-making because board members can collude with managers to expropriate the other stakeholders. The agency theory predicts that a smaller board should be more effective. The theoretical debate about the impact of board size on the bank's performance is unresolved. The empirical results are also mixed. Staikouras et al. (2007) conclude that there is a statistically significant and negative relationship between the board size and European bank performance. Simpson and Gleason (1999) find no effect of the number of directors on the probability of financial distress. However, Adams and Mehran (2008) identifies a significant positive correlation between board size and bank performance in USA. Andres and Vallelado (2008), based on a sample of 69 large banks in North America and Europe from 1995 to 2005 conclude that the addition of new directors is positively related to bank performance. This result is confirmed by Belkhir (2009a) for American banks. Based on a sample of 212 large American banks over the period 1997-2011, using the system GMM estimation technique, Pathan and Faff (2013) show a strong negative relation between bank board size and performance. Alexandre and Bouaiss (2008) find a negative relationship between the board of 18 French banks from 1998 to 2004 and its performance. Regarding the MENA region, Bektas and Kaymak (2009) indicate that board size do not significantly influence the returns on assets of Turkish banks. Chahine and Safieddine (2009) reports that Lebanon bank performance is positively related to board size. However, Trabelsi (2010) find that the high number of the board's members has a very negative effect over performance of a sample of 10 Tunisian banks during the period 1997-2007. Based on a sample of 11 large Tunisian commercial banks during 1997-2006, Rachdi and Ghazouani Ben Ameur (2011) find that a small bank board is associated with more performance. Recently, Al-Amarneh (2014) study a sample of 13 listed banks in Jordan during 2000-2012 and find that as board size increases the bank performance increase. In our study, we expect a positive association between board size and bank performance:

H1: There is a positive relationship between board size and banks' performance.

2.2 The CEO Duality

CEO duality refers to a situation where the CEO and the Chairman of the board are the same person. The duality is likely to influence the independence of the board of directors (Fama & Jensen, 1983) and provide more power to the CEO (Boyd, 1995). The board of directors is most effective in its task of control when both these duties

are separated (Beatty & Zajac, 1994). The agency theory has emphasized the need to separate the positions of CEO and board chairman to guarantee the board independence and improve the firm transparency (Jensen, 1993). The concentration of power can exacerbate potential conflicts of interest and decrease the effectiveness of monitoring as it restricts the information flow to other board directors and hence reduces board's independent oversight of manager (Fama & Jensen, 1983; Jensen, 1993). The empirical evidence on the relationship between CEO duality and bank performance is insufficient. Pi and Timme (1993) conclude that American banks with a dual CEO underperform banks where CEO and chairman of the board are two different persons. However, Fogelberg and Griffith (2000) find that the duality does not have any impact on the bank performance. In the MENA countries, Bektas and Kaymak (2009) reveal no performance differences between Turkish banks with duality and nonduality structures. Al-Amarneh (2014) asserts that the CEO duality is positively related to the performance of Jordan bank but the relationship is statistically insignificant. In our study, we expect a positive association between CEO duality and bank performance:

H2: There is a positive relationship between CEO Duality and banks' performance.

2.3 Independent Directors

For the agency theory, independent directors have an incentive to act as monitors of management because they want to protect their reputations as effective and independent decision makers (Fama & Jensen, 1983). More independent directors are considered to be important element of an effective board (Yermack, 1996; Fama & Jensen, 1983). However, the presence of independent directors can makes the exchange of information within the board more difficult because they prevent bank managers with specific knowledge from joining the board (Adams & Ferriera, 2007; Andres & Vallelado, 2008). Indeed, executive directors facilitate the transfer of information between board members and managers (Adams & Ferreira, 2007; Coles et al., 2008). In the banking sector, The Basel committee recommends that banks establish boards that are composed of an effective number of directors capable of exercising judgment that are independent of the views of management, large shareholders and governments (BIS, 2006). Regarding the presence of independent directors, many authors find no significant relation between the degree of board independence and performance (Pi & Timme, 1993; Griffith et al., 2002; Choi & Hasan, 2005; Adams & Mehran, 2008). Also, Simpson and Gleason (1999) conclude that independent directors do not influence the probability of American banks. However, Alexandre and Bouaiss (2008) and Andres and Vallelado (2008) observe a positive relation between the proportion of independent directors and performance. Pathan and Faff (2013) find evidence that US banks in which boards have more independent directors perform worse. The analysis of Bektas and Kaymak (2009) reveals a curvilinear relationship with Turkich banks' performance, implying that boards composed of a majority of either insiders or outsiders enjoy high performance. Besides, Chahine and Safieddine (2009) find that ROA and ROE first decrease and then increase with the percentage of outside directors on the Lebanon board. Rachdi and Ghazouani Ben Ameur (2011) conclude that the presence of independent directors within the board affects negatively the performance of Tunisian banks. Hence, we formulate the following hypothesis:

H3: The proportion of independent directors is positively related to banks' performance.

2.4 State Directors

According to the social welfare theory (Atkinson & Stiglitz, 1980), state-owned banks contribute to economic development and improve the general wealth (Stiglitz, 1993). Indeed, they finance risky projects and grant loans to SMEs in order to encourage investment and improve economic development (Salas & Saurina, 2002). However, according to the political theory (Shleifer & Vishny, 1994), State ownership politicizes the resource allocation and can thus block economic development. Public banks are more vulnerable than private banks, to the political lobbies engaged by the various interest groups (Hu et al., 2004). Whatever the theoretical argument, the empirical literature conclude that state-owned banks are less efficient and highly exposed to risk because they finance risky projects, according to the argument of social welfare (Iannotta et al., 2007) and are very vulnerable to political lobbying, according to the political argument (Hu et al., 2004; Sapienza, 2004; Khwaja & Mian, 2005). Nevertheless, the empirical studies about the role of the director representing the state on bank performance are almost nonexistent. In our study we expect a negative relationship between the proportion of state representing the state and bank performance. In this vein, we formulate the following hypothesis:

H4: the proportion of state directors has a negative impact on banks' performance.

2.5 The Presence of Institutional Directors

Although the role of institutional investors in non-financial firms has been subject to much attention from researchers, studies on banking institutions are rare. Are institutional investors active or passive in the banking

governance? The few existing studies cannot give a clear response. The proponents of the activism theory refer to the agency theory teachings and argue that institutional investors are more conscious and more competent than the other shareholders (Pearce & Zahra, 1992). However, advocates of the passivity theory argue that institutional investors are supposed to play a passive role in bank governance. The institutional investors' control is weaker in banks than in other firms because of regulation, which appears to be a substitute of the monitoring carried out by institutional shareholders (Adams & Mehran, 2003; Elyasiani & Jia, 2008). The institutional director can effectively control the bank activity. He has the skills, the knowledge and the experience that are appropriate in order to effectively control the management decisions. We therefore formulate the following hypothesis:

H5: the proportion of institutional directors has a positive impact on the performance of MENA banks.

2.6 The Presence of Foreign Directors

The liberalization of capital markets has facilitated the opening of the banks' capital to foreign investors. The acquisition of local banks through the privatization policies or the establishment of subsidiaries is the main catalyst of foreign investors' implementation mainly from foreign banks. Foreign participation in a bank's capital appears to be a signal of "good governance" (Gulamhussen & Guerriero, 2009). In the presence of a foreign director, the board can exercises its disciplinary function more efficiently. Indeed, the foreign director is even much more independent (Gulamhussen & Guerriero, 2009) and more experienced than the other directors (Choi & Hasan, 2005). In this context, Berger et al. (2000) developed two hypotheses: The home field advantage hypothesis and the global advantage hypothesis. Under the home field advantage hypothesis, domestic institutions are generally more efficient than foreign institutions. The banks controlled by foreigner may suffer from difference in language, culture and regulatory and supervisory structures. Thus, the domestic owned banks have some comparative advantage that foreign owned banks lack. Under the global advantage hypothesis, foreign institutions can overcome cultural and institutional barriers and operate more efficiently than domestic ones. Regarding the empirical studies, Choi and Hasan (2005) find a significant effect of the presence of foreign member in the board of director on bank return and risk. We formulate the following hypothesis:

H6: The proportion of foreign directors is positively related to banks' performance.

3. Empirical Methodology

3.1 Variables Used

We measure bank performance by using the Return on Assets (*ROA*) which is an accounting measure, and the Return on Equity (*ROE*) which is a stock measure. Many others studies use these measures as the dependant variable in research on board effectiveness (Andres & Vallelado, 2008). The board characteristics include the size of the board, the composition of the bank's board of directors. We include board size (*BS*) as the number of directors in the board. A dummy variable (*Dual*) is used to capture the independency of the board. Dual is equals one if the Chief Executive Officer also serves as chairperson of the board, zero otherwise. We take into account also the percentage of total directors who are independent (*Ind*). We include three other variables concerning the composition of the board. Institutional director (*Instit*) is defined as the percentage of total directors who represent institutional investors. State directors (*Stat*) is measured as the percentage of total directors who represent the state. Finally, we calculate the percentage of foreign directors to total directors on the board (*Frg*). A first group of control variables measures differences in bank structure. We take into account the bank size (*Size*), Charter value (*Charter*) and bank capital (*Capital*). Our second group of control variables accounts for the differences among MENA countries in terms of economic growth and institutional environment. To control for economic expansion we use the GDP Growth (*GDP_gr*). To account for the differences in the institutional quality amongst countries, we include the Institutional quality (*IQ*) which is the Regulatory Quality indicator produced by Kaufmann et al. (2010). Moreover, we include year dummies to capture year effect.

Table 1 shows the data source and a brief description of our key variables used in this study.

Table 1. Summary of the variables

Variables	Definition	Data Source
Performance	**ROA**: ratio of net income to total assets **ROE**: ratio of net income to total equity	Bankscope
BS	The number of directors in the bank's board (*Simpson and Gleason, 1999; Sumner and Webb, 2005; Pathan, 2009)*	Annual report of banks
Dual	Dummy variable which equals one if the Chief Executive Officer also serves as chairperson of the board, zero otherwise. (*Simpson and Gleason, 1999; Pathan, 2009; Palvia, 2011)*	Annual report of banks
Ind	The percentage of total directors who are independent (*Pathan et al. 2007, Andres and Vallelado, 2008; Pathan, 2009).*	Annual report of banks
Instit	The percentage of total directors who represent institutional investors	Annual report of banks
Frg	The percentage of foreign directors to total directors on the board (*Choi et Hasan, 2005; Gulamhussen and Guerreiro,2009).*	Annual report of banks
Stat	The percentage of total directors who represent the state (*Konishi and Yasuda, 2004)*	Annual report of banks
Size	The natural logarithm of total assets (*Pathan et al., 2007; Pathan, 2009; Azofra and Santamaria, 2011)*	Bankscope
NPLs	Non-performing loans/ total loans(*Gonzalez, 2005; Salas and Saurina,2002; Shehzad et a.l 2010)*	Bankscope
Capital	The bank total equity as percentage of total assets (*Iannotta et al. 2007; Pathan, 2009)*	Bankscope
Charter	Keeley's Q (Keeley, 1990) which is calculated as the sum of the market value of equity plus the book value of liabilities divided by the book value of total assets.	Bankscope
GDP_gr	Growth rate of gross domestic product on annual basis	World development indicators of the World Bank
IQ	Institutional quality measured by the variable Regulatory Quality which take into account the ability of the government to implement policies and regulations that promote private sector development	World Governance Indicators compiled by Kaufmann *et al*. (2010)
Year	7 individual dummy variables which equals either one or zero for each year from 2004 to 2011 with 2004 being the excluded year	Authors

3.3 Methodology

We use the following regression model to examine the board characteristics on the performance of MENA banks.

$$Performance_{i,t} = f\,(board\ characteristics_{i,t},\ control\ variables_{i,t}) + \varepsilon t_{i,t} \quad (1)$$

The index i denotes the bank (i =1, …, 38), whereas the index (t) denotes the year under consideration (t=2004, …, 2011).

In our study, we apply a dynamic panel data approach. Indeed, the characteristics of board are endogenously determined by firm performance (Hermalin & Weisbach, 2003). In this respect, the cross-sectional Ordinary Least Square (OLS) regressions of bank performance on single governance mechanisms may be misleading (Belkhir, 2009b). To address the endogeneity problem, we use the System Generalized Method of Moments (SGMM) estimators developed by Arellano and Bover (1995) and Blundell and Bond (1998). The SGMM simultaneously takes into account the unobserved heterogeneity, the endogeneity and the heteroskedasticity of the explanatory variables for panel data (Andres & Vallelado, 2008). Also, the SGMM allows us to solve the problem of simultaneity between the ownership structure and corporate value (Demsetz & Villalonga, 2001). Like Azofra and Santamria (2011) and since our sample size is not very large, we use the procedure suggested by Windmeijer (2005) that improves the robustness of our results. The lagged levels of explanatory variables are used as instruments. To test model specifications validity, we use the Sargan test of over-identifying restrictions that checks the validity of the instruments. We also include the AR(1) and AR(2) to test the first and second-order serial correlation, respectively.

4. Results

4.1 Descriptive Statistics

Table 2. Descriptive statistics

Continuous variables				
Variables	**Mean**	**Min**	**Max**	**SD**
ROA	0.10	-0.10	3.49	0.44
ROE	0.13	-1.11	0.79	0.13
BS	10.27	5	15	1.73
Ind	0.21	0	0.7	0.23
Instit	0.30	0	0.8	0.23
Frg	0.22	0	0.7	0.22
Stat	0.09	0	0.58	0.15
Size	15.88	11.58	19.65	1.79
NPLs	10.70	0.21	47.89	9.63
Capital	0.11	0.03	0.25	0.04
Gdp_gr	0.05	-0.01	0.20	0.04
Charter	0.92	0.74	1.26	0.08
IQ	0.10	-0.49	0.83	0.32
Dummy variables:				
	Modality			**Frequency**
Dual	1: Duality of leadership			33.22%
	0: dissociation of leadership			66.77 %

The descriptive statistics are presented in Table 2. In particular the average of ROA and ROE is 0.10 and 0.13 respectively. On average, the MENA banks of our sample have 10 members on their board. With respect of the board composition, the presence of institutional directors appears to be higher than foreign and state directors. We note that in the majority of MENA banks there is a separation of the functions of decision and control. In 33 % of banks in the sample, the Chief executive Officer presided at the board. The Pearson's correlation matrix (Appendix, table I) indicates that the degree of correlation between variables is low which suggests the absence of multicollinearity problem in the models.

4.2 Multivariate Analysis

Table 3 presents the results from the regressions of board structure variables and control variables on our performance measure. According to the table, the models seem well-fitted with statistically significant test statistics for second-order autocorrelation in the first difference (AR1), and statistically insignificant test statistics in the second difference (AR2). Likewise, we confirm the validity of the instruments using the Sargan over-identification test. In all models, the statistically insignificant Sargan test indicates that instruments are valid in the estimations.

Table 3. Board of directors and bank performance

Independent variables	**ROA** Model 1 Coeff. (t)	**ROE** Model 2 Coeff. (t)
Constant	0.082 (0.435)	0.075 (0.681)
ROA (-1)	0.653 (50.36)***	-
ROE (-1)	-	0.353 (43.851)***
BS	-0.005 (-1.726)*	-0.010 (-4.446)***
Dual	0.002 (0.160)	-0.009 (-0.881)
Ind	0.015 (0.453)	0.004 (0.222)
Stat	-0.095 (-1.679)*	-0.055 (-0.693)
Instit	0.005 (0.142)	0.022 (1.311)
Foreign	0.049 (1.236)	0.055 (3.374)***
Size	0.007 (1.764)*	0.009 (3.369)***

Capital	0.524 (1.990)**	0.893 (5.276)***
NPLs	-0.299 (-2.599)***	-0.318 (-7.017)***
Charter	-0.078 (-0.703)	-0.156 (-2.398)**
GDP_gr	0.119 (0.884)	0.137 (2.310)**
IQ	0.044 (2.364)**	0.033 (2.607)***
year dummies	Yes	Yes
Observations	254	257
Sargan test	9.361 (0.99)	22.569 (0.65)
AR(1)	-1.727 (0.08)**	-1.999 (0.04)**
AR(2)	-0.894 (0.37)	-0.909 (0.36)
N of instruments	47	46

Note. All variables are defined in table 1. The dependent variables are the ROA in model (1) and the ROE in model (2). AR (1) and AR (2) are t-statistics for first and second order serial correlation. Sargan is a test of the over-identifying restrictions under the null that the instruments are valid. The right-hand side variables are treated as endogenous using lags back from t-2 as instruments. *p < 0.01; **p < 0.05; ***p < 0.001.

With the regard to the board size, the coefficient of *BS* is negative and significant across the two measures of performance. These results suggest that the addition of new directors in MENA bank's board undermine the performance of banks. Our result confirms the findings of Staikouras et al. (2007) for a panel of Europeans banks and contradicts those of Adams and Mehran (2005) for American banks. Our result is consistent with the agency theory hypothesis. Regarding the CEO duality, the results indicate that the coefficient of *Dual* is statistically insignificant. Our hypothesis is then not confirmed. We conclude that CEO duality do not affect the MENA bank's performance. Our result refutes the empirical evidence of Simpson and Gleason (1999) and Pathan (2009) for a panel of Americans banks. However, our findings corroborate the results Bektas and Kaymak (2009) and Al-Amarneh (2014) for Turkish and Jordan banks. We explain this result by the relative variability of the leadership structure of the board during the sample period which makes it difficult to identify the impact of duality on performance. Besides, the coefficient of *Ind* is statically insignificant. We conclude that the presence of independent members on MENA board don't affect the performance of banks. Even when MENA boards contain independent members, the latter cannot counter-balance the other stakeholders' interests. In MENA region, banks were required to increase their number of independent board members irrespective of their performance. Consistent with the expectations, the coefficient on *Stat* is negative and statically significant for only ROA. This illustrates that the economic performance of MENA banks is deteriorated with the presence of a state directors in the board. Our finding about the statistically insignificant coefficient *STAT* for ROE point to clear evidence that the financial performance of banks is not affected by the state directors on the board. In fact, in MENA region, there is no clear system of accountability or responsibility for performance of government-appointed board members or executive management (Rochat et al., 2011). Also, results show that institutional directors (*Instit*) do not affect performance in the MENA countries. We conclude that an institutional director don't impact banks performance. Indeed, bank board in MENA lack knowledge and experience to challenge management in evolving risk profiles of borrowers (Rochat et al., 2011). Regarding the presence of foreign directors on the board, results show that the coefficient (*Frg*) is positive and statically significant for only ROE. We explain this result by the superior managerial skills and experience of foreign directors which translate into an improvement in MENA financial performance. Thus, we confirm the global advantage hypothesis of Berger et al. (2000). In most regressions, the bank size explains the variation of performance. Our finding indicates that the size of banks (*Size*) is significant and positive. It appears that large banks, due to the economies of scale, have the experience and the necessary resources to properly monitor managers and increase the performance. Our results reveal that bank capital has a significant positive impact on performance. Furthermore, the charter value banks have a significant and negative impact on their performance. Banks with high charter value are associated with higher ROA and ROE. Besides, GDP_growth exhibits positive and statistically significant relationship in all regression models. We conclude that the economic growth ameliorate the financial sector performance in MENA region. Also, credit risk is significant exhibiting negative relationship with performance measure. Finally, we notice that the coefficient on institutional quality variable (*IQ*) is significant and positive in all regressions.

4.3 Robustness Chek

In order to test the sensitivity of estimation results, we use alternative proxies for some of the variables. We first use the Market to Book ratio as an alternative proxy for the bank performance. The results obtained remain the

same. In terms of institutional quality, we replace the regulatory quality by the others five dimensions of governance provided by Kaufman et al. (2010). We include simultaneously, voice and accountability as indicator of the extent of political and civil rights; political instability and violence which indicates the likelihood of violent threats or changes in governments; government effectiveness which measures the competence and the quality of public service delivery; regulatory burden which measures the incidence of market unfriendly policies; and finally control of corruption as a proxy of the exercises of public power for private gain, including both soft and grand corruption and state capture. The results remain similar without many changes.

5. Conclusion

The aim of this paper was the study of board of director's characteristics on performance for a sample of MENA banks. Through a dynamic panel data approach and after controlling for the endogeneity problem we establish relationship between banks' performance and three main attributes of board: the board size, the presence of state directors and foreign directors. However, the presence of CEO duality, independent and institutional directors on the board are not significant in explaining performance differences between MENA banks. We conclude that the board of directors plays an effective role in bank governance.With these different results, our research could provide some policy implications. Indeed, the board of directors is the primary mechanism of the internal control system, serving to discipline and monitor managers and MENA countries need to take effective measures to improve the functioning of this mechanism. Although large board may reflect more variety in experience and knowledge, the board must be composed by few directors who cannot be manipulated by managers. Besides, MENA Bank board's lack the presence of independent members. Moreover, even in the cases where the presence of these members is reported, they are passive and their independence is not confirmed and subject to conversers.

Further investigations are needed to better apprehend the impact of bank board characteristics and this respective impact on bank performance. For instance, it is worthy to incorporate other board characteristics as the nature and the composition of the committees connected with it and the members' remuneration.

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Notes

Note 1. www.bis.org/press/p100316.htm

Note 2. For all estimations, the Sargan test of over identifying restriction of the instruments has not rejected the null hypothesis of valid instruments.

Appendix A. The Correlation Matrix of Pearson

	ROA	ROE	BS	Dual	Ind	Stat	Frg	Instit	Size	NPLs	Capital	Charter	GDP_gr	IQ
ROA	1													
ROE	0.06	1												
BS	0.08	-0.16*	1											
Dual	-0.14*	0.01	-0.00	1										
Ind	0.18*	0.10**	-0.30*	-0.06	1									
Stat	-0.13*	-0.08	0.18*	0.34*	-0.16*	1								
Frg	-0.05	0.02	0.09	-0.13*	-0.48*	-0.38*	1							
Instit	-0.00	-0.05	0.28*	-0.15*	-0.38*	-0.44*	0.55*	1						
Size	-0.19*	0.26*	0.10**	0.15*	-0.02	0.05	0.19*	-0.03	1					
NPLs	-0.02	-0.32*	0.13**	0.10**	-0.33*	0.15*	0.05	0.13*	-0.39*	1				
Capital	0.13**	-0.04	-0.27*	-0.20*	0.32*	-0.23*	-0.18*	-0.01	-0.16*	-0.14*	1			
Charter	-0.14*	-0.05	0.02	0.31*	-0.33*	0.06	0.26*	0.18*	-0.14*	0.16*	-0.49*	1		
GDP_gr	0.03	0.10**	-0.09	-0.19*	0.24*	-0.09	-0.10*	0.09	0.09	-0.22*	0.33*	-0.49*	1	
IQ	0.23*	-0.02	-0.11**	-0.41*	0.34*	0.01	-0.45*	-0.18**	-0.21*	-0.26*	0.45*	-0.32*	0.33*	1

Note. * Statically significant at 5% level, ** statically significant at 10% level.

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Cyclicality of Lending Behavior by Banking Sector for the Period (2000-2013): Evidence from Jordan

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Abstract

All economic sectors and individuals in Jordan rely mainly on banks to cover their shortage in money, thus banking sector plays a vital role in enhancing investments and economic development by standing in the middle between deficit units and surplus units. The major goal of this study is to identify what are the main drivers that impact lending behavior in Jordan. Using panel data and applying multi regression analysis on (13) Jordanian Conventional banks and two Islamic banks for the period (2000-2013) that are covered in this research, we found that lending behavior is statistically significantly affected by internal factors (DV, IR and net profit after tax) and it is also affected significantly by external factor (RR, GDP, IFR, OWDR and Red. R). Also the analysis indicated that OWDR and Red. R as a proxy for monetary policy did have a negative impact on lending behavior but not significantly proven. The study also reached to a conclusion that the amount of loans and advances extended by Jordanian banks is not affected by rate of interest. We recommend that Jordanian banks' management should take into consideration internal specific factors as well as external specific factor with more care while formulating their lending policy, moreover central bank in cooperation with the Jordanian banking sector should work in more productive relationship in order to enhance more the economic growth.

Keywords: lending behavior, monetary policy, banking sector, central bank

1. Introduction

Investment cycle momentum depends mainly on funds availability were commercial banks (CB) are the major players in this regard, as commercial banks are considered the backbone of country's financial system, as banks act as an intermediaries between different society units and the do so in order to generate returns. Many studies tried to investigate into the linkage between the financial system and investment cycle. Banks working in emerging economies do not have enough capability to provide long-term financial needs to private organizations that is required for investments' augmentation. In some other words, financial barriers of local banks in emerging markets lead to low level of investment and constrain lending to borrowers (Tomak, 2013). Moreover in developing countries, bank's lending behavior significantly will have a potential impact on executing the monetary policy than in developed countries. Generally speaking bank's loans are one of the most important sources of long-term financing in most countries (Freixas & Rochet, 2008).

Since the early emergence of money, there was always two different units – those who own surplus money (surplus units) and those who are in need of such surplus money (deficit units). Thus one of the main drivers that led to the existence of financial credit system was to find a mean that these two units should meet to fulfill the other party requirement. It started with direct financing between both surplus unit and deficit units (Akpaniko & Acha, 2010). But were the need aroused to find away to collect all these surplus money from different sources (individuals or legal entities) so that they will be able to grant funds to deficit units (indirect lending). Thus Commercial banks are the main provider of such type of service in order to extend credit to business units and keeps the economic cycle moving (Mckinon, 2005).

Many Studies have investigated behind the variables that are responsible in determining banks' lending behavior. This study do differ from these studies will focus on investigating into the internal factors (Deposit Volume – DV, Interest Rate – IR and Net Profit after Tax) and the external factors (Reserve Requirements – RR, Gross Domestic product-GDP, Inflation Rate – IFR, Overnight Window Deposit Rate - OWDR and Rediscount Rate –

Red. R) That influence baking sector lending behavior in Jordan.

2. Literature Preview

(Slovin & Sushka, 1983) investigated into the commercial banks loans' level determinants rates, as they argued for the independence of liability: assets management policy, supported by experimental evidence based on time series data.

(Tomak, 2013), study was based on private commercial banks and government owned banks taking into account bank based determinants such as bank size and funds availability and market based factors such as rate of interest, GDP and inflation rate. The study concluded that the major factors that affect commercial banks lending behavior are bank's size, total liabilities and rate of inflation, more over the study indicated that commercial banks performance outperformed Government owned banks.

(Toni, 2008) studied profitability macroeconomic factors that influence banks' lending determinants in Nigeria, The study reached to a number of number of results one of the most important one was that macroeconomic factors such as rate of inflation, rate of interest, monetary policy and rate of exchange are the main determinants of banks' profitability level. (Talavera at el., 2006) pointed that the lending level by banks will grow during boom periods and less level of macroeconomics instability and will decline during recession periods.

(Chernykh & Theodossiou, 2011), run their research on a sample of Russian banks, were they found that banks ability to grant more loans depends on factors such as: market capitalization, bank size and the availability of long term liabilities and that banks with low capital level, provide a low level of long term finance.

(Adofu & Audu, 2010) to test the influence of interest deregulation on increasing the agricultural productivity by adopting ordinary least square model. The researchers found that rate of interest own a substantial role in mobilizing and developing economic activities. (Rasheed, 2010) by applying the error correction model they concluded that the more the Nigerian financial system incorporate more with the international market, the foreign investments will play a major role in fixing the local rate of interest.

Olumuyiwa at el. (2012) in their study they investigated into lending behavior and the level of lending in Nigerian commercial banks, they found that there is a direct relationship between deposit volume and loans and advances volume, from the other side factors such as naira rate of foreign exchange, GDP and reserve requirement by central bank do reflect a negative relationship with lending behavior.

Drumond and Jorge (2013) theoretically tested the effect of banking sector structure on lending behavior in the context of a new regulatory environment. They indicated that shifting from risk free capital requirements to risky ones the rate of interest on lending. While (Felicia, 2011) applied regression analysis to study commercial banks lending behavior's determinants, were he pointed out that the main determinant that effect the Nigerian lending behavior was the deposit volume. (Amidu, 2006) investigated if the Ghanaian banks lending behavior is limited due to monetary policy, using panel cross sectional data analysis, found that lending behavior by Ghanaian commercial banks are significantly affected by change in the volume of money supply and economic activities, more over the prime rate and the rate of inflation do have an adverse effect on commercial banks lending behavior. This is the same result reached by (Bernanke & Blinder, 1988) that monetary policy is the main factor that constrain commercial banks lending behavior. While (Pausch & Welzel, 2002) analyzed the role capital adequacy standard by applying Klien-Monti model, as they concluded that adoption of capital adequacy standard may cause an increase in lending rate for one time but it also indicated that such standard will have no effect on deposit rate.

Ogbokor and Moses (2014) study which was conducted on Namibia (1993-2002), found that demand on banks' loan is influenced more by other factors rather than by rate of interest such as REPO rate by central bank that could be used an effective way to direct credit by banks.

In a study by (Guo & Stepanyan, 2011) they revealed that foreign and domestic and foreign financing are positively related with credit growth, as the stronger is the economic growth means a growth in credit volume while inflation rate affect adversely the credit growth.

3. Theoretical Framework

3.1 Banking Sector in Jordan

Jordanian Banking industry plays a significant role as the main financial lender to individual as well as business organization and plays a leading role in economic activities (World Bank, 2003). At present there are 26 banks working in Jordan (10 banks are Non- Jordanian banks constitute almost 12% of the total banking sector assets) out of it 15 commercial and Islamic banks are listed in Amman Stock Exchange (Banking Sector Report, 2013),

all are working under the umbrella of the Jordanian Central Bank (CBJ) which was established in 1964, which was in charge of applying monetary policy and controlling the volume of liquidity within the economy through direct methods (rediscount rate, legal reserve requirements and credit limits) tell early 1990's, then since 1993 it started adopting indirect methods such as (open market operation, Certificate of deposit and overnight deposit) for the same aforementioned purposes. Since 1989, the Central Bank of Jordan (CBJ) has introduced a number of reforms' measures to create a secured and competitive. Such reforms included increasing the paid-up capital and relaxing all the restrictions on the movement of trade in foreign currency in 1997 (JIB, 2005). More reforms' measures were also initiated certain measures to develop the sector during the period 1999-2002 (Zeitun, 2013). Such measures and procedures are adopted by central bank to ensure a sound and stable banking sector.

Banking sector in Jordan witnessed a development in all aspects for instance the amount of credit facilities in Jordan increases significantly, as at the end of financial year 2000 the total amount of credit amounted to J.D. 8,045 billion ($ 11,343 billion), and at the end of 2013 the total amount of credit facilities provided by banks amounted to J.D 24,341 billion ($34,320 billion, the below table shows the growth of credit facilities during the last 10 years (billion US dollar):

Table 1. Credit facilities growth in Jordanian banking sector (2000-2013)

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Credit facilities	11.34	11.16	11.12	12.33	13.86	17.23	20.83	25.30	29.32	29.12	30.19	31.05	32.92	34.32
% of Non-Jordanian Banks	13.41	14.08	15.95	17.66	8.74	8.78	8.69	9.39	14.00	10.66	9.36	9.56	10.42	11.23

Source: Amman stock Exchange – ASE.

Due to central bank role the banking sector in Jordan is characterized by sound financial position from all aspect and this due to rigid procedures and surveillance conducted by Jordanian Central Bank. For instance the non performing loans percentage in Jordan reached 8.3% at the end of 2013 and this is below the international standards rates, moreover the capital adequacy ratio reached 18.6% end of 2012 which is higher than the limit fixed by the Central Banks which is 12% and by the Basel committee standard of 8%. Moreover the average leverage ratio reached 6.7% at the end of 2013, also its liquidity ratio reached 39% and 36% end of 2012 and 2013 respectively. (Association of Jordanian Banks Report, 2013). In general deposits act as a stable source of finance for banks (Song & Thakor, 2007). We should mention that banks in Jordan depends mainly on deposit as the main source of finance, table- 2 below reveal the percentage of deposit as to total assets (2000-2013):

Table 2. Percentage of banks' total deposits to total assets

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Credit facilities	84.8 %	81.2 %	80.9 %	80.4 %	79.6 %	77.2 %	72.2 %	72.5 %	73.6 %	73.8 %	81.6 %	75.1 %	71.8 %	65.0 %

Source: Amman stock Exchange – ASE.

3.2 Lending Determinants

Lending behavior by banks is long debated by many researchers, where they navigated into the factors that affect lending behavior. (Gertler & Gilchrist, 2003) and (Chowdhury at el., 2003) Studied the effect of monetary policy, (Bibow, 2000) stated that saving volume and cash balances do affect lending volume. While (Bernake, 2000) pointed out that lending is motivated by the Government. Also factors such as foreign ownership do also affect lending behavior in banking sector (De Haas & Van Lelyveld, 2010), while a study by (Takats, 2010); (De Youngat el., 2005) found that demand and supply are the main derivers of banks' credit facility amount. Analyst and economist have long admitted that there are various usually active factors when it comes to the determinants of lending behavior by banks (Ogbokor, 2014) bank credits in modern economies.

The significance and importance of banks' lending behavior have been viewed in many lectures and studies. Most of these lectures studied banks' lending behavior determinants from two angels – the external factors and the internal factors. Internal factors can be extracted from the financial statement of accounts and the non-financial aspect of bank's management like number of branches and the branch size (Haron, 2004).

Commercial banks are considered the most important mobilize and allocator of financial resources. Therefore this role makes them a significant landmark in economic development and growth. But we should mention that performing such rule in an efficient way is linked to many variables, some of these variables are attributed to bank's management goals (profitability and solvency) also variables such as deposits' volume, banks' portfolio composition, rules and regulations enacted by the central banks, The aforementioned variable are to be taken into account by the bank's management while formulating its lending policy and behavior.

3.3 Objectives of the Study

Banking sector plays a very crucial role in enhancement of economic activities and as a major mobilizer of funds from deficit units to surplus units. This significant role may be affected by various factors, that are may be attributed to the bank's financial position indicator or may be attributed to other factors that out of the banking sector control. The purpose of this study can be summarized in the following points (questions):

a) What are the major factors that affect banking sector lending behavior?

b) Is it internal, external or monetary policy that majorly affects the banking sector lending behavior?

c) Identifying the nature of effect that the study variables do impose on lending behavior by banking sector.

d) To establish a concept related to the role of central bank measures in influencing the lending behavior by Jordanian banks.

4. Hypothesis of the Study

The study will be based on the following three main hypotheses as follow:

H_1: Internal factors do significantly impact the banking sector lending behavior.

H_2: External factors do significantly impact the banking sector lending behavior.

H_3: Monetary policy by Central bank does significantly impact the banking sector lending behavior.

5. Research Methodology and Data Analysis

This study differ from other previous studies as it takes into consideration the factors that may have an impact on lending behavior by banking sector in Jordan from three angels – (1) internal factors (Deposit Volume-DV, Interest Rate-IR and Net Profit after Tax, (2) external factors (Reserve Requirements-RR, Gross Domestic product-GDP, Inflation Rate-IFR, Overnight Window Deposit Rate-OWDR and Rediscount Rate-Red. R) (3) monetary policy effect (OWDR and Red. R as a proxy for monetary policy. In order to investigate into the impact of the aforementioned factor on lending behavior, accumulated data of the banking sector were extracted for the period plus data related to external factors for the period (2000-2013) will be used for the purpose of testing the study hypothesis.

5.1 Database and Statistical Approaches

The data base of this research is an outcome of merged sources. First the amounts of loans (as a proxy for lending behavior), deposit volumes, net profit after tax, reserve requirement volumes are collected from the financial reports of Jordanian banks for the period (2000-2013), and GDP, interest rate, inflation rate, overnight window deposit rate and rediscount rate are also collected from the annual reports of the central bank of Jordan for the same period as illustrated in Appendix (A &B)

Also the natural logarithm - LN for the amounts of loans as dependent variable and deposit volumes, net profit after tax, reserve requirement volumes and GDP as independent variables are calculated (as illustrated in Table 3). After that, using the panel data analysis, we run the Multi - Linear regression done for the independent and dependent variables in order to analyze the regression coefficients (βs) between the loans as dependent variable and the internal, external and monetary policy factors as independent variables.

Table 3. Natural logarithm of variables

Loans	Deposit	Interest	Net profit after Tax	Reserve Requirements
22.81	23.63	21.07	18.86	20.91
22.79	23.65	20.96	19.08	21.89
22.79	23.66	20.73	18.98	22.00
22.89	23.71	20.60	19.08	22.26
23.01	23.82	20.67	19.47	22.31
23.23	23.89	21.01	20.06	22.35

23.42	23.95	21.31	20.15	22.30
23.61	24.09	21.54	20.29	22.55
23.76	24.19	21.57	20.36	22.58
23.75	24.25	21.46	20.05	22.87
23.79	24.40	21.40	19.96	22.93
23.82	24.36	21.45	20.17	22.78
23.87	24.34	21.57	20.25	22.66
23.92	24.30	21.68	20.45	22.86

Since the loan volumes of banks is a function of the independent variables, we can express this relationship by the following formula:

$$Y = \alpha + \beta_1(X_1) + \beta_2(X_2) + ... + \beta_t (X_t) + e$$

Where:

Y: represents the dependent variable(loans – lending behavior);

α: is the constant of the regression formula;

β_1: is the regression coefficient of the first independent variable;

X_1: is the first independent variable;

β_t:is the regression coefficient of the last independent variable;

X_t: is the last independent variable;

e: is the standard error of the regression model.

6. Empirical Results

6.1 Analyzing Impact of Internal Factors

Table 4 presents the empirical results of the Multi regression analysis of pooled data using the independent variables:

Table 4. Presents the multi regression results: (R2) and (Sig) for independent variables

Coefficient	R^2	Sig
Internal Factors	0.991	0.000
External factors	0.987	0.000
Monetary Policy Factors	0.203	0.287

As indicated in table (4) above, and according to determinant value (R^2) the internal factors explain 99.1% of the changes in loans and advances amounts (lending behavior) granted by Jordanian banks and that the analysis also indicated a significant positive impact of internal factors (DV, IR and net profit after tax) on banks loans and advances, also the external factor RR, GDP, IFR, OWDR and Red. R together, do influence positively banks' lending behavior. But, monetary policy factors explain a positive impact amounted to 20.3% of the change in the amount of loans and advances, (Heuvel, 2005) study reached for the same result. The results also show that according to Sig - t. level, not all the internal factors have significant impact on loans and advances volume, only deposit volume and net profit after tax have positive significant impact for the period (2000-2013) at Sig ≤ 0.05 while the interest rate has a positive impact on loans and advances but this impact is insignificant as shown in table 5 below. This insignificant positive impact may be due to inclusion of two Islamic banks in this research which do not deal with interest rate.

Table 5. Presents the multi regression results: (B) and (Sig) for internal independent variables

Coefficient	B	Sig
Deposit Volumes	1.029	0.000
Interest Rate	0.040	0.071
Net Profit After Tax	0.331	0.000

6.2 Analyzing Impact of External Factors

Table 5 above also shows that the external factors explain 98.7% of the change in the amount of loans and advances granted by Jordanian banking sector also the statistical analysis pointed out that there exist a positive impact of external factors (RR, GDP, IFR, OWDR and Red. R.) on banks loans and advances is found. In addition to the aforementioned, the Results show that according to Sig. level, not all the external factors have a significant impact on loans and advances, only the GDP has positive significant impact for the period (2000-2013) at Sig ≤ 0.05as shown in Table 4, same result was reached by a study conducted by (Panizza, 2004).

Table 6. Presents the multi regression results: (B) and (Sig) for external independent variables

Coefficient	B	Sig
Reserve requirement volumes	0.130	0.161
GDP	0.764	0.000
inflation rate	0.003	0.691
overnight windows deposit rate	0.006	0.887
rediscount rate	0.055	0.144

7. Analyzing Impact of Monetary Policy

Referring to Table 2 and to explain the impact of monetary policy factors on banks' lending behavior we can notice that these factors explain 20.3% of the change in the amount of loans and advances granted by Jordanian banks and such impact is statistically insignificant but indicates a negative impact as shown in Table 7. of these factors (overnight window deposit rate and rediscount rate) on banks loans and advances as sig-t value is more than 5% which is the level of significance approved for this study (Sig. = 27.8%).

Table 7. Presents the multi regression results: (B) and (Sig) for monetary policy independent variables

Coefficient	B	Sig
overnight windows deposit rate	0.309	0.123
rediscount rate	-0.314	0.151

8. Conclusion

Based on the above statistical analysis we should indicate that both the hypothesis (H_1 and H_2) are accepted and that the internal factors and external factors do influence significantly and positively the lending behavior of Jordanian banks, while the monetary policy tools (OWDR and Red. R) were reflecting a negative but insignificant impact, nevertheless of the concept that central banks measures and tools are meant to direct the lending behavior of banks and this result is contradicting such notion as they have a mutual beneficiary relation between them, based on that we will reject hypothesis (H_3). Moreover its worth mentioning that the major determinants of Jordanian banks lending behavior was from internal factors which are under the control of banks management, were they should concentrate on to enhance their lending which ultimately will lead to increase in banks profitability, also they should act toward attracting more deposit, as its increase will lead to increase in loans and advances which is the major function of all banks. Moreover we should expose that interest rate has insignificant influence on lending behavior, this due to the fact that when borrowers (either individuals or legal entities) are in need of finance they will head to banks no matter how much is the interest rate, and also due to the inclusion of two Jordanian Islamic banks included in this research. Very important recommendation of this study, that commercial banks should be more responsive toward monetary policy procedures and tools, that aim at protecting the economy as well as the currency value.

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Appendix A. Independent Internal Factors

Year	Internal Factors				
	Loans	Deposit	Interest	Interest On Loans and advances	Net profit after Tax
2000	8,044,898,960	18,260,987,043	1,414,531,331	11.38	155,316,895
2001	7,917,221,881	18,648,219,517	1,270,981,320	11.88	193,630,700
2002	7,888,802,962	18,943,754,700	1,005,606,613	9.85	174,250,361
2003	8,745,531,757	19,897,949,804	886,913,788	10.24	193,960,950
2004	9,825,907,557	22,091,550,407	945,451,100	8.98	284,534,051
2005	12,216,907,211	23,684,870,337	1,329,970,719	7.92	513,607,694
2006	14,772,271,394	25,153,877,932	1,802,038,477	8.72	564,784,554
2007	17,937,734,412	29,031,341,163	2,259,250,977	9.45	647,169,895
2008	20,792,617,320	31,913,376,898	2,324,914,250	8.89	692,795,406
2009	20,651,660,614	34,051,613,504	2,085,413,947	9.17	512,166,315
2010	21,408,367,027	39,570,242,760	1,975,240,695	9.41	465,588,851
2011	22,020,352,390	37,942,952,406	2,067,969,464	9.34	576,906,634
2012	23,367,007,166	37,334,393,620	2,331,054,011	9.59	624,566,402
2013	24,341,154,121	35,671,768,557	2,599,784,251	9.20	760,010,958

Appendix B. Independent External Factors and Monetary Policy Factors

Year	Internal Factors				
	Reserve Requirements	GDP	Inflation Rate	Rediscount Rate	Overnight Window Deposit Rate
2000	1,208,593,343	8,457,923,945	0.70	6.50	5.75
2001	3,220,252,574	8,972,965,061	1.80	5.00	3.88
2002	3,595,913,156	9,580,191,951	1.80	4.50	2.2
2003	4,664,499,207	10,193,023,726	1.60	2.50	2.00
2004	4,866,384,268	11,407,566,660	2.60	3.75	2.25
2005	5,080,968,070	12,582,876,895	3.50	6.50	4.50
2006	4,860,118,305	15,056,937,190	6.25	7.50	5.25
2007	6,195,797,150	17,110,610,000	4.70	7.00	4.75
2008	6,393,158,278	21,971,835,256	13.90	6.25	4.00
2009	8,563,375,488	23,818,322,918	-0.70	4.75	2.50
2010	9,104,219,608	26,425,379,367	5.00	4.25	2.00
2011	7,789,978,339	28,840,197,019	4.40	4.50	2.25
2012	6,940,390,081	31,015,239,496	4.70	5.00	4.00
2013	8,476,522,184	33,678,459,200	5.60	5.25	3.75

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Rules vs. Discretion in Monetary Policy: From Commodity Money to Unconventional Monetary Policies

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Abstract

This paper proposes a review of the rules vs. discretion in monetary policy debate. Research shows that monetary regimes based on one or more rules had drawbacks, mainly due to the inflexibility imposed by these rules. Therefore, guiding monetary policy strictly by a set of rules is not the optimal approach. The late twentieth and early twenty-first centuries were characterized by a relaxation of the regulations in force, which led in 2008 to one of the worst economic crisis. Since the efficiency and correctness of the measures taken by the authorities as a response to the crisis are questionable and also that their long-term effects (especially the redistribution of wealth) and how to exit from them are still unknown, it becomes clear that a purely discretionary approach is not desirable either. Consequently, it should be implemented a more restrictive approach in terms of the discretionary component embedded in the authorities' decision. A starting point might be to increase the transparency regarding, for example, the algorithm by which the central banks set the policy rate or decide to increase the monetary base. In this sense, for central banks managing reserve currencies could be established publicly announced rules that govern the issuance of money and the policy rate. Moreover, such measures must be combined with improving the regulations in force, so that the attention will be also geared towards the microeconomic level, where it is most important to maintain financial stability. Last, but not least, it is important to remember that this stability should come as a result of the improvement of the general welfare, as the architects of the old Bretton Woods system envisioned.

Keywords: monetary policy, rules, discretion, quantitative easing, inflation targeting

1. Introduction

The crisis from 2008 and, in particular, the measures taken to remove its consequences reignited the discussion related to the necessity of rules governing the economic activity and, in particular, the money issuance. The idea of finding some rules to help to achieve some monetary targets is not new. According to some historians, the presence of this dilemma can be identified since the Roman Empire. Volkart (2007) examined the available data for 25 cities from the period 1352-1562 and concluded that those that managed their own currencies were more effective in ensuring their stability than cities whose currency was provided by a prince. In other words, the existence of rules aimed at maintaining the purchasing power of money is preferable to discretionary policies in this regard. Two centuries later, Smith (1776) noted in the “Wealth of Nations” that the use of paper money, provided their issuance is properly regulated, may “even bring benefits”. Ensuring the so-called proper regulation rose controversies. After some, the banks of issue had to adjust their activity as they saw fit, after others there had to be rules imposed. From the last category, the most prominent voice was that of Henry Thornton (1802), who argued that there is no automated method to control the amount of banknotes in circulation. Therefore, this task should be the responsibility of an institution (Bank of England) which was to guide the system based on some macroeconomic considerations. This view made Thornton to be considered the father of modern central banks. He sketched the principles that should guide such bank, among which was the recommendation that the amount of money in circulation should not be decreased but let to fluctuate within certain limits and allowed to increase slightly if the economic activity grew and also that the bank had to act temporarily off limits if there were extraordinary circumstances. After four decades occurred the famous debate between the currency and banking school. The firsts argued that inflation comes from excessive government

spending, while others explained inflation as a mismatch between the amount of banknotes in circulation and the needs of trade. They wanted banks of issue to adjust the amount of money based on existing demand, so it should have fluctuated not be limited by rules. Laider (2002) analyzed the dispute and showed that it is preferable to have an exchange rate constraint i.e. to keep constant the coverage of the stock of money with precious metal instead of discretion in their issuance. Shortly after this dispute, Bagehot (1873) analyzed what should a central bank do in order to achieve what we call today financial stability. He showed that in times of crisis, the central bank must provide liquidity, or in other words, to sterilize any losses of the reserve asset, by granting substantial loans to eligible banks.

The twentieth century brought the First World War which caused, among other things, a huge inflation. With this occasion, writings such as "100% money" by Fischer (1920) and "A tract on monetary reform" by Keynes (1923) gave a new dimension to the discussion related to a managed currency or a currency subject to rules. Commodity money began to lose their importance, as maintaining price stability started to be considered more important than exchange rate stability. This stability implied in Keynes's vision the breaking of all links with gold, while Fischer believed that gold is necessary to be kept as an anchor, only that its stiffness had to be made more flexible. He proposed the monitoring of an index of the purchasing power of gold in relation to other products and its fluctuations should have been offset by redefining the gold content of the currency. For example, a variation of this index by 1% would mean that the currency has lost 1% of its purchasing power, so its gold content should be increased by 1%. Otherwise, the operation was reversed. Despite his efforts, Fischer's proposal was not implemented.

Since 1950 and until 1971, the last stage of the existence of commodity money is consumed. The Bretton Woods system, which required signatory countries to keep their exchange rate stable by binding it to gold and set the IMF to help overcome temporary imbalances of payments among members, collapsed in 1971, when US President Nixon suspended the convertibility of the US dollar.

After 1971, fiat money management goes through several stages, starting with exchange rate targeting, monetary targeting, inflation targeting and, finally, the implementation of unconventional monetary policies.

2. Some Types of Rules, in Chronological Order

2.1 Commodity Money

Their principle of operation involved the possibility to convert one currency into a good at default parity and the monetary policy's objective was to ensure that convertibility was always maintained. The convertibility rule is the first rule limiting monetary expansion, with the hope of containing inflationary pressures coming from the government and not only. As for the relation with the outside, the capital was free to move, so any movement in the balance of payments turned into an increase or a decrease in the number of banknotes in circulation. Commodity money can be considered the most longevous rule that governed money creation, their period ending de facto in the early 1900s, even though full switch to fiat money was made in 1971. The bulk of the period in which such money circulated is called free banking and involved the lack of central banks. The results of my research covering this type of banking showed that commodity money were complemented by other restrictions on the banking activity such as the requirement to hold government securities as collateral for notes issued (USA), the obligation to publish financial data (USA, Chile), the prohibition of accepting land as collateral (Australia and partially in Scotland), capping interest rates (Scotland) etc. Therefore, the rule of convertibility was not sufficient to ensure price stability by itself. Although the general consensus is that inflation under free-banking was lower than the inflation under central banking (Mafi, 2003; Meltzer & Robinson, 1989), it is important to mention that the price level was stable in the long run, but on short term (annually) it was very volatile, registering variations of ± 10-15% per year (Jastram, 1977; Bernanke, 2012). The problem lied in the existence of fractional reserves without minimum limits stipulated, which caused the amount of money to be practically indefinite. For example, in the Scottish system the gold coverage of banknotes ranged from 20% at the end of the eighteenth century to 0.5 to 3.2% at the beginning of the nineteenth century. Therefore, at the same stock of gold, a gold monetary unit could support in circulation an extra 4 to 199 units of paper money.

Also during this period appeared the concept of what we call monetary base due to the observation that the total volume of money in circulation could be controlled through the quantity of the reserve asset. This principle is true today, where the central bank, by controlling the quantity of cash in circulation and commercial bank reserves, influences the evolution of other monetary aggregates.

The first decades of the twentieth century brought a weakening of the role of this kind of money. Increasingly more opinions converged to the idea that for the well-functioning of the system had to be implemented other rules than convertibility. Thus, the role of gold, symbol of commodity money, began to diminish as price stability

started to be more important than exchange rate stability.

In short, a monetary system based on such money involves three pillars: a fixed exchange rate, because all currencies are defined in gold, the presence of entities that monitor the system (central banks) and free flows of capital.

2.2 The Bretton Woods Regime

The Bretton Woods regime was an attempt to combine the classical gold standard regime with the advantages of flexible exchange rates (Bordo, 1993). The problem of the gold standard (as well as of any commodity money) was that prices were volatile and the national economies were vulnerable to the inflows or outflows of gold. Therefore, it was believed that more flexible exchange rates might help national economies to better insulate themselves from foreign shocks. As previously mentioned, price stability started to be more important than exchange rate stability.

The system put the US dollar at its center marking the beginning of US financial dominance. This situation created a paradox that became known in the economic literature as the "Triffin Dilemma", which states that the country whose currency is also the reserve currency must make a trade-off between short term domestic goals and long term international goals. Out of the two, it is quite unlikely that the domestic goals will be discarded, even if the statute of supplier of the reserve currency brings certain benefits. The problem lies in the fact that beyond one point, the reserve currency's price in gold will depart from its official value, usually suffering a depreciation. In this case, the supplier of the reserve currency can either start implementing measures to correct this deficiency or abandon convertibility. In the first case, those measures imply what we call a tightening of the monetary policy, which affects the national economic environment. In the second case, which is what actually happened, the system collapsed.

In terms of performance, judged by inflation and economic growth, the regime ranked well as Meltzer and Robinson (1989) find that the economic growth in this period was the highest compared to previous and post regimes, up to the year 1985. However, it is important to remember that economic growth can be partly justified by the fact that the system overlapped the period of the reconstruction of the economies of the war-torn countries. As for inflation, the regime was on average better than the fiat standard regimes that succeeded it and under the gold standard.

The fall of the Bretton Woods system was caused primarily by the US pursuing an inflationary policy which was in line with its domestic goals but not appropriate with its role as supplier of the reserve currency. In fact, the system evolved in its final years towards a dollar standard, as it was clear that the US did not have the necessary gold to back the dollars issued. In this moment, countries became reluctant to either allowing the US to gain the seigniorage revenues associated with issuing dollars (France), unwillingness to import inflation (Germany) or to accept opportunity costs of holding greater and greater amounts of US dollars (probably almost all countries). This shows that a system dependent of a single reserve currency is not the best choice. Finally, I would like to recall that this regime was presented as one that promotes prosperity, aiming at assuring full employment and rising wages. In this light, one important lesson that can be drawn and applied to today's circumstances is that the general welfare should come first and stability afterwards, as a result.

2.3 The Taylor Rule

Taylor's rule (1993) discards the quantitative aspect of monetary targeting and shifts to setting policy rates. In general, the rule implies that the central bank should react to two variables: the gap between current and desired inflation and the gap between actual and potential GDP. In its general form, Taylor's rule can be written as:

$$i_t = i + \pi_t + \alpha(\pi_t - \pi^*) + \beta(y_t - y^*) \quad (1)$$

where i_t is the interest rate in period t, i is the equilibrium real interest rate, π_t is the inflation rate, π^* is the desired rate of inflation and $(y_t - y^*)$ is the GDP gap.

The classic form of the rule is:

$$i_t = i + 1.5(\pi t - 2) + 0.5(y_t - y^*) + 2 \quad (2)$$

The rule is simple and intuitive. Coefficients can be modified so that the importance given to the two variables, inflation and GDP gap can be adjusted. The focus is on inflation and it implies that for a change of 1% in its value the central bank should adjust the interest rate by 1.5%. Introducing the GDP gap was made because the US central bank has a mandate aimed also at full employment. However, this approach is consistent with an inflation targeting regime, where even if the central bank is not responsible for promoting economic growth, it is not indifferent to the evolution of this variable.

Regarding the usefulness of this rule, opinions seem to indicate a low utility. For example, Asso et al. (2010) summarize the views of some major central banks. They find that the European Central Bank indicates that the two variables are not usually sufficient to calibrate the monetary policy. Factors like exchange rates, fiscal indicators etc. must also be taken into account. The Bank of Japan shares the same view, but believes that such a rule is still useful for the estimations than can be made using it. A similar approach is found in the case of the Bank of England. King (2001) believes that a flexible inflation targeting regime brings superior results to using simple Taylor-type rules.

Currently there are in use a variety of rules derived from the original rule proposed by Taylor. Their importance appears to be secondary, as no central bank guides itself only by such a rule. The merits of this rule remain the impulses given towards greater transparency and independence of the central bank.

2.4 Inflation Targeting

As previously shown, monetary targeting eliminated the lack of response to national conditions implied by exchange rate targeting, but suffered from a lack of correlation between the aggregates and the targeted variables. To correct this, it was passed to the inflation targeting regime. This means that the central bank announces what rate of inflation targets on medium term and then the expected rate is compared with the recorded rate and the monetary policy is adjusted according to the difference between the two.

The definition highlights several positive features of the regime. The first is that it allows the central bank to take into account developments in the national economy, so it can respond, for example, to changes in the velocity of money, thus eliminating the inconvenience discussed at monetary targeting. In addition, setting clear targets increases the central bank's accountability, so on one hand, the public can assess more easily whether the bank has achieved its goal and, on the other, the political pressures to conduct monetary policy in a certain way, usually expansionist, are significantly tempered. The big advantage is that, as noted by Mishkin (1999), such a system shows that the central bank can control inflation rather than support economic growth.

One of the questions that can be asked is why, as long as this regime directly targets inflation and the central bank's mandate is to ensure price stability, the inflation target is not zero? The answer comes from the fact that in extreme situations such as those experienced today, interest rates charged by banks cannot be negative, so the policy rate loses its effectiveness and can no longer give a boost to the economy. Conversely, if a 2% inflation is allowed, for example, real interest rates become negative, so that the depositors are encouraged to spend rather than save and the investors to borrow and invest, given the low or even negative costs credit. Basically, the option of having negative real interest rates is paid by accepting a very low inflation. Another argument is that methods of calculating the price index are sensitive to non-monetary fluctuations, so pursuing a null variation is impossible.

The proper functioning of this strategy requires the existence of a high degree of independence of the central bank, so that it does not respond favorably to the government's financing needs, either by issuing currency or by reducing interest rates or other mechanisms. Another problem is the trilemma, especially when the central bank is forced to keep the exchange rate stable, as is the case in emerging economies. As long as inflation target coexist with other objectives of the monetary policy and the central bank does not have the means to transmit to the public its priorities and how will act to achieve them in a credible way, there will be a tension between inflation targeting and other objectives.

This regime also enjoys transparency, by publishing inflation reports, by holding press conferences discussing various aspects of inflation, the central bank's objectives etc.

3. Unconventional Monetary Policies

As the crisis forced the authorities to lower the policy rates to almost 0%, this instrument was used to the maximum, so other measures were needed to continue the easing of the monetary policy. These came to be known as unconventional monetary policies and I will insist on them in the followings. Although these policies have manifested in many forms, they can fall into three categories, according to Cerna (2014): signalling policies, policies aimed at providing liquidity and asset purchase policies. Because policies aimed at providing liquidity, even under very relaxed conditions, can be treated as part of the role of lender of last resort that the central bank has, I will not insist on them in this paper.

3.1 Signalling Policies

Such policies are useful because central banks cannot fully understand how the financial markets work, which is why, at least under special circumstances, they should be transparent in terms of the objectives they pursue and the variables used as benchmarks. If in the past the perception was that the central bank should leave some

ambiguity about its future intentions, as Greenspan once said "*If you understood more than 20 per cent of what I said, it means I didn't express myself well*", the crisis has changed this perception and today the major central banks of the world are clear about their objectives and the actions they will take.

In practice, central banks have used these policies to describe how the policy rates will evolve. In other words, these policies aimed at anchoring the public's expectations about the future values of policy rates, exploiting a finding of the economic research, namely that the public's expectations about a particular phenomenon affects its current behaviour and, therefore, the macroeconomic equilibrium.

The best example of a signalling policy is the *forward guidance* adopted by the US central bank (the Fed). In 2008, the Federal Open Market Committee decided that, due to the poor conditions of the US economy, the policy rates will remain at exceptionally low levels "*for a while*". Three months later, "*for a while*" turned into "*a longer period of time*" and, in 2012, as the US economy still wasn't recovering, the period considerably extended "*until the economy shows signs of recovery*". In October 2014, the Fed reiterated that the policy rate will be kept at a minimum until it will achieve its objectives of full employment (i.e. the unemployment rate below 6.5%) and an annual inflation rate of 2%.

In the European region, the European Central Bank (ECB) has been slower to adopt such a policy. In fact, the first signal sent to the market was in 2012, when Mario Draghi, the ECB President, announced that it will do whatever it takes to save the euro, without giving specific details. Regarding policy rates, the ECB announced in July 2013 that it would keep them low "*for a long time*", adding in 2014 that even if inflation is approaching the 2% target, the poor economic prospects will keep the monetary policy in this stance.

A natural question is how effective is such a policy. Given that the objective of any central bank is to control inflation, what will happen when these low interest rates will be below those indicated by the models used in the calibration of the monetary policy, such as, for example, Taylor's rule? Will the central bank waive them or accept a higher inflation? These questions show that it is not clear how useful such policies really are. Furthermore, the implementation of programs aimed at purchasing securities makes the empirical research on its effectiveness even more difficult.

3.2 Asset Purchase Policies

These are the most mediatized, since, unlike those above, they involve the direct intervention of the central bank through the acquisition of securities. This policy assumes that the economy is in a "liquidity trap", a situation which is characterized by the fact that interest rates are very low or even zero and fluctuations in the money supply do not affect the price level. Under these conditions, the public is very interested in hoarding cash because his expectations are that a period of deflation will follow, so the purchasing power of money will increase. Consequently, any surplus money created by the central bank will be hoarded instead of being spent.

According to Bowdler and Radia (2012), the transmission mechanism of these policies can be represented as follows:

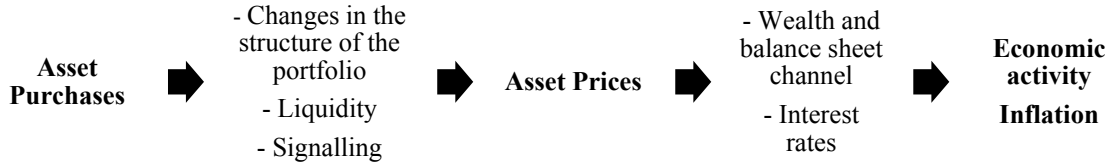

Figure 1. The effects of asset purchases by central banks

In the first phase, the central bank buys assets to inject liquidity into the system. It is important that those assets are not substitutes for money (i.e. they are not highly liquid) because if so, the strategy will not work. Any asset acquisition involves an increase in their price as a result of the rise in the demand. Moreover, in the case of assets generating a fixed income (such as bonds), these purchases, coupled with the commitment to keep policy rates to a minimum, will put pressure on the interest rate demanded by investors, because it eliminates the interest rate risk, for which the latter demand remuneration. The result is that, on one hand, the increase in the price of some assets can make them to be considered too expensive to be bought and, on the other, a decrease in the remuneration of others can make them unattractive. This change in the composition of the available portfolio requires investors to turn to other types of assets, even if they are riskier. In terms of liquidity, it is easy to guess

that if funding disappears or is very expensive, liquidity injections made by central banks through buying operations help at improving market conditions. Finally, sending a signal relates to the fact that such operations induce the idea the monetary policy will continue to be relaxed in the future.

In the second phase, asset prices would have risen, at least in theory. Consequently, due to their revaluation, there is an increase in the wealth of their owners and, therefore, the possibility that they spend or borrow more. This trend is exacerbated by the fact that, following the acquisitions made by central banks, the risk-free interest rate, which is the base for calculating interest rates at different maturities, decreases, thereby causing a general decrease in the interest rates charged by banks on loans of different types. However, it can be seen that the beneficiaries from these operations will be those who have access to financial markets i.e. companies, households that already hold assets etc. Most of the households and small businesses will not benefit from these programs or, if they do, it will be due to side effects. Therefore, such policies may cause a redistribution of wealth in favour of the wealthy.

Such policies help to enhance the credibility of the fact that the central bank will keep the policy rate at zero as long as necessary. In addition to the impulse given by injecting liquidity into the system, by massively buying public and private debt the central bank is unable to change its monetary policy stance ad-hoc, due to the costs caused by the inverse relationship between interest rates and stock prices.

The most well-known programs of this type are the quantitative easing programs carried out by the Fed. After their deployment, the US central bank's balance sheet developed as it can be seen in the chart below:

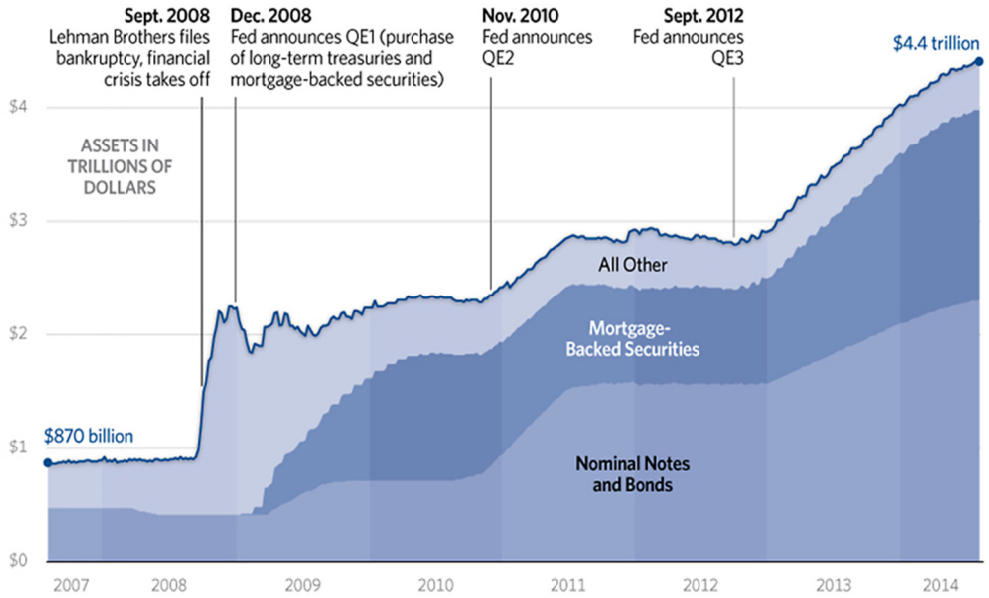

Figure 2. Fed's balance sheet 2007-2014 (USD millions)

Source: www.heritage.org.

In the first program, launched in December 2008, the Fed announced it would buy securities issued by the two state companies in the amount of USD 100 billion and mortgage-backed securities worth of USD 600 billion. In the second program, in November 2010, the Fed announced that it would buy long-term government bonds worth of USD 600 billion at a rate of USD 75 billion per month. In the third program, which began in September 2012 and ended in October 2014, the Fed bought stocks worth of USD 45-85 billion per month.

Regarding the European Central Bank (ECB), given that the euro zone borrows money predominantly through the banking sector, it has provided unlimited liquidity to commercial banks, if they had quality collateral. Subsequently, this list of eligible collateral has been enlarged.

When these measures proved to be insufficient, the ECB launched the Securities Markets Programme by which it started to buy government bonds directly from secondary markets. These were held until they reached maturity and the liquidity created through these purchases was sterilized. This program was replaced with the Outright Monetary Transactions (OMT) program, through which the ECB committed to buy short-term bonds on

secondary markets in unlimited quantities in order to support the Eurozone countries that risked abandoning the euro. The access is conditioned by four criteria: the applicant must have received help through the Eurozone bailout funds, the European Financial Stability Facility / European Stability Mechanism, it must have respected those assumed in the Memorandums of Understanding signed on the receipt of those funds, it must have access to financial markets and, if all of these are met, the acquisition of securities through the OMT would begin only if the interest rate demanded on that countries bonds is inconsistent with its economic status. At the time of this writing, no state had asked for support through this program, but its existence seems to have calmed markets for government securities. As for the ECB balance sheet, its evolution is captured in the figure below.

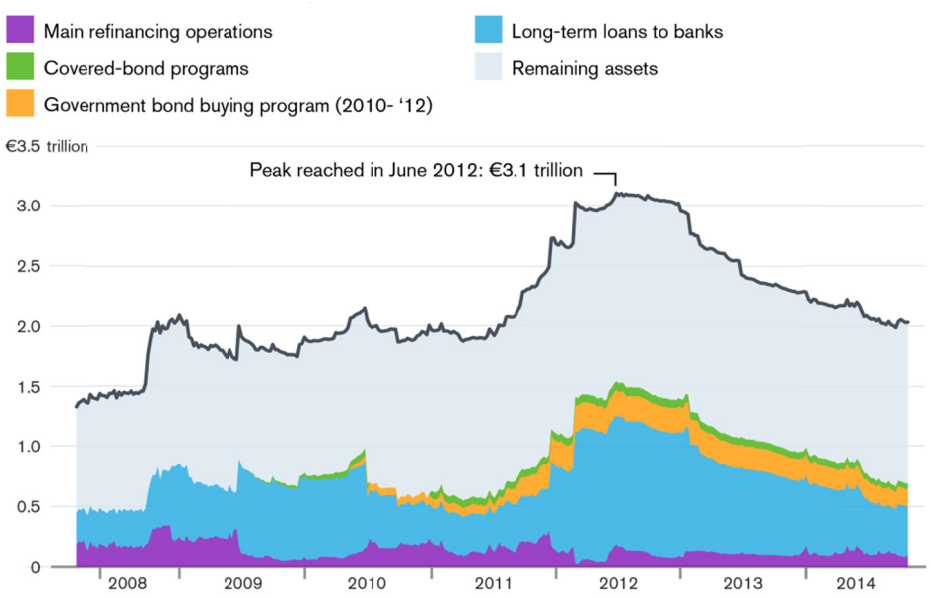

Figure 3. ECB balance sheet evolution (EUR billions)

Source: Bloomberg.

Regarding the efficiency of these operations, it is difficult to give an answer now. The general consensus is that they had an effect, but it is unclear how strong. As in other situations, such as using the changings the price index as benchmark for inflation, the problem lies in accurately identifying which of these effects were caused by these monetary operations and which were caused by other factors. On the other hand, the fact that these operations continued for a long period of time or are still continuing indicates that their outcome was, so far, not the desired one. Most of the excess liquidity created by these programs remained in the reserves of commercial banks, for the reason that they have not found lending opportunities. In contrast, the central banks' balance sheet ended up containing a huge amount of so-called toxic assets, thus clearing the balance sheet of commercial banks. In other words, these assets were exchanged for money issued by central banks, practically bailing-out the banks.

In terms of efficiency, the only experience of quantitative easing that can be investigated empirically, the one that Bank of Japan conducted during 2001-2006, does not provide clear conclusions. Some studies conclude that the measures taken by the Japanese central bank appears to have had some effectiveness, but only in the sense of a slight decrease in long-term interest rates. Others see it beneficial as it maintained the financial markets' stability, but in terms of stimulating economic activity the effects were small and uncertain. From the governments' point of view, these programs led to a reduction in the costs with interests paid, as previously stated. Moreover, the government is the shareholder who enjoys most of the profits made by the central bank as a result of currency issuance through the consistent taxation of its profit. For example, in the case of Romania, 80% of the profit made by the National Bank is paid as tax. In the US, after the central bank shareholders (which are private) receive an annual dividend of 6%, the remaining profit goes to the treasury.

4. Conclusions

Commodity money was the first rule limiting the money issuance, i.e. the convertibility rule. Experience has shown, however, that this rule is not sufficient to ensure price stability by itself, since keeping fractional reserves

without stipulating a minimum required level for them meant that the amount of money was practically indefinite. This type of money began to lose its importance in the early twentieth century, as the perception migrated from exchange rate stability to price stability. Under this new vision, the Bretton Woods regime was implemented, with the hope of promoting prosperity i.e. full employment and rising wages. The system was flawed by was became to be known as the "Triffin dilemma", because the US pursued an inflationary policy which was in line with its domestic goals but not appropriate with its role as supplier of the reserve currency. This shows that a system which depends on a single reserve currency is not the best choice, as its supplier might be interested in pursuing primarily its own economic objectives or tempted to gain extra advantages, which will eventually undermine the system.

The move from commodity money to fiat money and the loss of the opportunity to convert the latter into something of value generated the problem of ensuring their credibility. In this sense, there were tried several alternatives, from targeting the exchange rate, the monetary aggregates and, eventually, inflation. Empirical research has shown that all these monetary regimes have drawbacks, mainly due to the inflexibility imposed by the rules. Consequently, guiding monetary policy according to strict rules is not the optimal approach.

The late twentieth and early twenty-first century were characterized by a relaxation of the regulations, which caused in 2008 one of the worst economic crisis. In response, the authorities' actions have taken a strong discretionary approach by launching quantitative easing programs (America) and intervening to defend the currency (the Eurozone). Since the effectiveness of these policies is questionable and long-term effects (especially the redistribution of wealth) and how to abandon them are still unknown, it is clear that a purely discretionary approach is not desirable either.

Therefore, future actions will probably be to implement a more restrictive framework for the discretionary component of the authorities' decision. A starting point might be to increase transparency regarding, for example, how the central bank sets the policy rate or decides to increase the monetary base. Moreover, for the banks managing reserve currencies and other major central banks (such as those of China, Japan and England) could be established public rules governing the money issuance and the policy rate. Furthermore, such measures must be combined with improving the enforced regulations, so attention should also be geared towards the micro level, where most important is to maintain financial stability. Last, but not least, it is important to remember that this stability should come as a result of the improvement of the general welfare, as the architects of the old Bretton Woods system envisioned.

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Leverage and the Jordanian Firms' Value: Empirical Evidence

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Abstract

This study aimed to investigate the assumed impact of the leverage on the firms' value utilizing unbalanced pooled Ordinary Least Square (OLS) cross-sectional time series panel data regression approach to all listed companies in Amman Stock Exchange (ASE) during the period 2000-2013 after excluding the financial sector and services sector, due to their own characteristics. F-test was used to test the hypothesis that the changes in the firms' leverage level significantly explain the changes in the firms' value. The results shows that the firms' leverage level affect the firms' value for the Jordanian listed companies included in the sample test. This result is consistent with the result of Rajan and Zingales (1995) who find inverse association between debt and performance.

Keywords: leverage, firm value, Jordan

1. Introduction

The association between Leverage and the value of the firm has been the subject of significant discuss theoretically and empirically. Discuss have concentrate on whether the optimum capital structure exist and if there is an impact of the debt's level and the value of the firm. Pandey (2004) indicate that, the capital structure decision depend on its effects on the firm's value, thus, the capital structure of the firm would be the mixture, between equity and debt, that maximize the firm's value. An optimal capital structure is obtained when the firm's value is maximized along with minimum cost of capital (Firer et al., 2004; Erhardt & Brigham, 2003).

Empirical studies have found evidence that support the direct association between firm's performance and their optimal or leverage level: Ward and Price (2006) concluded a direct and significant relationship between leverage and profitability. Sharma (2006) found that leverage and performance are positively correlated. Lasher (2003) concluded a positively relationship between debt ratio and earnings per share (EPS) and return on equity (ROE) as profitability proxies. Conversely, Ebaid (2009), concluded that capital structure has no significant effect on the firm's performance. Tian and Zeitun (2007) find out that Leverage have a negative significant effect on the firm's performance using accounting and market measures for performance.

Modigliani and Miller (1958) known as MM I, considered the starting point for most studies on capital structure. MM I derived the Leverage Irrelevance theory, stating that capital structure has no effect on the firm's value in an ideal environment that has no tax, inflation or transaction costs. This MM I received substantial criticism from researchers who questions the realistic of the MMI theory assumptions.

This substantial criticism stimulates Modigliani and Miller (1963) to issue a correction to MMI theory known as MMII. In MMII Modigliani and Miller still quarrel that the transform in the leverage level does not affect the firm's value, but when taxes and other transaction costs are considered two factors need to be recognized: First, the firm's weighted average cost of capital goes downward as leverage level goes upward. Second, the increase in the leverage level will affect the firm's cost of equity positively due to the fact that investors bear higher business risk cause by the increase in the leverage level as it increase the possibility of bankruptcy.

Although Leverage and its affect on the firm's value had been study for long, it stills a subject of controversy and disagreement among researchers. Accordingly, there is a set of questions still need to be answered, such as: What is the optimal mixture between equity and debt firm has to adopt? If it does, to what extend can the debt ratio maximize the value of the firm? If there is an optimal capital structure, dose it vary among industries?

Based on the above the objective of this paper aims is to investigate the assumed impact of the leverage on the

firms' value in developing market economies namely Jordan.

The importance of this study stems from the fact that most of the studies on this topic was done in developed markets and only little evidence are available from developing markets. Knowing that evidence from developed market cannot be generalize for developing market without research, the main importance of the study comes from trying to find specific evidence of the influence of leverage on the firms' value in developing markets mainly Jordan.

Based on the above, the hypothesis that the study seeks to test can be formulated as follows:

H_0: Firms' leverage level has no significant impact on its value.

To achieve the aim of the study and test its hypothesis, unbalanced pooled Ordinary Least Square (OLS) cross-sectional time series panel data regression approach was applied to selected firms listed in Amman Stock Exchange (ASE) for the time horizon 2000-2013.

2. Theoretical Formwork

2.1 Pecking Order Theory (POT)

Pecking order theory was first featured by Donaldson in 1961 and then modified by Stewart C. Myers and Nicolas Majluf in 1984. Pecking order theory states that funding priorities in corporate finance start from the internal financing to the equity, according to the cost of funding, and raising equity is the last resort in financial decision.

POT is consistent with the idea of asymmetric information, which states that managers have more information about the overall performance of their firms'. This additional information to the managers affects their choice of source of funding between internal and external financing, POT favors' the funding through debt over equity as it signals the board's confidence that the investment is profitable and that the current stock price is undervalued. Funding through equity would signal management distrust and a feeling of overvalued of the stock price. Thus, an issue of stocks would lead to a drop in share price.

Experimental studies in testing the pecking order theory were unable to provide evidence that the theory is considered the most important in explaining the firm's capital structure. Fama and French (2002) and Myers and Shyam-Sunder (1999) concluded the Pecking Order theory was better able to explain some of the data features than trade-off theory. Frank and Goyal (2003) concluded that POT fails where it should hold.

2.2 Trade off Theory (TOT)

The classical version of the Trade off theory goes back mainly to the Kraus and Litzenberger (1973) who considered a equilibrium between the weight costs of bankruptcy and the tax saving advantage of debt. This theory is often set up as an alternative theory to the POT.

The TOT aimed to explain the fact that firms usually use a structure of debt and equity to finance their needs of funds, and states that there is an advantage of debt financing , the tax shield, and there is a cost of financing with debt, the financial distress, bankruptcy and non-bankruptcy. The benefits of the debt financing declines as debt increases, while the cost increases, therefore, to maximize the overall value of the firm, firms have to focus on the trade off when choosing how much debt and equity to use for financing.

2.3 Agency Cost Theory

Agency costs theory expresses the conflicts between owners and managers. Owners surely expect managers to maximize their wealth through their decisions. In contrast, managers seek to increase their salaries and reward, without paying good attention to the wealth of the owners. Therefore, the conflict between the owners and managers occur when the owners' agent "managers" places their personal financial interests the owners'. Agency costs can be either:

A) The costs borne by the firm if the management uses the firm's resources for their own benefit; and

B) The cost of means that owners use to stop the managers from achieving their own interests over the owners'.

To stop or mitigate the agency problem, owners sometimes provides incentives to keep their interest in the top. This usually means paying bonuses to managers if and when the value of the firm increases. These monetary incentives are an example of agency costs. If the incentive plan works as expected, then, these agency costs will be less than the cost of allowing the agents to act in their own interests.

Denis and Milov (2002) argue that a firm's decision to fund through debt means that the firm will be restricted

by the debt holder and this fruition a control means optionally chosen by the firms' owners. De Andres Alonso, Inturriaga, Sanz and Gonzalez (2005) agrees with this view, and proposed that this action is also a signal of a pledge to self-regulation, which reduces debt agency costs.

2.4 Life Stage Theory

Frielinghaus, Mostert and Firer (2005), states that the basic idea of organizational life stage theory is that firms growth through a number of life stages that begins at birth and ends in death. Bender and Ward (1993) argued that the capital structure of a firm could be influenced by its life stage, because financing needs could vary as firm's circumstances do. Bender and Ward also maintained that business risk decreases with the progress of the company's age, allowing financial risk to increase.

Hovakimiam, Opler and Titman (2001) argued that firms should utilize a higher ratio of debt to finance fixed assets, and therefore firms should have higher debt in their capital structure as they mature. Frielinghaus, Mostert and Firer (2005) Concluded to the same conclusion that mature companies have more debt in their capital structure.

3. Methodology

This study adopts the scientific analytical approach by using the unbalanced pooled Ordinary Least Square (OLS) cross-sectional time series panel data regression approach in order to attain the study's aims and test its hypotheses.

3.1 Data Collection

The data needed for the study were selected figures from the financial statements of the all listed firms on ASE for the time period of year 2000 to 2013 after excluding the financial sector and services sector, due to their own characteristics, result in 1082 firm-year observations. Needed financial information was available at the website of the Amman Stock Exchange (ASE).

3.2 Variables

This study consists of two main groups variables which are Leverage as independent variable and firms' performance as dependent variables.

3.2.1 Dependent Variable (ROA)

The return on asset (ROA) is the dependent variable in the econometric model of the study defined as the ratio of annual net income to total assets of a business during a financial year. It measures the ability of the firm to generate net income using its available assets. ROA can be computed as:

$$ROA = \frac{annual\ net\ income}{total\ assets} \quad (1)$$

3.2.2 Independent Variable

The capital structure (leverage) is the independent. Two proxies for the leverage were utilized as follows:

- The Long-term Debt to Capitalization Ratio (LtDC)

The Long-term Debt to capitalization Ratio computes the proportion of a firm's long-term debt compared to its total capital. LtDC can be computed as follows:

$$LtDC = \frac{long\ term\ debt}{total\ capital} \quad (2)$$

- The Total Debt to Capitalization Ratio (TDC)

A metrics of a Firm's financial leverage, defined as the ratio of the firm's debt to the total capital. Debt includes all short-term and long-term liabilities. Total capital includes the firm's debt and equity rights, which includes common stock, preferred stock, minority interest and net debt. TDC can be computed as follows:

$$\text{TDC} = \frac{total\ debt}{total\ capital} \quad (3)$$

3.2.3 Control Variable

A number of firm level characteristics have been identified in previous empirical research that have impart on the firms value. These include sales growth, firm size and asset structure.

- Sales Growth (SG)

Following Zuraidah et al. (2012) the sales growth is defined as the annual growth rate of the sales as follows:

$$SG = \frac{sales_t - sales_{t-1}}{sales_{t-1}} \quad (4)$$

- Firm's Size (FS)

Following Ramadan (2013) the firm's size is measured by the natural logarithm of the firm's total assets, as follows:

$$FS = ln\ (total\ asset) \quad (5)$$

- Assets Structure (AS)

Defined as the ratio of the fixed assets to the total assets, and can be computed as follows:

$$AS = \frac{total\ fixed\ assets}{total\ assets} \quad (6)$$

3.3 Model

To investigate the potential impact of the leverage on the firms' value, the general equation used in our study stated that the value of the firm is a function of its leverage level and its characteristics as follow:

$$Value = f(leverage, firms' characteristics) \quad (7)$$

The two econometric models to be estimate depending on the proxy of the firms' level of leverage by converting equation 7 are as follows:

$$ROA_{it} = \alpha_0 + \beta_1 LtDC_{it} + \gamma_1 SG_{it} + \gamma_2 FS_{it} + \gamma_3 AS_{it} + \varepsilon_{it} \quad (8)$$

$$ROA_{it} = \alpha_0 + \beta_1 TDC_{it} + \gamma_1 SG_{it} + \gamma_2 FS_{it} + \gamma_3 AS_{it} + \varepsilon_{it} \quad (9)$$

Where; ROA is the return on the assets a proxy of the firm value for i^{th} cross-sectional company for the t^{th} period, as i = 1,2,3,…,n, t = 1,2,3,…,14. α_0 is constant. β_1 unknown parameters of the firms' leverage level, which take one of the two alternative measures: LtDC and TDC, to be estimated. γ's parameters of control variables included in the econometric models to be estimated. FS is the firm's size. SG is the sales growth. AS is the assets structure. ε_{it} the error.

4. Empirical Results

Table 1 shows the results of the descriptive statistics analysis for all variables included in the study. It shows that the return on assets in average for the Jordanian firms in the sample of the study is 0.076 with a standard deviation of 3.54. The highest value of ROA is 0.333 and the lowest value ROA is -0.236.

Table 1. Descriptive analysis

Variables	Mean	Min.	Max.	Std Dev.
ROA	0.076	-0.236	0.333	3.54
LtDC	0.35	0.16	0.52	8.84
TDC	0.45	0.21	0.63	4.41
FS	16.08	14.09	18.65	1.12
SG	0.03	-0.37	0.26	1.15
AS	0.67	0.52	0.92	0.36

Note. ROA is the return on. LtDC is the long-term debt to total capitalization ratio. TDC is the total debt to capitalization ratio. FS is the firm sizes. SG is the sales growth ratio. AS is the assets structure.

Long-term debt (LtDC) which is measured by the ratio of Long-term debt to total capital has an average value of 0.35. Its standard deviation is 8.884, the maximum value of the LtDC 0.52 and the lowest value is 0.16. The average Total debt (TDC), measured by the ratio of total debt to total capital, is 0.45, with a standard deviation of 4.41. The value of TDC ranged between 0.21to 0.63. For size (FS), measured by the Ln (Total Asset), has an average of 16.08. Sales growth and assets structure have an average of 0.03 and 0.67 respectively.

Table 2. Pearson correlation matrix

	ROA	LtDC	TDC
ROA	1		
LtDC	-.231**	1	
	.000		
TDC	-.468**	-.788**	1
	.009	.007	
FS	.132*	.014*	.012
	.041	.039	.053
SG	.828*	-.041*	-.037*
	.023	.047	.028
AS	.001*	.191*	.173
	.048	.047	.107

Note. *, **. Correlation is significant at 0.05 and 0.01 level (2-tailed) respectively. The first line is the correlation coefficient; second line is the p-value. ROA is the return on. LtDC is the long-term debt to total capitalization ratio. TDC is the total debt to capitalization ratio. FS is the firm sizes. SG is the sales growth ratio. AS is the assets structure.

Table 2 shows the Pearson correlation analysis results. Table 2 shows that leverage level of the firm, expressed as LtDC and TDC, is significantly inversely correlated to the firm value expressed as ROA. The analysis shows that while the firm value ROA is significantly inversely correlated to the long term debt capitalization ratio (Corr= -0.231, p-value=0.000), it's also significantly correlated inversely with the total debet capitalization ratio (Corr= -0.468, p-value=0.009). Results also shows that the ROA is significantly positively correlated to the firm size (FS) (Corr= 0.132, p-value=0.041), sales growth (SG) (Corr= 0.828, p-value=0.028) and assets structure (AS) (Corr= 0.001, p-value=0.048).

Table (3) presents the regression analysis results; two models were estimated model 1 related to equation 8, where model 2 related to equation 9.

Table 3. Regression analysis results (dependent variable: ROA)

	Model 1	Model 2
LtDC	-0.307*	-
	.039	
TDC	-	-.271*
		.046
FS	1.921*	1.267*
	.0141	.0253
SG	1.917**	2.841*
	.007	.046
AS	13.859	23.571
	.719	.805
Adjusted		
R-Square	0.649	.627
df Regression	5	5
Residual	1076	1076
Total	1081	1081
N	1082	1082
F-value.	.19.924	17.294
p-value	0.000	0.000

Note. Dependent variable: ROA a proxy of the firm value, First line regression coefficient, Second line sig. (2-tail). **, *; significant at 0.01, 0.05 level respectively. LtDC is the long-term debt to total capitalization ratio. TDC is the total debt to capitalization ratio. FS is the firm sizes. SG is the sales growth ratio. AS is the assets structure.

Table 3 shows that after controlling for size, sales growth and assets structure, long term debt and total debt, proxies for leverage, found to be significantly affecting the firm value (ROA). LtDC, in model 1, found to be

negatively associated with the firm value as the regression coefficient of LtDC is -0.307 with p-value = 0.039. This result was confirmed in model 2, as table 3 indicate a negative significant association between the second leverage proxy, TDC, and firms' value with coefficient = -0271 and p-value= 0.046. Thus, we can conclude that the long and total debt significantly have a negative impact on the firms' value. Table 3 also shows that the firm's value is positively significantly affected by the firms' size and the sales growth, but not the assets structure.

5. Conclusion

This study aimed to investigate the assumed impact of the leverage on the firms' value. Utilizing unbalanced pooled Ordinary Least Square (OLS) cross-sectional time series panel data regression approach to all listed companies in Amman Stock Exchange (ASE) during the period 2000-2013 after excluding the financial sector and services sector, due to their own characteristics. F-test was used to test the hypothesis that the changes in the firms' leverage level significantly explains the changes in the firms' value, and biased on the value of p-value's of the independent variables, the p-value of the allover model in model 1 and model 2 and the value of the explanatory power of the models, the adjusted R-square, which range from 62.7% to 64.9%, we can conclude that the firms' leverage level affect the firms' value for the Jordanian listed companies included in the sample test. This result is consistent with the result of Rajan and Zingales (1995) who find negative relationship between debt and profitability.

This unexpected result can be explained by view of De Wet (2006) who states that significant amounts of value can be unlocked in moving closer to the optimal level of gearing, and Modigliani and Miller (1963), who concluded that a firms cost of equity increases as the firm increases its debt. This would support the negative impact of leverage on the firm's value.

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Relationship between the Star and the Hotel Service Guarantees of Customer Satisfaction

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Abstract

Earlier research on service guarantees have evidenced the importance of service guarantees, their positive relationship with the firm, enhance customer's perception and act as a tool to the service quality. The objectives of this study were to examine the relationship between hotel star, service guarantees and customer satisfaction in the luxury hotels in Malaysia. The study wished to explore if hotel star has significant relationship with employee perception and service guarantees and employee perception toward customer satisfaction. The study investigates these relationships from the front-line hotel employee perspective. The study conducted survey and delivered the questionnaires to the front-line employees. The findings indicated that hotel star has strong influence on service guarantees offered by hotels and it has moderate relationship with customer satisfaction. The result showed that customer has almost same level of satisfaction when staying at four or five star hotels due to similar service offerings. Based on the findings, implications for hotel and customers are discussed and further research is suggested.

Keywords: service guarantees, customer satisfaction, front-line hotel employee, hotel sector

1. Introduction

A service guarantee is a tool for promoting service quality which consists of few strong points (Hart, 1988). It encourage organization to identify service failure, focus on customer needs, clear company's performance standard and guideline and builds customer loyalty and increase sales (Zeithaml, Bitner, & Gremler, 2009; Gronroos, 2007; Lovelock & Wirtz, 2007; Hart, 1988). 'Excellent service is a profit strategy for an organization' (Berry, Parasuraman, & Zeithaml, 1994, p. 32) and they highlighted that service quality has close relationship with company's growth, revenue and customer satisfaction. Therefore, to achieve company's success, clear guidelines to employees and organization ultimate strategy is vital (Firnstahl, 1989).

Service sector, for example, will inevitably involve with service encounters to deliver service and front-line employees have high interaction services with customers. Thus, front-line employees play crucial role to present the organization image and build customer positive perception.

In order for front-line employees to perform as expected by the organization, they must have knowledge on performing the job and clear understanding on company policy provided by the employer. Front-line employees have high interaction with customers on a daily basis and they are likely to represent the organization to customers. The nature of their work allowed the researcher to examine the practice of service guarantees which is quite common in the hotel sector. A review of the literature shows that the focus of studies has predominantly been from customer's perspective rather than employee's perception of service guarantees. The potential correlation between service guarantees and employee's perception is interested to be explored and this relationship is being examined in this study.

2. Objectives and Statement of Hypotheses

Bearing in mind the importance of having service guarantees in this customer orientation era, the study findings could help the hotel sector in delivering efficient service guarantees and achieving an optimal continuous service improvement among employees. Based on the above objectives and after reviewing the literature, below are the hypotheses of the study:

H1a: There is a significant difference between hotel star in the perception among employees towards service guarantees.

H1b: There is a significant difference between hotel star in the perception among employees towards customer satisfaction.

3. Literature Review

A service guarantee is viewed as the company signaling to service quality (Wirtz, Kum, & Lee, 2000) while Liden and Skalen (2004) assumed that guarantees act as service development process to company. Theorists have proposed service guarantees from multi-approach dimension since its scope is broad (Kashyap, 2001). Some researchers view it as policy and some say that it is a firm promise. Hotels are often associated with guarantees as it covers the essence of service offerings and the courtesy of service employees during the service consumption (McDougall, Levesque, & Plaat, 1998). Effective guarantee should be meaningful and value to customers, easy to invoke and easy to understand (Hart, 1988). Further, hotel guarantees do not specify on certain attributes but it covers the whole service performance (McDougall et al., 1998). Some hotels known for its guarantees are Hampton Inn and Four Seasons Hotel.

High end or luxury hotels such as four-and five-star hotels are believed to have higher commitment to maintain long-term guest relationship and are committed for customer satisfaction (Kim, Kim, & Kim, 2009). The genteel client values impeccable service and willing to pay for the comfort provided by this type of hotel thus meaningful service guarantees are very much appreciated by the customers. In hotel sector, appropriate relationship marketing such as offering a meaningful service guarantees is important to form, improve and maintain a sound business relationships with customers. Once the hotel has gain customer trust to service provider, it will give confidence to customer and increase their satisfaction (Kim et al., 2009). Thereby, the study suggest that luxury hotel have a better strategy through service guarantees to signaling firm commitment to deliver high standard of service and to reach customer maximum satisfaction.

Customer satisfaction has been main focus for the firm's because of positive customer behavior from the organization's perspective (Söderlund, 1998). Delivering quality service has become priority in this competitive millennium businesses which in turn will lead to satisfied customer (Shemwell, Yavas, & Bilgin, 1998). It has been widely acknowledged in the services and marketing literature that customer satisfaction and service quality is undoubtedly are two related core concepts (Jones & Sasser, 1995; Reichheld & Sasser, 1990; Spreng, Harrell, & Mackoy, 1995). Customer's perception on service excellent has been found to increase satisfaction which leads to customer retention and purchase intention (Cronin & Taylor, 1992; Kandampully & Suhartanto, 2003; Kivelä & Chu, 2001; Söderlund, 1998). Particularly, more recent research conducted in hotel setting, specifically luxury hotels suggest that luxury hotel services and customer satisfaction is highly correlated and contributes to the success on hospitality business (Suki, 2012; Li & Krit, 2012; Guzzo, 2010). Therefore, it is argue that higher level of hotel category has positive relationship with customer satisfaction.

4. Methodology

The study sample will be the four-star and five-star hotels that are situated in Peninsular Malaysia. 10 four-star and 10 five-star hotels in Peninsular Malaysia were contacted and the hotel agreed to participate in the research. Stratified sampling was used to determine the hotel population. According to Aaker, Dave and Kumar (2001), stratified sampling can improve the sampling efficiency by increasing the data accuracy.

The list of hotel was obtained from The Tourism Malaysia's Accomodation Directory 2012-2013, which is used to identify hotel organizations to be used in the study. The researcher referred to the directory book year 2012-2013 because it provides the latest list of hotels with all information available at the time data to be collected. At the time research was conducted, such directory book of year 2014-2015 was not available in the Tourism Malaysia Centre, thus using the directory book year 2012-2013 was highly recommended.

These hotels categories were selected as the research site because it serves the purpose of the study whereby this type of hotels are believed to be more committed with customer satisfaction and provide good service. Furthermore, it is assumed that luxury hotel offer service guarantees to their guests, whether it is explicit or implicitly displayed and with or without the knowledge of its guests.

Accordingly, the unit of analysis for the study is the front-line hotel employee from food and beverage and front office department. They were selected since they have high interaction and deal directly with customers. In determining the population of the study, the hotel managers were contacted to gather data on the average number of front-line employee that work at their hotels. Based on the information, the average number of front-line workers in the front office department was about 10 employees, whereas the average number of food and

beverage department was about 15 employees. Therefore, they form the projected population of the study and calculated as follows:

20 hotels (four-star and five-star) x 25 employees = 500 employees

However, a minimum of 108 respondents were sufficient to statistically represent a population of 500 (Krejcie & Morgan, 1970).

The instrument used was the common measurement behavior with scales and questionnaire method adapted from the work of Hays and Hill (2006), Shahril (2014), Aziz (2007) and Severt (2002) with the reliability or Cronbach's alpha for the questionnaire ranges above 0.8. These researchers work was adapted for this study because of their considerable researches in the field. Furthermore, the researchers feel that the measurement construct developed are suitable for the research design adopted for this study.

5. Findings and Discussion

120 copies of the questionnaires were distributed to the participated hotel. From the 120 questionnaires that were distributed, 110 were useable. The respondent's demographic characteristics are presented in the table below:

Table 1. Respondent demographic characteristics

Demographic	Characteristics and classification	Frequency	Percentage
Gender	Male	64	58
	Female	46	42
Total		110	100
Age	18-20 years	21	19
	21-30 years	32	29
	31-40 years	23	21
	41-50 years	25	23
	Above 50 years	9	8
Total		110	100
Race	Malay	63	57
	Chinese	12	11
	Indian	20	18
	Others	15	14
Total		110	100
Working experience	0-3 years	49	45
	4-6 years	30	27
	7-10 years	24	22
	Above 10 years	7	6
Total		110	100
Level of education	Secondary	45	41
	Certificate	23	21
	Diploma	32	29
	First degree	5	4.5
	Others	5	4.5
Total		110	100
Department	Food and beverage	68	62
	Front office	42	38
Total		110	100

6. Results of T-Test and ANOVA and SEM

In this study, the control variables include star rating, gender, age and experience. T test analysis and one way analysis of variance (ANOVA) was conducted to explore the relationship on the dependent and independent variables.

The analysis was guided based on exploratory analysis. A separate analysis was conducted for each variable. T test was only used when include gender since gender has only two categories; which is male and female; while the other analysis used ANOVA since each of the control variable has more than two categories.

Table 2. Summary of the effect of control variables for employee study

Control Variable	Variable	Sig
Hotel star	Service Guarantees	0.000
Hotel star	Customer Satisfaction	0.039

As evidenced in Table 1, hotel star have a significant impact on the service guarantees. For example, the results showed a significant value on the impact of star hotel on service guarantees (sig: 0.000). Based on the information provided in Table 1, it is assumed that these control variables have a significant impact on the respective variable. For example, it is predicted that hotel star difference has a significant impact on service guarantees. As mentioned previously, four-and five star hotels were evaluated in this study.

Following the steps taken by Aziz (2007), the control variables (as listed in Table 2) were regressed on their respective dependent variables. This is done in structural model by specifying control variables as one of the predictors where additional new paths are created between the control variables to its dependent variables. For example, the effect of hotel star was regressed on two variables where there were two paths leaving the hotel star to service guarantees and customer satisfaction to examine if hotel category makes a significant different to these two variables.

Initially, the effect of hotel star was regressed on all variables and ANOVA proposed only two significant paths found, that was hotel star to service guarantees and customer satisfaction. The study also tests the relationship in structural model analysis to reconfirm the findings. Similar to the result of ANOVA, the structural model analysis found that hotel star has significant relationship with service guarantees and customer satisfaction.

Table 3. Summary of control variables effect in the structural model analysis

Control Variable	Standardized Estimates	Sig
Hotel star → service guarantees	0.241	0.000
Hotel star → customer satisfaction	0.089	0.039

6.1 Relationship between Hotel Star and Service Guarantees

Hotel star were found to be significantly different on service guarantees. The standardized estimates derived from the final structural model has shown that hotel category has significantly associates with service guarantees ($r = 0.241$, $p = 0.000$). This value denotes that hotel star, that is four-and five-star may have a significant different impact on service guarantees offered by the organization.

6.2 Hotel Star and Customer Satisfaction

Similarly, hotel star were also found to be significantly different on customer satisfaction. The result of the standardized estimates derived from the final structural model has shown that hotel category has marginally significant impact on customer satisfaction ($r = 0.089$, $p = 0.039$). The marginal result showed that customer has almost the same level of either satisfaction when staying at four or five-star hotel in this country as the two hotels category offers similar type of services and facilities in their service offerings.

7. Discussion and Conclusions

Good service is an essential asset to upscale or luxury hotels. An assumption is that four and five-star hotels are committed to provide service that will delight the customers. In a similar vein, service guarantees can assist hotels to achieve superior service quality through the management commitment and its employee participation to ensure the consistency of service delivery.

The study found that the front-line employees perceived that hotel star do have significant difference in terms of relationship with service guarantees. It shows that four-star and five-star hotels have some level of service differences offered to customer. Employees in five-star hotel might perceive that they offer higher level of service guarantees and committed to service excellent and do not compromise with service mistakes. Learning from previous service failures is vital to create a long-term relationship with the customers, thus employees committed to provide efficient service recovery and take proactive action to prevent repeat service breakdown. Therefore, service failure is minimal and customers have higher level of satisfaction when staying in five-star hotel.

On the other hand, four-star hotel employees might feel that they have meet customer expectation and achieved

customer's satisfaction. The employees believed that service guarantees guide them to act and serve the customers accordingly. They believe that they can improve the service especially when they receive comment or feedback from customers as service guarantees act as service improvement in future. Nevertheless, based on the result of the study, it can be said that the service guarantees offer in five-star hotel might be more meaningful and have higher credibility compared to the service guarantees offer in four-star hotel in Malaysia.

In terms of hotel star and customer satisfaction, the result shows that employees assumed that customers might perceive that four-star and five-star hotel offer almost the same service level and facilities. Customers might find it quite difficult to differentiate the level of service offering as most of the customer's actual experience met the expectation and they satisfied with the services offered by both types of hotel. Employees may perceived that customers may find the facilities such as hotel rooms, restaurant and outdoor facilities are quite similar in both four and five-star hotels thus the level of satisfaction is almost similar. However, the key differences in the service delivery could be the performance and dedication of hotel employees in serving the guest.

8. Practical Implication

The findings of the study have some implication to the hotel sector, particularly the top management who usually formulate policies, rules and regulation and also to the middle managers who practice and implement them. The findings show that there is a significant relationship between hotel star and service guarantees. Clear information, knowledge and awareness among employees are important to ensure employees know what is expected from them and able to perform accordingly. Employees should be encouraged to give honest feedback about matter concerning their work, free of giving suggestions on the improvement on the overall service performance and management should tolerate dissent.

The study also found that there is a marginal relationship between hotel star and customer satisfaction. Thus, managers play an important roles in encouraging its employees to deliver consistent and reliable service to customers to enhance the perception among customers who consumed the service. Managers also facilitate, coach and giving guidance rather than use of control and command technique (Ayup & Chung, 2010). Employees appreciate if they are given the freedom to perform as they will be more motivated and flexible in delighting the customers. Managers should also provide regular feedback to employees about customer comment and work related issues so they can continuously improve. Luxury hotels required dedicated and motivated employees, therefore the encouragement and support from management and peers will persuade the employee's interest to perform and act diligently.

9. Recommendation for Future Research

Further studies should be conducted in different hotel categories such as in three star hotel. A comparative study among employees in different industries such as fast food could be conducted in addition to studying the relationship between other control variables selected in the demographic factors.

10. Conclusion

To the hotel managers and practitioners, it is important for the managers to pay attention to how they manage their employees, particularly those who work on the front line as they are in a critical position to represent the organisation. As service guarantees serve as important guidelines, managers must ensure that employees follow the rules and procedures during service transaction and they honoured the service guarantees either it is explicit or implicitly display. The managers must also acknowledged that customer appreciate service guarantees as they signal the quality of a hotel and increase their purchase intentions because customers believe that they have made a better choice by staying with a service provider with higher credibility, thus hotels must be able to keep their reliable service promise. Customers also believed that in the case of service failures, luxury hotel would treat them fairly. Therefore, it is the managers and the hotels' responsibility to promote the culture of customer satisfaction among employees.

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Study of Poverty Alleviation Effects for Chinese Fourteen Contiguous Destitute Areas Based on Entropy Method

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Abstract

China has begun to implement a new round of poverty alleviation and development since 2011, according to the regional distribution, the poverty counties were divided into fourteen destitute areas as the main battlefield in next ten years for China's poverty alleviation. In order to understand the poverty alleviation effects more objectively, this paper uses entropy method to evaluate fourteen contiguous destitute areas in China in 2012, and makes correlation analysis with two reference groups which is one of the Characteristic of this paper. The results show that, poverty alleviation effects of fourteen contiguous destitute areas in 2012 is generally poor, because the mean values of five different correlation degrees in table 3 are lower than 50%, that means the difference between the evaluation value for each area with the minimum reference group does not reach half of the difference between the maximum and minimum reference groups. LiuPan Mountain Area's performance is the best, the lowest is Wumeng Mountain Area. It is surprising that the performance of Wuling Mountain Area, which is pioneer of regional development and poverty alleviation confirmed by State Council of China, is poor. The comprehensive evaluation value of Wuling Mountain Area is only above the value of Tibet Area and Wumeng Mountain Area. In addition, from the comparison of four first-level indexes, the index of production and life makes the best contribution for comprehensive poverty alleviation effects, followed by index of social development and economic development, and the index of works progress of poverty alleviation is ranked last.

Keywords: depressed areas, poverty alleviation, regional development

1. Introduction

Since 2011 the Chinese government has officially launched the plan of Regional Development and Poverty Alleviation Pilot of Wuling Mountain Area, after then the "China Rural Poverty Alleviation and Development Program (2011-2020)" was published and implemented, until now, China's new round of poverty alleviation and development work has been carried out more than three years. Theoretical and empirical research on poverty alleviation and development is also deepening, the study of contiguous destitute areas also made a series of achievements which mainly focus on poverty measures of China destitute areas, factors and countermeasures which lead to the poverty, regional development strategy, area development and governance, poverty reduction performance, various forms of poverty and so on.

In order to reflect the poverty alleviation effects of Chinese contiguous destitute areas more objectively and to provide a reference for the future development of pro-poor policy formulation and implementation of poverty alleviation projects, on the basis of entropy method, this paper makes an evaluation and sort of the poverty alleviation effects of China's fourteen contiguous destitute areas in 2012. Based on the existing data, the paper sets two reference groups to make a correlation analysis with the Chinese fourteen contiguous destitute areas about the evaluation value of poverty alleviation effects. Then this paper makes analysis for the progress of poverty alleviation and development of each contiguous destitute area.

The rest of this paper is organized as follows. The second part is to build literature review and the evaluation index system of poverty alleviation effects, and the third part is the description of the data sources, the fourth part of this paper is introduction of entropy method. The fifth part is a further analysis for the result of the poverty alleviation effects of fourteen contiguous destitute areas in China. Part six is the section of the conclusions and recommendations

2. Literature Review and Evaluation Index System

The evaluation index system of poverty alleviation effects is built on the basis of the understanding of poverty alleviation and the knowledge of poverty. When making the poverty judgment, generally annual net income per capita is the standards, for instance, the current poverty standard of China is annual net income per capita of less than 2300 yuan RMB (with 2010 as the base period). There is also an international poverty line, which is less than one dollar a day (United Nations Millennium Summit, 2000). The advantage of this type of standard is simple to be quantified and strong operability, but the disadvantage is also obvious that a single standard set ignores other aspects in addition to income inequality and poverty, such as education, health, quality of life, etc. The understanding bias of poverty may lead to unsuitable poverty alleviation projects, development plans and other negative results such as "pollution first, treatment later", strong vulnerability of poverty and other issues.

With the in-depth study of the poverty problem and the further profound understanding of poverty, United Nations Development Programme (UNDP) proposed the concept of "human poverty" in 1997, which is defined as a lack of basic individual right to development and the choice right including income poverty, the poverty of rights, human poverty and poor knowledge (UNDP, 1997). Sen firstly proposed the theory of multidimensional development in 1999, he regards development as the process of expanding peoples real freedom, the real freedom means people's basic capabilities that people are freed from hunger, malnutrition, preventable diseases and premature death (Sen, 1999). Alkire and Foster proposed the method of identifying, aggregating and decomposing the multidimensional poverty in 2008, this method of measurement uses a more accurate and detailed index system for poverty judgment (Alkire & Foster, 2011). Based on the method of Alkire and Foster, some Chinese scholars measured the multidimensional poverty for the cities and counties in China, and pointed out that besides income poverty, there are other kinds of poverty existed in both urban and rural areas in China (Wang & Wang, 2013).

In order to reflect the poverty alleviation effects of Chinese contiguous destitute areas more comprehensively, according to the multidimensional indicators used to monitor the works progress of poverty alleviation of poor counties by Chinese State Leading Group Office of Poverty Alleviation and Development(CPAD), and use the ideas and methods of United Nations Human Development Index (HDI), OECD green growth measure index system, Chinese green development index (HGDI) (Li, Liu, & Song, 2014), Oxford Poverty and Human Development Initiative's (OPHI, Oxford) multidimensional poverty Index (Alkire & Foster, 2011), we build an evaluation index system to reflect the effects and progress of poverty alleviation and development of fourteen contiguous destitute areas (see Table 1). Evaluation Index system including four first-level indexes which are economic development, social development, production and life, works progress of poverty alleviation. These four levels include aspects of secondary indicators such as income levels, education and information, medical and health, ecology and environment and so on. We increase ecological indicators and monitor indicators of poverty alleviation works based on the multidimensional poverty index OPHI. In order to promote ecology and environment protection at the same time with poverty alleviation and development process on the one hand, and aims to accelerate the speed of poverty alleviation and development of China on the other hand. The evaluation index system consists of a total of 62 detailed indicators which are objective and quantifiable indicators.

Table 1. Evaluation index system of poverty alleviation effects for contiguous destitute areas

First-level index	Second-level index	Third-level index
Economic Development	Macroeconomics	GDP per capita (million); Fiscal budget and expenditure per capita (million); The balance of the savings deposits of urban and rural residents per capita (million); Investment per capita in fixed assets completed (million)
	Income	Per capita net income of farmers (yuan); Per capita disposable income of urban residents (yuan)
	Poverty Reduction	Poverty rate
Social Development	Education	Percentage of number of administrative villages which have kindergarten or preschool (%); Gross enrollment rate of pre-school education (%); Gross enrollment rate of high school education (%)
	Healthcare	The number of beds per capita health institutions (bed / person); The number of beds per capita social welfare (bed / person); Percentage of number of administrative villages which have fitness equipment (%); Percentage of number of administrative villages which have cultural / sporting events plaza (%); Percentage of the number of administrative villages in which there are clinics (%)

	Social Security	Percentage of the number who participate in the new rural cooperative medical insurance (%); The proportion of the number of participating in the new rural social pension insurance (%)
	Environmental Health	Percentage of the number of administrative villages in which there are garbage dump sites (%); Percentage of the number of administrative villages in which there are landfill sites (%); Percentage of the number of administrative villages in which there are full-time cleaners (%)
	Public Security	Percentage of the number of administrative villages in which there is police station (%); Percentage of the number of administrative villages in which there is community police (%)
Production and Life	Create Income	Percentage of the number of administrative villages in which there are operating farmhouse (%); Percentage of the number of administrative villages which have agricultural greenhouse facilities (%); Percentage of the number of administrative villages which have facilities of livestock sheds (%); Percentage of the number of administrative villages which have farmers' specialized cooperative economical organization (%); Percentage of the number of administrative villages in which there is organization of poor villages mutual funds (%)
	Traffic	Percentage of natural villages' number which have cement / asphalt roads connection (%); Percentage of villages' number which through passenger bus (%)
	Drinking Water Safety	Percentage of natural villages' number which have through running water (%)
	Energy	Natural village percentage of being electrified (%)
	Information	Proportion of the number of natural village through radio and television (%); Proportion of the number of natural village through broadband network (%)
	Service	Proportion of the number of administrative villages which have accounted for more than one community service center (%); Proportion of the number of natural village which have accounted for more than one farmer supermarket (%)
	Ecological Environment	The forest coverage rate (%)
Works Progress of Poverty Alleviation	Farmland	Increased basic farmland / administrative village (mu / village); New basic farmland that is irrigated / administrative village (mu / village); New efficient water-saving agricultural area / administrative village (mu / village)
	Meadow	The new artificial improved pasture and forage area / administrative village (mu / village)
	Ecological Restoration	The new conversion of cropland to forest area / administrative village (mu / village); New cropland to grassland area / administrative village (mu / village)
	Traffic	Mileage of new and expansion (cement / asphalt) rural highway / Number of administrative villages (km / village); Mileage of new built (cement / asphalt) roads inside village / Number of administrative villages (m / village); New (cement / asphalt) road between households / Number of administrative villages (m / village)
	Irrigation	Mileage of new (stone / cement) water channel / Number of administrative villages (m / village); New water infrastructure / Number of administrative villages (item / village)
	Drinking	Length of new drinking water pipeline / Number of administrative villages (m / village); Number of people whose problem of drinking water has been solved / Number of administrative villages(people / village)
	Energy	Number of new biogas digesters / Number of administrative villages (item / village)
	Economic development	New economic crop area / Number of administrative villages (mu / village); New economic forest area / Number of administrative villages (mu / village); Households percentage which get financial support from government to build new (greenhouse) facilities (%);Households percentage which get financial support from government to build new farm of livestock industry (%); Number of farmers' poultry (cattle / sheep / pig) which support by government / Peasant household (head / household); Number of farmers' poultry (chicken / duck / goose) which support by government / Peasant household (head / household); Number of households that operate farm stay / Peasant household(%)

	Living	Households percentage of Poverty alleviation migration (%); Households percentage to complete the reconstruction of dangerous house for difficult family (%); Households percentage which get financial support from government to complete old housing renovation (%)
	Training	Sum of frequency that rural people participate in various skills training / Number of rural people (frequency / individual)

3. Data Sources

In this paper, raw data used to calculate 62 detailed indicators are CPAD's monitoring data of counties located in fourteen contiguous destitute areas. The original data includes counties' data of fourteen contiguous destitute areas in China, 2012, in addition, in the Four Tibetan-inhabited Areas which include 77 poor counties, 3 counties' date are not included. In the Tibet Area which includes 74 counties, there are only 63 poor counties' data were got. Therefore, the range of evaluation in this paper includes 665 poverty-stricken counties located in fourteen contiguous destitute areas in China, 2012.

4. Evaluation Method Based on Entropy Method

The entropy is a measure of uncertainty, the greater the amount of information, the smaller the uncertainty, the smaller entropy; the less amount of information, the greater the uncertainty, the greater the entropy (Agmon, Alhassid & Levine, 1979). Therefore, in a comprehensive evaluation, according to the characteristics of entropy, we can calculate entropy to determine the dispersion degree of an indicator, the greater the dispersion degree of indicator, the greater of the indicator's impact on the final comprehensive evaluation. In addition, the biggest advantages of the entropy is that it is an objective weighting method, each detailed indicator's weight can be calculated based on the indicator's sample observations value.

4.1 Calculation of Entropy

Based on original monitor data, the values of 62 third-level indexes for fourteen contiguous destitute areas are calculated to form a 14 × 62 row-column matrix, denoted by X, then:

$$X = \begin{pmatrix} x_{11} & \cdots & x_{1n} \\ \vdots & \ddots & \vdots \\ x_{m1} & \cdots & x_{mn} \end{pmatrix} = (x_{ij})_{m\times n}$$, Where i = 1,2 ... m; j = 1,2 ... n; m = 14, n = 62.

4.1.1 Data Standardization and Date Translation

In order to eliminate the different influence of positive and negative indicators, matrix X need to be normalized (An, 2014). For the efficiency indicator which is better when the value is greater, namely standardize formula for positive indicators is: $r_{ij} = \frac{x_{ij} - \min\limits_{i}(x_{ij})}{\max\limits_{i}(x_{ij}) - \min\limits_{i}(x_{ij})}$, Where i = 1, 2 ... m; j = 1, 2 ... n; $\max\limits_{i}(x_{ij})$ and $\min\limits_{i}(x_{ij})$ denote the maximum and minimum values of the j-th indicator in fourteen contiguous destitute areas.

For the cost indicators which is better when the value is smaller, the negative indicators standardized formula is: $r_{ij} = \frac{\max\limits_{i}(x_{ij}) - x_{ij}}{\max\limits_{i}(x_{ij}) - \min\limits_{i}(x_{ij})}$, where i=1, 2…m; j = 1, 2…n; $\max\limits_{i}(x_{ij})$ and $\min\limits_{i}(x_{ij})$ denote the maximum and minimum values of the j-th indicator in fourteen contiguous destitute areas.

In addition, since in the process of entropy calculation, there is logarithmic calculation included, in order to eliminate negative impacts, the indicators' normalized value needs to be translated. General method is that the normalized indicators' value plus one after that is used.

4.1.2 Calculation of the Entropy Value of j-th Indicator

To calculate the entropy value of j-th indicator, we must first calculate the indicator value's ratio of i-th area, on the j-th indicator, which is calculated as: $p_{ij} = s_{ij} / \sum_{i=1}^{m} s_{ij}$, there $0 \le p_{ij} \le 1$, $\sum_{i=1}^{m} p_{ij} = 1$. Resulting in a new normalized matrix P, expressed as:

$$P=\begin{pmatrix} p_{11} & \cdots & p_{1n} \\ \vdots & \ddots & \vdots \\ p_{m1} & \cdots & p_{mn} \end{pmatrix}=(p_{ij})_{m\times n}$$, i=1,2…m; j=1,2…n; m=14, n=62.

Then we can calculate the j-th indicator's entropy value based on matrix P as: $e_j=-k\sum_{i=1}^{m}p_{ij}\ln p_{ij}$, k> 0, where ln$P_{ij}$ expresses to calculate natural logarithm of P_{ij}, $e_j\geq 0$.

If P_{ij} =1/m, That means on the j-th indicator, the indicator values of fourteen contiguous destitute areas are equal, e_j get the maximum value, general set k = 1 / ln (m), $0\leq e_j\leq 1$.

4.1.3 Calculation of the Entropy Weight of the j-th Indicator

Firstly, according to the entropy value of j-th indicator, calculating the variation coefficients of j-th indicator by the formula $d_j=1-e_j$. Then calculating j-th indicator's weight by normalized the matrix $D=(d_j)_{1\times n}$ (j = 1,2 ... n), the formula is $w_j=d_j/\sum_{j=1}^{n}d_j$,where $0\leq w_j\leq 1$, $\sum_{j=1}^{n}w_j=1$.

4.2 Comprehensive Evaluation Value of the Poverty Alleviation Effects and Calculation of the Evaluation Value of Four First-Level Indexes

4.2.1 Comprehensive Evaluation Value of the Poverty Alleviation Effects

Base on entropy weight of every indicator and matrix P, we can calculate comprehensive evaluation value of the poverty alleviation effects for fourteen contiguous destitute areas. The formula is $f_i=\sum_{j=1}^{n}w_j\times p_{ij}$, where i = 1,2 ... m; j = 1, 2 ... n; m = 14, n = 62. The larger f_i in an area, indicating the more significant effects of the area about poverty alleviation, by comparing the values of f_i between different areas, poverty alleviation effects can be sorted between areas.

4.2.2 Calculation of the Evaluation Value of Four First-Level Indexes

According to the additivity of entropy weight (An, 2014), the evaluation values of four first-level indexes for fourteen contiguous destitute areas can be calculated. This paper makes a weighted sum of the evaluation value of third-level indexes to get the evaluation values of four corresponding first-level indexes which are economic development, social development, production and life, works progress of poverty alleviation for fourteen contiguous destitute areas as f_i^k respectively (where i=1, 2…m; k=1, 2, 3, 4).

5. Evaluation Result and Analysis of Poverty Alleviation Effects for Fourteen Contiguous Destitute Areas

5.1 Evaluation Value and Analysis of Poverty Alleviation Effecs

According to the evaluation method based on entropy method above, this paper measures comprehensive evaluation values of poverty alleviation effects and the evaluation values of four first-level indexes respectively for fourteen contiguous destitute areas (data including 665 poor counties in fourteen contiguous destitute areas) in China, the results are showed in Table 2 .

Table 2. Evaluation values of poverty alleviation effects for fourteen contiguous destitute areas and two reference groups, 2012

Areas and Reference groups	Comprehensive Evaluation Value (f_i)	Economic Development (f_i^1)	Social Development (f_i^2)	Production and Life (f_i^3)	Works Progress of Poverty Alleviation (f_i^4)
Liupan Mountain Area	0.076364	0.006552	0.016804	0.017435	0.035574
Daxinganling South Area	0.076210	0.006792	0.015111	0.018682	0.035624
Qinba Mountain Area	0.075442	0.007536	0.018058	0.016462	0.033386
Yanshan-Taihang Mountain Area	0.073237	0.008510	0.017267	0.016967	0.030493
Western Yunnan Area	0.072663	0.007039	0.016138	0.014698	0.034788
South Xinjiang Area	0.072106	0.006133	0.016958	0.016863	0.032152
Luoxiao Mountain Area	0.071620	0.006790	0.019293	0.015230	0.030307
Four Tibetan-inhabited Areas	0.071029	0.008436	0.014089	0.013633	0.034870

Lvliang Mountain Area	0.070819	0.006787	0.016950	0.017140	0.029943
Dabie Mountain Area	0.070119	0.007112	0.017214	0.016931	0.028862
Desertification Area of Yunnan, Guangxi and Guizhou	0.069568	0.006424	0.014642	0.013677	0.034826
Wuling Mountain Area	0.067828	0.007087	0.015216	0.014326	0.031198
Tibet Area	0.066929	0.007169	0.016203	0.012078	0.031479
Wumeng Mountain Area	0.066066	0.006541	0.013895	0.012911	0.032719
Maximum Reference Group	0.106838	0.010487	0.023316	0.021722	0.051314
Minimum Reference Group	0.053419	0.005244	0.011658	0.010861	0.025657

Note. Calculate to 6 decimal places.

In order to reflect the poverty alleviation effects better, it is necessary to set two reference groups which are standers to judge the results of fourteen contiguous destitute areas. There are two different ideas to set reference groups, the first one is based on the targets of national poverty alleviation planning to set each index in the index system; the seconed one is base on the evaluation values of poverty alleviation effects for fourteen contiguous destitute areas.

This paper chooses the second way to set reference groups. Firstly, choosing the maximum value and the minimum value for every index from matrix P in order to form maximum reference group and maximum reference group. The maximum reference group $Q_{\max} = (q_j)_{1\times n} = \max_i p_{ij}$, where i = 1, 2... M; j = 1, 2... N; and $\max_i p_{ij}$ indicates on the j-th index, taking the maximum value from the fourteen contiguous destitute areas p_{ij}. The minimum reference group $Q_{\min} = (q_j)_{1\times n} = \min_i p_{ij}$, where i = 1, 2 ... M; j = 1, 2... N; and $\min_i p_{ij}$ indicates on the j-th index, taking the minimum value from the fourteen contiguous destitute areas p_{ij}. The second idea of setting reference groups is equivalent to combine the maximum and the minimum values on each indicator for all fourteen contiguous destitute areas in 2012 into two imaginary new areas, representing the best and the worst scores of the fourteen contiguous destitute areas on each indicator in 2012. If applying the factor of time into anlysis, the standard will be changing over time, and the standard of maximum reference group will increase until it reaches the goals of national poverty alleviation and development planning.

Secondly , by making the weighted sum of the index values of the maximum and the minimum reference groups respectively base on the index's weight of entropy w_j, we can measure out comprehensive evaluation values f_{max} and f_{min} of the poverty alleviation effects of the maximum and the minimum reference groups, and the evaluation values of four first-level indexes (Represented by f^k_{max} and f^k_{min} respectively, where k = 1, 2, 3, 4), calculation results are shown in the last two rows in Table 2.

Thirdly, estimating the correlation degree of the evaluation values which include comprehensive evaluation values and evaluation values of four first-level indexes of fourteen contiguous destitute areas with which of two reference groups. The correlation degree of comprehensive evaluation value of poverty alleviation effects between each area with two reference groups can be calculated as: $g_i = \frac{f_i - f_{\min}}{f_{\max} - f_{\min}} \times 100\%$, where i=1, 2…m. The correlation degree of evaluation values of four first-level indexes between each area with two reference groups can be calculated as: $g_i^k = \frac{f_i^k - f_{\min}^k}{f_{\max}^k - f_{\min}^k} \times 100\%$, where i=1, 2……; k=1, 2, 3, 4. Final results are shown in Table 3.

Table 3. Correlation degree between poverty alleviation effects of fourteen contiguous destitute areas with two reference groups in 2012

Areas	Comprehensive Evaluation Value (g_i)	Economic Development (g_i^1)	Social Development (g_i^2)	Production and Life (g_i^3)	Works Progress of Poverty Alleviation (g_i^4)
Liupan Mountain Area	42.95%	24.94%	44.14%	60.53%	38.65%
Daxinganling South Area	42.66%	29.53%	29.62%	72.01%	38.85%
Qinba Mountain Area	41.23%	43.71%	54.90%	51.57%	30.13%
Yanshan-Taihang Mountain Area	37.10%	62.29%	48.12%	56.22%	18.85%

Western Yunnan Area	36.02%	34.24%	38.43%	35.33%	35.59%
South Xinjiang Area	34.98%	16.97%	45.46%	55.26%	25.31%
Luoxiao Mountain Area	34.07%	29.49%	65.49%	40.23%	18.12%
Four Tibetan-inhabited Areas	32.96%	60.88%	20.86%	25.53%	35.91%
Lvliang Mountain Area	32.57%	29.43%	45.40%	57.81%	16.70%
Dabie Mountain Area	31.26%	35.63%	47.66%	55.89%	12.49%
Desertification Area of Yunnan, Guangxi and Guizhou	30.23%	22.51%	25.60%	25.93%	35.74%
Wuling Mountain Area	26.97%	35.15%	30.53%	31.91%	21.60%
Tibet Area	25.29%	36.71%	38.99%	11.21%	22.69%
Wumeng Mountain Area	23.67%	24.73%	19.19%	18.87%	27.53%

Note. Calculate to 6 decimal places.

By calculating the mean values of five different correlation degrees in table 3, the correlation degree's mean value of comprehensive evaluation value between fourteen contiguous destitute areas with which of two reference groups is 33.71%; the correlation degree's mean values of four first-level indexes between fourteen contiguous destitute areas with which of two reference groups are 34.73%, 39.6%, 42.74%, 27.01% respectively. Therefore, in these four first-level indexes, the best performance is the production and life, followed by social development and economic development, while works progress of poverty alleviation is in the final ranking.

In addition, results in Table 3 show that the effects of poverty alleviation for fourteen contiguous destitute areas are generally poor. On the one hand, the mean values of five different correlation degrees in table 3 are lower than 50%, that means the difference between the evaluation value for each area with the minimum reference group does not reach half of the difference between the maximum and minimum reference groups; on the other hand, the result of comprehensive evaluation value g_i indicates the values of fourteen contiguous destitute areas are all less than 50%, the highest is Liupan Mountain area which reaches only 42.95%; the results of economic development g_i^1 which is one of the four first-level indexes indicate only Yanshan-Taihang Mountain Area and Four Tibetan Area are respectively 62.29% and 60.88%, and the remaining areas are less than 50%; the results of first-level index social development g_i^2 indicate only Luoxiao Mountain Area is 65.49%, and the remaining areas are less than 60%; the results of first-level index production and life g_i^3 indicate only Daxinganling South Area and Liupan Mountain Area are 72.01% and 60.53%, and the remaining areas are less than 60%; the results of first-level index Works progress of poverty alleviation g_i^4, fourteen contiguous destitute areas are all belowing 40%.

5.2 Sort and Analysis for the Evaluation Values of Poverty Alleviation Effects of Fourteen Contiguous Destitute Areas

According to results in Table 2, in Table 2, fourteen contiguous destitute areas can be sorted basing on the comprehensive evaluation values and four first-level indexes' evaluation values. Results are shown in Table 4. Base on fourteen contiguous destitute areas' mean values of five different indexes (excluding the two reference groups) in Table 2 or Table 3, we known that the top seven of the fourteen contiguous destitute areas are higher than the mean value in the indexes of comprehensive evaluation value, social development, production and life, and progress in poverty alleviation works, in the index of economic development, the top six of the fourteen contiguous destitute areas are higher than the mean value (see Table 4).

Table 4. Ranking of poverty alleviation effects for fourteen contiguous destitute areas in 2012

Ranking	Comprehensive Evaluation Value	Economic Development	Social Development	Production and Life	Progress in Poverty Alleviation
1	Liupan Mountain Area	Yanshan-Taihang Mountain Area	Luoxiao Mountain Area	Daxinganling South Area	Daxinganling South Area
2	Daxinganling South Area	Four Tibetan-inhabited Areas	Qinba Mountain Area	Liupan Mountain Area	Liupan Mountain Area
3	Qinba Mountain Area	Qinba Mountain Area	Yanshan-Taihang Mountain Area	Lvliang Mountain Area	Four Tibetan-inhabited Areas
4	Yanshan-Taihang	Tibet Area	Dabie Mountain	Yanshan-Taihang	Desertification Area

	Mountain Area		Area	Mountain Area	of Yunnan, Guangxi and Guizhou
5	Western Yunnan Area	Dabie Mountain Area	South Xinjiang Area	Dabie Mountain Area	Western Yunnan Area
6	South Xinjiang Area	Wuling Mountain Area	Lvliang Mountain Area	South Xinjiang Area	Qinba Mountain Area
7	Luoxiao Mountain Area	Western Yunnan Area	Liupan Mountain Area	Qinba Mountain Area	Wumeng Mountain Area
8	Four Tibetan-inhabited Areas	Daxinganling South Area	Tibet Area	Luoxiao Mountain Area	South Xinjiang Area
9	Lvliang Mountain Area	Luoxiao Mountain Area	Western Yunnan Area	Western Yunnan Area	Tibet Area
10	Dabie Mountain Area	Lvliang Mountain Area	Wuling Mountain Area	Wuling Mountain Area	Wuling Mountain Area
11	Desertification Area of Yunnan, Guangxi and Guizhou	Liupan Mountain Area	Daxinganling South Area	Desertification Area of Yunnan, Guangxi and Guizhou	Yanshan-Taihang Mountain Area
12	Wuling Mountain Area	Wumeng Mountain Area	Desertification Area of Yunnan, Guangxi and Guizhou	Four Tibetan-inhabited Areas	Luoxiao Mountain Area
13	Tibet Area	Desertification Area of Yunnan, Guangxi and Guizhou	Four Tibetan-inhabited Areas	Wumeng Mountain Area	Lvliang Mountain Area
14	Wumeng Mountain Area	South Xinjiang Area	Wumeng Mountain Area	Tibet Area	Dabie Mountain Area

We can get the performance of fourteen contiguous destitute areas' in four first-level indexes by the stander of mean value (shown as Table 5).

Table 5. Poverty alleviation effects of four first-level indexes for fourteen contiguous destitute areas in 2012

Areas	Ranking of Comprehensive Evaluation Value	Index higher than mean value	Index lower than mean value
Liupan Mountain Area	1	Social Development, Works Progress in Poverty Alleviation	Economic Development, Production and Life
Daxinganling South Area	2	Production and Life, Works Progress in Poverty Alleviation	Economic Development, Social Development
Qinba Mountain Area	3	Economic Development, Social Development, Production and Life, Works Progress in Poverty Alleviation	-
Yanshan-Taihang Mountain Area	4	Economic Development, Social Development, Production and Life	Works Progress in Poverty Alleviation
Western Yunnan Area	5	Works Progress in Poverty Alleviation	Economic Development, Social Development, Production and Life
South Xinjiang Area	6	Social Development, Production and Life	Economic Development, Works Progress in Poverty Alleviation
Luoxiao Mountain Area	7	Social Development	Economic Development, Production and Life, Works Progress in Poverty Alleviation
Four Tibetan-inhabited Areas	8	Economic Development, Works Progress in Poverty Alleviation	Social Development, Production and Life
Lvliang Mountain Area	9	Social Development, Production and Life	Economic Development, Works Progress in Poverty Alleviation

Dabie Mountain Area	10	Economic Development, Social Development, Production and Life	Works Progress in Poverty Alleviation
Desertification Area of Yunnan, Guangxi and Guizhou	11	Works Progress in Poverty Alleviation	Economic Development, Social Development, Production and Life
Wuling Mountain Area	12	Economic Development	Social Development, Production and Life, Works Progress in Poverty Alleviation
Tibet Area	13	Economic Development	Social Development, Production and Life, Works Progress in Poverty Alleviation
Wumeng Mountain Area	14	Works Progress in Poverty Alleviation	Economic Development, Social Development, Production and Life

Results in Table 5 show that Liupan Mountain Area and Daxinganling South Area of which comprehensive evaluation values are ranked first and second are both performed relatively well in social development, Progress in Poverty Alleviation works, but are less than the mean value in economic development and production and life; Qinba Mountain Area which is ranked third expresses more balanced in the four first-level indexes that all above the mean value; Yanshan-Taihang Mountain Area ranked fourth has three first-level indexes reaching the mean value, it is dragged down mainly by index of works progress of poverty alleviation; in the contrary ,Western Yunnan Area ranked fifth is mainly benefit from the index of works progress of poverty alleviation.

6. Conclusion and Suggestion

Based on the calculation and analysis of evaluation index system of the poverty alleviation effects, we can conclude that poverty alleviation effects of fourteen contiguous destitute areas in 2012 is generally poor, because the mean values of five different correlation degrees in table 3 are lower than 50%, that means the difference between the evaluation value for each area with the minimum reference group does not reach half of the difference between the maximum and minimum reference groups.

In relative terms, the comprehensive evaluation value of Liupan Mountain Area is highest and ranked first, the comprehensive evaluation value of Wumeng Mountain Area ranked last. And it is surprising that the performance of Wuling Mountain Area which is pioneer of regional development and poverty alleviation confirmed by State Council of China is poor. The comprehensive evaluation value of Wuling Mountain Area is only above the value of Tibet Area and Wumeng Mountain Area, in the four first-level indexes, only index of economic development is higher than the mean value of fourteen contiguous destitute areas, the remaining three were lower than the mean value of the fourteen contiguous destitute areas.

In addition, from the comparison of four first-level indexes, the index of production and life makes the best contribution for comprehensive poverty alleviation effects, followed by the index of social development and economic development, and the index of works progress of poverty alleviation is ranked last.

From the three conclusions, we know that in order to reach the goal of building a well-off society, the most arduous task for Chinese government is how to develop the rural areas, especially the fourteen contiguous destitute areas. It is necessary to enhance the understanding of poverty alleviation work's importance in fourteen contiguous destitute areas and the dimensions of poverty. Poverty is not just income poverty, but a multidimensional phenomenon (Bennett & Mitra, 2013). Poverty alleviation and development cannot be carried out from only a single aspect. It should be carried out from multi aspects, and promotes the balance development of poor areas.

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Competitiveness and Unemployment in the Eurozone

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Abstract

The paper analyzes the long term dynamics of the relationship between the competitiveness and the unemployment in the Eurozone, with the emphasis on the "North" and "South" differences. Using the productivity per person as a proxy for competitiveness, it shows both the differences between the North and South of the Eurozone and the differences between the pre-crisis and crisis periods in both areas. Moreover, it demonstrates that the relationship between the competitiveness and unemployment is negative in the North and undetectable in the most of the South. These results indicate that the recent gains in competitiveness can be preserved – and even perhaps extended – without the negative impact on employment. Indeed, in this context the structural reforms are the key.

Keywords: competitiveness, productivity, unemployment, Eurozone's north and south

1. Introduction

The long term dynamics of the relationship between the competitiveness and the unemployment in the Eurozone, with the emphasis on the North - South differences, is analyzed.

It is today commonly recognized that the restoration (and in fact the improvement) of the competitiveness among the Eurozone members on the Mediterranean littoral is the key for the restoration of the economic health of those countries. And, indeed, the reduction of the unemployment (from its current unprecedented heights) is necessary to restore the political stability which in turn should lead to a restoration of hope and believe in the future prosperity of the common European project.

The effort to restore and improve the competitiveness implies the improvement of the unit labor costs which in turn requires a higher productivity (statistically, the reduction of the wage bill as the share of GDP, measured macroeconomically). On the macroeconomic scale, the productivity can rise, rising the GDP and hence lowering the unit labor costs (ULC) independently on the employment level. Alternatively, the elimination of the low productivity activities rises macro productivity (and reduces the ULC), but leads to the rise of the unemployment.

Distinguishing between these alternatives is important for the Eurozone's (and hence the EU's) future. The first case is, indeed, desirable. In contrast, the second case raises the question of a possible tradeoff between the competitiveness and a full employment in the absence of a possibility of currency devaluation – the tradeoff which threatens the Eurozone's cohesion and stability.

Part II discusses the relevant analytical modelling and reviews some of the existing literature on the relationship between the productivity, competitiveness and unemployment. Data and estimations are provided in Part III. Part IV then discusses the econometric results. Part V concludes.

2. Analytical Modelling

Looking at the recent data and using the conventional indicators of competitiveness (real exchange rates, unit labor costs, current account positions), one may argue that the competitiveness in the Eurozone improved, especially in the Mediterranean countries. However, the unemployment in the same countries remains stubbornly high. In fact, the casual look at the data for these countries suggests the negative correlation between the competitiveness and the unemployment after the onset of recession.

To determine the actual relationship between the competitiveness and employment dynamic in different parts of the Eurozone, we compared the dynamics of the labor productivity per person to the unemployment rate (data

are available from the Eurostat). Following the analysis of di Mauro and Forster (2008), the productivity may be considered a better measure of competitiveness compared to conventional indicators.

There is an extensive economic literature discussing the relationship between the dynamics of productivity and unemployment. (As examples, see Brauninger & Pannenberg, 2002; Blanchard, Solow, & Wilson, 1995; Gordon, 1995; Trehan, 2001). The critical review is beyond the scope of this paper. However, it may be useful to mention the main ideas.

Theoretically (assuming the Cobb-Douglas type of the production relationship) an increase in productivity – i.e. an increase in the output per unit of labor – increases the marginal product of at least one, but possibly both, basic inputs (capital and labor). The impact on the employment (or, more precisely, the demand for labor) will then depend on the nature of productivity changes. In "corner" cases, if the change in productivity is entirely embedded in the increases of a marginal product of capital (with no change in the marginal product of labor), the capital will be substituted for labor in production. The demand for labor and hence the employment declines – i.e. the unemployment increases.

Conversely, if the increase in productivity is entirely embedded in the marginal product of labor, the labor will be substituted for capital and the demand for labor increases – i.e. the unemployment may decline.

The "corner" cases are, indeed, the borderline. In reality supported by the historical experience, the increases in productivity increase both marginal products. The actual impact on employment will then depend on the detailed nature of marginal product changes.

Moreover, one may argue that whatever is the mechanism (and results) described above, in a sufficiently long period increases in productivity increase income of factors of production which increases aggregate demand and (based on the historical experience) the demand for labor

This dynamics will lead to an increase in employment – hence a lower unemployment - ceteris paribus, i.e. under stable labor supply conditions. However, the latter is unlikely to remain stable due to changing demographics, social and labor policies etc. which all influence the level and dynamics of reservation wages and hence the labor supply and observed unemployment.

To summarize at this point, the theoretical analysis postulates the increases in productivity can have positive, negative or neutral impacts on employment (and hence on the measured unemployment) depending on detailed circumstances of individual cases (countries).

In this paper we concentrate on the empirical analysis of the relationship between the productivity (measured as productivity per person working) and the unemployment in 12 Eurozone countries (11 founding members plus Greece). There are three questions to be answered. First is the nature of empirically observed relationship between the productivity as a proxy measure for competitiveness and the unemployment in individual countries. Second question is whether there is a difference in this relationship between the precrisis (1999: Q1-2009: Q1) and crisis (2009: Q2-2014: Q2) periods. And the third question is whether there is a difference between the Southern (basically the countries on the Mediterranean littoral plus Ireland) and Northern Eurozone members.

3. Data and Estimation

The relationship between the productivity per person (as the proxy for a measure of competitiveness) and the unemployment is estimated individually for the 12 Eurozone countries (11 original members and Greece). In reporting, these countries are divided into two groups: North, composed of Germany, Netherlands, Belgium, Luxembourg, France, Finland and Austria, and South, composed of Italy, Spain, Greece, Portugal and Ireland. The estimates for each country are then divided into two periods: the pre-crisis period

1999: Q1-2009: Q1 and the crisis period 2009: Q2-2014: Q2. (The last date is the last one for which the data were available at the time of estimation.) All data used were obtained from the Eurostat database.

All time series were tested for unit roots in both levels and first differences. The results (not reported here) rejected the unit roots hypothesis for first differences. For levels the results were mixed. This implies that the cointegration estimations would be questionable. (That was confirmed be preliminary tests, all of which rejected the cointegration hypothesis.) Because of the ex ante unclear direction of causality, the VAR approach was considered. However, given the quarterly data frequency the contemporaneous effects cannot be excluded, which implies infeasibility of the VAR approach. Therefore, the SUR (seemingly unrelated regression) approach was selected.

Two equations (1 and 2 below) were estimated by SUR for each country and for both pre-crisis and crisis periods.

$$Unemployment = Constant + \sum_{t=1}^{2} Unemployment_t + \sum_{t=0}^{2} Productivity_t \quad (1)$$

$$Productivity = Constant + \sum_{t=0}^{2} Unemployment_t + \sum_{t=1}^{2} Productivity_t \quad (2)$$

Number of lags was determined by Akaike and Schwartz criteria. Estimations were made in first differences and results are reported in Tables 1-4 (in the Appendix). The coefficients of explanatory variables were summarized by using the SUMMARIZE instruction in the RATS software. Statistically significant coefficients are printed in bold.

4. Results

Tables 1 and 2 report the estimates (numbers in parenthesis are the relevant t-statistics) for the South and North respectively for the pre-crisis period 1999: Q1-2009: Q1. For the South estimates show a positive relationship between the productivity and unemployment for Spain (positive estimated coefficient indicates that the increase in productivity increases unemployment) and a negative one for Italy (negative estimated coefficient indicates that the increase in productivity reduces unemployment). In the case of Ireland it is indicated that an increase in unemployment tends to increase the productivity (the relevant coefficient is positive). The constants then indicate whether the underlying productivity and/or unemployment dynamics tend to accelerate (Portugal) or decelerate (Italy). (Remember, estimates are made in first differences.)

Table 1. Productivity and unemployment–south: pre-crisis 1999 Q1-2009 Q1

Dependent Variable	Country	Constant	Unemployment Summarized	Productivity Summarized
	SPAIN			
Unemployment		0.018	0.898	1.163
		-0.39	-8.81	-4.34
Productivity		0.017	1.734	0.387
		-0.36	-10.3	-1.68
	PORTUGAL			
Unemployment		0.122	0.296	-0.225
		-2.06	-1.42	-1.75
Productivity		0.35	-0.266	-0.136
		-2.36	-0.61	-1.36
	ITALY			
Unemployment		-0.089	0.169	-0.174
		-2.19	-0.76	-2.43
Productivity		-0.258	-0.29	-1.3
		-1.97	-0.53	-1.85
	IRELAND			
Unemployment		0.025	1.37	0.142
		-0.41	-7.96	-1.77
Productivity		0.473	3.495	0.012
		-2	-5.8	-0.19
	GREECE			
Unemployment		-0.015	0.208	-0.059
		-0.22	-0.86	-0.61
Productivity		0.379	-0.036	-0.031
		-1.89	-0.07	-0.4

As far as the North is concerned, reductions in unemployment tend to increase the productivity in all countries except the Belgium and Austria. Perhaps more importantly. the increases in productivity tended to reduce unemployment in Netherlands, France, Finland and Austria. Netherlands displays an increasing unemployment trend, albeit marginally.

Table 2. Productivity and unemployment–north: pre-crisis 1999 Q1-2009 Q1

Dependent Variable	Country	Constant	Unemployment Summarized	Productivity Summarized
	NETHERLANDS			
Unemployment		0.043	0.85	-0.149
		-1.98	-9.21	-3.24
Productivity		0.133	-0.162	-0.057
		-0.36	-10.3	-1.17
	LUXEMBOURG			
Unemployment		0.025	0.693	-0.029
		-1.13	-5.98	-1.46
Productivity		0.075	-4.495	-0.005
		-0.23	-2.03	-0.27
	GERMANY			
Unemployment		0.009	0.869	-0.076
		-0.42	-11.3	-1.76
Productivity		0.004	-2.93	0.053
		-0.03	-4.06	-1.05
	FRANCE			
Unemployment		0.036	0.78	-0.294
		-1.11	-6.09	-3.3
Productivity		0.056	-0.913	0.059
		-0.78	-3.03	-0.59
	FINLAND			
Unemployment		0.003	0.599	-0.106
		-0.14	-3.96	-3.56
Productivity		-0.093	-5.708	-0.039
		-0.37	-4.29	-1.29
	BELGIUM			
Unemployment		0.006	-0.09	-0.24
		-0.1	-0.36	-1.65
Productivity		0.055	-0.08	-0.246
		-0.64	-0.25	-1.62
	AUSTRIA			
Unemployment		0.074	0.462	-0.247
		-2.12	-2.57	-3.38
Productivity		0.155	-0.369	0.004
		-2.5	-1.13	-0.05

The comparison between the North and South indicates the divergent dynamics even in the pre-crisis period. The negative relationships between the productivity and unemployment (in either direction) indicates a capacity for a "positive circle' – increases in productivity (i.e. the competitiveness) reduce unemployment and declining unemployment enhances competitiveness. This relationship seemed to be common in the North but is basically missing in the South – except in Italy. Indeed, it might contribute to a different impact of the globalization phenomena on North and South, observable even in the pre-crisis period.

Tables 3 and 4 provide estimated results for the South and North respectively for the crisis period 2009: Q2-2014: Q2. Positive relationship between the unemployment and productivity (i.e. an increase in unemployment increases productivity) is indicated for Portugal and Spain. However, both Spain and Italy display an increase in secular productivity trends. For the rest of the "South" countries there appear to be no statistically significant relationship between the productivity and unemployment in the crisis period.

Table 3. Productivity and unemployment–south: crisis 1999 Q2-2014 Q2

Dependent Variable	Country	Constant	Unemployment Summarized	Productivity Summarized
	SPAIN			
Unemployment		-0.572	0.091	1.743
		-3.4	-0.61	-4.41
Productivity		0.535	0.961	0.768
		-3.71	-4.62	-2.12
	PORTUGAL			
Unemployment		0.015	0.822	-0.146
		-0.17	-5.08	-0.81
Productivity		0.35	1.284	-0.24
		-1.86	-2.53	-1.94
	ITALY			
Unemployment		0.128	0.384	-0.223
		-1.58	-1.68	-1.76
Productivity		0.345	-0.023	-1.34
		-2.07	-0.04	-1.77
	IRELAND			
Unemployment		-0.115	0.448	0.168
		-1.41	-3.79	-1.44
Productivity		-0.066	-0.812	0.357
		-0.3	-1.5	-3.26
	GREECE			
Unemployment		0.025	0.93	-0.067
		-0.14	-5.75	-0.62
Productivity		0.034	0.043	0.035
		-0.09	-0.86	-0.32

In the North (Table 4) the reduction in unemployment increases productivity (i.e. the estimated coefficient has a statistically significant negative sign) in Luxembourg, Germany, France and Finland, whereas an increase in productivity reduces unemployment in Germany, France and Finland. No statistically significant relationship between these two variables was detected in Netherlands and Belgium. Austria, where an increase in unemployment indicate an increase in productivity (statistically significant positive coefficient) appears to be the Northern outlier.

Table 4. Productivity and unemployment–north: crisis 2009 Q2-2014 Q2

Dependent Variable	Country	Constant	Unemployment Summarized	Productivity Summarized
	NETHERLANDS			
Unemployment		0.083	0.485	-0.151
		-1.47	-2.11	-1.26
Productivity		-0.085	0.437	-0.143
		-0.57	-0.73	-2.19
	LUXEMBOURG			
Unemployment		0.018	0.53	-0.101
		-0.54	-2.42	-1.52
Productivity		0.006	-2.18	0.002
		-0.03	-2.07	-0.04
	GERMANY			
Unemployment		-0.05	0.192	-0.277
		-2.33	-1.35	-8.16
Productivity		-0.182	-5.123	-0.126
		-1.22	-5.74	-3.97
	FRANCE			
Unemployment		0.174	0.104	-0.657
		-3.99	-0.55	-4.67
Productivity		0.378	-1.183	-0.376

	-4.12	-2.59	-4.16
FINLAND			
Unemployment	0.033	0.502	-0.233
	-1.69	-5.12	-6.67
Productivity	0.297	-7.202	-0.131
	-1.73	-5.6	-5.22
BELGIUM			
Unemployment	0.088	0.418	-0.55
	-1.21	-1.46	-1.89
Productivity	0.121	0.005	0.074
	-2.22	-0.01	-0.46
AUSTRIA			
Unemployment	0.001	0.411	0.004
	-0.02	-1.4	-0.04
Productivity	0.028	1.737	-0.405
	-0.51	-4.18	-5.58

The estimated results indicate that divergent tendencies between the North and South, detected in the pre-crisis period, continued in the crisis period. The North (except Austria) appears to ride off the impact of the recession more successfully than South. A positive relationship between the unemployment and productivity in Portugal and Spain in the crisis period indicates that an observed improvement in competitiveness in those two countries was achieved via a liquidation of marginal low productivity activities – which would explain both a rise in the unemployment and an increase in the productivity on a macroeconomic scale.

5. Conclusion

Estimates presented above confirm the existence of rising divergences between the Eurozone's North and South. Indeed, if not addressed, these divergences make a stabilization oriented monetary policy increasingly difficult and may present the greatest danger to the cohesion and perhaps the existence of the Eurozone itself.

However, our analysis indicates some silver linings. The negative relationship between the productivity (the proxy for the competitiveness) and unemployment, observed in the majority of Northern countries (including France, which some today call "the sick man of Europe") indicate that those countries may be well positioned in the future globalized world economy.

Second, the lack of observable relationship between the competitiveness proxied by the productivity and the unemployment in most of Southern countries (except Portugal and Spain) indicate that their recent gains in competitiveness can be preserved – and even perhaps extended – without the negative impact on employment.

Indeed, in this context the structural reforms are the key. Their successful implementation requires a cooperation between the EU and national authorities. Eurozone and the whole EU have a future – but it must be worked on.

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Should Investors Pay Attention to Domestic and US Election Regimes? A Canadian Perspective

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Abstract

Based on Canadian historical returns from 1951 to 2011 and mean-variance frontier analysis, we document better stock market opportunities in the late versus early part of the mandates of the Canadian federal governments or the American presidents, as well as when Democratic versus Republican American presidents are in power. Better bond market opportunities are found in majority versus minority Canadian parliaments and in Conservative versus Liberal federal governing parties. We investigate the role of controls for the state of the economy to explain these results. We conclude that both domestic and American electoral regimes significantly affect investment opportunities and optimal asset allocation.

Keywords: asset allocation, Canadian financial market, electoral regime, investment opportunity, Sharpe ratio

1. Introduction

In countries with a democracy, political parties spend large amounts of time, money and effort to convince electors that their policies are the most appropriate for their country. In particular, they argue that their economic policies are the best for the finances and growth of the country, that they are the best equipped to foster solid relations with their international partners and that they should be given "strong" mandate to operate efficiently and reduce uncertainty. Political analysts and economists regularly comment on these claims and further analyze the outside influence of foreign politics. The media and ultimately many citizens show tremendous interest for elections and their results. Should investors pay attention to election regimes?

In the United States (US), there is a growing academic literature that answers 'yes' to this question by looking at the relationship between electoral regimes and returns. For examples, Huang (1985), Hensel and Ziemba (1995), Johnson, Chittenden and Jensen (1999), Santa-Clara and Valkanov (2003) and Booth and Booth (2003) show that large and small-capitalisation equities yield higher returns under Democratic presidencies and in the last two years of a presidential term, while US Treasury bonds and bills produce higher returns under Republican presidencies. As no corresponding differences in volatility or macroeconomic conditions are found, the "Democratic equity premium" and "presidential cycle effect" have been called puzzles, although explanations based on a longer-run analysis (Beyer, Jensen, & Johnson, 2004), international comparison (Bohl & Gottschalk, 2006), spurious econometrics problem (Powell, Shi, Smith, & Whaley, 2007, 2009) and time-varying risk premiums (Sy & Zaman, 2011) have been proposed.

This study extends this literature by examining the question for another country, namely Canada. Apart from the importance of a clear answer for investors in Canadian capital markets, it makes two contributions. First, by focusing on Canada, a country similar to the US for the stability and functioning of its capital markets, and with a political system that has similarly resulted in only two parties being in power (a left-leaning one and a right-leaning one), this study provides a useful out-of-US-sample check on the US results. Second, and more importantly, this study gives a novel assessment of the outside influence of American politics on foreign capital markets by investigating whether US election effects spill over to the capital markets "north of the border". Canada is a natural choice for detecting such influence as it has strong ties to the US, being its most important

economic and political partner in the last century.

Specifically, using monthly returns on Canadian bills, bonds and stocks from 1951 to 2011, this paper investigates five sub-questions. Are investment opportunities different in:

1) Left-leaning Liberal versus right-leaning Conservative governments?
2) Minority versus majority governments?
3) The early versus late parts of the federal mandates?
4) Left-leaning Democratic versus right-leaning Republican presidential administrations?
5) The early versus late parts of the American presidential mandates?

We answer these questions about investment opportunities in different electoral regimes with a traditional mean-variance analysis. Using bonds and stocks, we compute the investor opportunity set, which is delimited by the mean-variance frontier, conditional on the electoral regimes. We then evaluate the Sharpe ratio performance of the individual assets and optimal portfolios, and formally test for the equality of Sharpe ratios across regimes. While there are many other performance measures, the Sharpe ratio has a long history of relevancy and is the most natural measure to complement mean-variance analysis. Due to its simplicity and intuitive appeal, it is widely used both in practice and in academic studies. Next, we check the robustness of the results with controls for the state of the economy. Finally, we examine the optimal asset allocation between bills, bonds and stocks across regimes by computing the asset weights for selected optimal portfolios.

For Canada, Foerster (1994) and Chrétien and Coggins (2009) are the only two references that provide some evidence on these questions. Focusing on estimates of expected return and standard deviation, they document a "prime ministerial cycle effect" as well as a Democratic equity premium and a presidential cycle effect in Canadian stocks, but no robust "Liberal equity premium" or minority government differential. This paper expands on their results by considering a more complete dataset and by looking at mean-variance frontiers, Sharpe ratios and optimal asset allocations across regimes, offering a clearer overall picture of investment opportunities. It also puts more emphasis on the impact of American political regimes on Canadian investments.

The empirical results indicate that investors and portfolio managers should pay close attention not only to their domestic electoral regimes, but also to the American ones. With respect to the domestic regimes, the Canadian investment opportunities are significantly better in Conservative versus Liberal governing parties, although mainly a reflection of the strength of the bond market. This is consistent with Alesina and Sachs (1988), who suggest that leftist parties generate higher inflation, and with Booth and Booth (2003), who document a similar finding for the US bond market. While this difference is robust to the use of Canadian information variables to control for the state of the economy, it does not subsist when US information variables are included as controls. For the stock market, in contrast to the findings of the US literature, there is only weak evidence that it yields better opportunities under a left-leaning leadership, although the difference becomes significant when we use US information variables as controls. The exclusion of minority parliaments also reinforces these results.

The Canadian investment opportunities are also better in the late parts of the federal election cycle than in the first two years, with significantly higher Sharpe ratios for the bond market, the stock market and the optimal portfolio. With an optimal Sharpe ratios more than three times higher in the late versus early mandates (0.955 versus 0.311), these results confirm a prime ministerial cycle effect stronger than the presidential cycle effect in US returns, perhaps because Canadian governments have the additional option of calling an election at the "right moment", as election dates are not fixed in our sample period.

With respect to the American regimes, we find that Canadian investment opportunities are significantly better in Democratic versus Republican administrations. The performance spread comes entirely from the stock market and is particularly striking: The value-weighted portfolio of stocks earn a Sharpe ratio of 0.830 in Democratic regimes versus -0.007 in Republican ones. Having ideologically aligned leaderships in Canada and the US preserves but does not reinforce the effects found independently. The Canadian stock market also performs significantly better in the late versus early parts of the US presidential cycle. Furthermore, stocks yield even worst risk-adjusted returns when the Canadian and US governments are simultaneously in the early parts of their mandates, with a *negative* Sharpe ratio of -0.385. Thus, the puzzling Democratic equity premium and presidential cycle effects strongly spill over "north of the border". Hence, we document an important outside influence of American politics on Canadian capital markets that is consistent with the ties between both countries, as exemplified by correlations varying from 0.7 to 0.8 between their capitals markets.

These findings on the significant effects of the Canadian election cycle, the US President party and the US

election cycle are robust to the inclusion of Canadian or US controls for the state of the economy, so that they do not appear to have been expected due to measurable business cycle variations. Finally, we document that following electoral regimes would result in large optimal asset allocation shifts for managed portfolios of bills, bonds and stocks, consistent with differential investment opportunities. Nevertheless, given the low frequency of electoral regime switches, our performance results involve investable, low turnover, portfolio strategies.

The remainder of the paper is divided as follows. The next section describes the electoral regimes, the methodology for measuring the investment opportunities and the data sample. The third section presents and interprets the results. The last section concludes the paper with a look at the implication of our results for market efficiency.

2. Methodology and Data

This section defines the electoral regimes, and describes the financial assets and performance measures used to compare the investment opportunities across regimes. Our database starts in January 1951 and ends in December 2011, for a total of 732 monthly observations covering 21 different Canadian elections. Appendix A gives the background data on the outcomes of the Canadian federal elections and Appendix B gives information on US election outcomes.

2.1 Definitions of Electoral Regimes

Using publicly available information on Canadian and American election results, we form electoral regime variables organized into five categories: Canadian governing party, electoral strength of the government, Canadian election cycle, US President party and US election cycle. In each category, we classify each month into one of two mutually exclusive regimes as defined below, based on information *at the start of the month* so that the regimes are publicly known when examining the investment opportunities up to the end of the month. Figure 1 shows the proportion of months in a given regime.

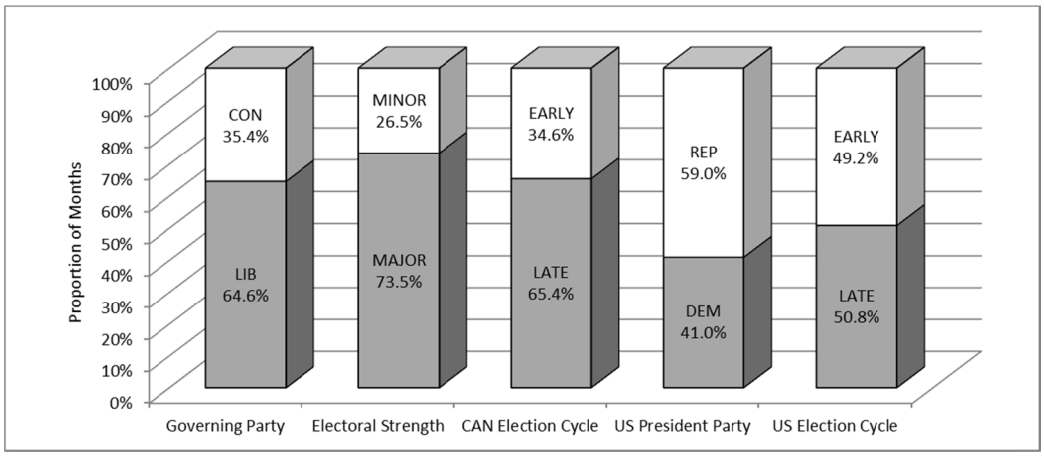

Figure 1. Electoral regimes, 1951 to 2011

Note. This figure shows the proportion of months for the Liberal (LIB) versus Conservative (CON) governing party regimes, for the majority (MAJOR) versus minority (MINOR) electoral strength regimes, for the late (LATE) versus early (EARLY) Canadian election cycle regimes, for the Democratic (DEM) versus Republican (REP) US president party regimes and for the late (LATE) versus early (EARLY) US presidential election cycle. The period from January 1951 to December 2011 represent a total of 732 months.

Canadian governing party: The LIB regime regroups the months under a Liberal federal government, while the CON regime includes the other months. The (left-leaning) Liberal Party of Canada is in power for 64.6% of the months, while the (right-leaning) Conservative Party of Canada (in its current appellation) rules for 35.4% of the time.

Electoral strength: The MINOR regime includes all months for which the parliament was in minority status (the governing party has less than half the total number of seats). The remaining months form the MAJOR regime. Minority governments represent just 26.5% of the months in our sample, although 9 (out of 21) elections resulted in such status.

Canadian election cycle: The EARLY regime includes the months in the first two years after an election resulting

in a majority, while the LATE regime has the other months. The restriction to majority months ensures governmental control on policy implementation and election calling in the early part of the mandate, creating conditions where "tough" long-term policies could be implemented more easily. With such a definition, 34.6% of the months fall in the EARLY part of the mandate (Note 1).

US President party: The DEM regime regroups the months under a Democratic President, while the REP regime includes the months with a Republican President. Democratic and Republican Presidents are in the White House for 41.0% and 59.0% of the months, respectively.

US election cycle: The EARLY US regime includes the months in the first two years after a fixed-date US presidential election, while the LATE US regime has the months in the last two years of the four-year mandate. Thus, about half the months are in each regime.

2.2 Measures of the Investment Opportunities

The Canadian investment opportunities we investigate are composed of four assets representing three common financial asset classes: bills (denoted RF, based on three-month Treasury bills), bonds (denoted RGOV, based on long-term government bonds) and stocks (two assets denoted RVW and REW, based on respectively value-weighted and equally-weighted portfolios of all exchange-traded stocks). While RVW is similar to the S&P/TSX Composite Index and is highly weighted in large-cap stocks, REW can be thought as representing the small- and medium-cap equity asset classes as they are the dominant portfolio components. The series of monthly realized returns for these assets are obtained from the TSX Canadian Financial Markets Research Centre (CFMRC).

Table 1 presents the annualized mean return (monthly value $\times 12$), the annualized standard deviation (monthly value $\times \sqrt{12}$) and correlations for the four assets (Note 2). The historical risk-reward opportunities look good compare to the ones of the last few years. More importantly for our purpose, we can observe a risk-return trade-off between the assets as expected.

Table 1. Investment opportunities, 1951 to 2011

	RF	RGOV	RVW	REW
Mean	5.46%	7.38%	10.60%	17.18%
St Dev		8.40%	15.46%	19.66%
Corr		RGOV	20.33%	10.51%
		RVW		83.81%

Note. This table presents the annualized means, standard deviations (St Dev) and correlations (Corr) for the monthly returns of three-month Treasury bills (RF), the long-term government bonds (RGOV), the value-weighted equity portfolio (RVW) and the equally-weight equity portfolio (REW).

To examine how the investment opportunities vary across electoral regimes, we rely on mean-variance (MV) analysis. Specifically, we first estimate the means, standard deviations and correlations, conditional on being in a given regime. We then compute the corresponding MV frontiers, which represent the limit of the investors' opportunity set. The MV frontier is defined as the portfolios that have minimum variance for a given mean return. Using the notation and demonstrations of Roll (1977), let $\boldsymbol{R}$ be the 3 × 1 vector of mean returns for RGOV, RVW and REW, let $\boldsymbol{V}$ be their corresponding variance-covariance matrix, and let $\underline{\mathbf{1}}$ be the unit vector. Then, for a given mean return of $E(R_p)$, the MV frontier portfolios have the following variance:

$$\sigma_{MV-p}^2 = \frac{a - 2bE(R_p) + cE(R_p)^2}{ac - b^2} \tag{1}$$

where $a = \boldsymbol{R}'\boldsymbol{V}^{-1}\boldsymbol{R}$, $b = \boldsymbol{R}'\boldsymbol{V}^{-1}\underline{\mathbf{1}}$ and $c = \underline{\mathbf{1}}'\boldsymbol{V}^{-1}\underline{\mathbf{1}}$.

Next, we compare the Sharpe ratios of the individual assets and of the MV tangency portfolio (the portfolio with the maximum Sharpe ratio) across regimes. The Sharpe ratio (Sharpe, 1966, 1994), also called the reward-to-variability ratio, is a portfolio's excess return over the risk-free rate divided by its standard deviation,

$$h_p = \frac{E(R_p) - R_f}{\sigma_p} \tag{2}$$

This commonly used performance measure is intuitively interpreted in the mean-standard deviation space as the

slope of a line from the risk-free asset to a specified portfolio. The higher is the slope, the better located is the portfolio. The highest possible slope leads to the MV tangency portfolio, with return denoted R_{MV-tan}, which has the following maximum possible or optimal Sharpe ratio:

$$h_{maximum} = \frac{E(R_{MV-tan}) - R_f}{\sigma_{MV-tan}} \tag{3}$$

where:

$$E(R_{MV-tan}) = \frac{a - bR_f}{b - cR_f} \tag{4}$$

$$\sigma^2_{MV-tan} = \frac{a - 2bE(R_{MV-tan}) + cE(R_{MV-tan})^2}{ac - b^2} \tag{5}$$

As discussed by Ferson and Siegel (2003), the sample maximum Sharpe ratio is biased upward when the number of assets K is large relative to the number of observations T. We thus report adjusted maximum Sharpe ratio by using their proposed correction:

$$h^{adj}_{maximum} = \sqrt{\frac{h^2_{maximum} \times (T - K - 2)}{T} - \frac{K}{T}} \tag{6}$$

In this paper, while T varies depending on the regimes under consideration, we only consider three assets ($K = 3$) for the MV frontiers, which implies that the bias is small. Furthermore, our tests focus on the difference between Sharpe ratios across regimes, which mitigates the effect of the bias further. Hence our results are similar whether we use adjusted Sharpe ratio or not.

We formally test for the equality of Sharpe ratios across regimes with a statistic proposed by Jobson and Korkie (1981), revisited by Lo (2002) and Memmel (2003). (See also Ledoit & Wolf, 2008, Leung & Wong, 2008, for further discussions.) Specifically, let $\hat{h}_{p,r}$ et $\hat{h}_{p,s}$ be the estimated Sharpe ratios for portfolio p in regimes r and s, two mutually exclusive regimes (for example MINOR and MAJOR). These estimates are obtained by using the sample mean and standard deviation of the portfolio returns in the two regimes, with samples of T_r and T_s observations, respectively. Then, under the null hypothesis that the Sharpe ratios are equal, and assuming that returns are identically and independently distributed, the estimated Sharpe ratio difference has the following asymptotic distribution, which allows a test on its significance:

$$\hat{h}_{p,r} - \hat{h}_{p,s} \xrightarrow{d} N\left(0, \frac{1 + \frac{1}{2}\hat{h}^2_{p,r}}{T_r} + \frac{1 + \frac{1}{2}\hat{h}^2_{p,s}}{T_s}\right) \tag{7}$$

This distribution leads to a *z*-test on the equality of Sharpe ratios across regimes. When applied to the maximum Sharpe ratio portfolio, this test becomes a test on the equivalence of the optimal MV opportunities across regimes.

As a robustness check, following Santa-Clara and Valkanov (2003), we also use predetermined information variables to control our results for the anticipated state of the Canadian economy. Specifically, we run the following regression with the returns of each risky asset class (RGOV, RVW and REW):

$$R_{it} = \mu_i + \boldsymbol{b}'\boldsymbol{Z_{t-1}} + \varepsilon_i \tag{8}$$

where $\boldsymbol{Z_{t-1}}$ is a vector of state of the economy control variables that have been demeaned. Then, we re-estimate the measures of investment opportunities using a new set of returns that exclude the effect of the information variables:

$$R^Z_{it} = \mu_i + \varepsilon_i \tag{9}$$

Our information variables are Canadian versions of the ones used in the study of Santa-Clara and Valkanov (2003), namely the annualized log dividend-price ratio, the term spread, the default spread and the relative interest rate (Note 3). The predictive value of these variables has been studied extensively in the literature, starting with Keim and Stambaugh (1986), Campbell (1987), Campbell and Shiller (1988), and Fama and French (1988, 1989). Rapach, Wohar and Rangvid (2005), Hjalmarsson (2010) and Chrétien and Coggins (2014) provide evidence in a Canadian context. To account for the possibility that the Canadian information variables

might be endogenously determined along with our asset returns, under the common influences of Canadian government policies, we also consider the exogenously determined US versions of the information variables (Note 4).

Finally, we examine the optimal asset allocation between bills, bonds and stocks across regimes by computing the asset weights for selected MV efficient portfolios. Specifically, as the efficient portfolios are combinations of the risk-free asset with a weight of X_f and the MV tangency portfolio with a weight of $1 - X_f$, the optimal portfolio weights for an investor with a required return of $E(R_p)$ are equal to:

$$\boldsymbol{X_{MVp}} = \begin{bmatrix} X_f \\ (1 - X_f)\boldsymbol{X_{MV-tan}} \end{bmatrix} \tag{10}$$

where:

$$X_f = \frac{E(R_p) - E(R_{MV-tan})}{R_f - E(R_{MV-tan})} \tag{11}$$

$$\boldsymbol{X_{MV-tan}} = \boldsymbol{V}^{-1}[\boldsymbol{R} \quad \underline{\mathbf{1}}] \begin{bmatrix} a & b \\ b & c \end{bmatrix}^{-1} \begin{bmatrix} E(R_{MV-tan}) \\ 1 \end{bmatrix} \tag{12}$$

with $\boldsymbol{X_{MVp}}$ being a 4 × 1 vector and $\boldsymbol{X_{MV-tan}}$ being a 3 × 1 vector (Note 5).

3. Empirical Results

This section analyses our empirical results. We first focus on comparing the investment opportunities across regimes. Then, we examine some refinements with respect to our electoral regimes. Third, we assess the robustness of our results to the inclusion of the state of the economy control variables. Finally, we provide some evidence on the effect of the regimes on the optimal asset allocation.

3.1 Investment Opportunity Set and Sharpe Ratios

This section first presents our results with the help of a figure and a table for each electoral regime category. The figure shows, in the mean-standard deviation space, the risk-free asset RF, the risky assets RGOV, RVW and REW, and their MV frontier, across the two relevant regimes differentiated by black circle and grey square markers. The assets' annualized mean returns by regimes are also provided in their labels. The table gives the Sharpe ratio across regimes of the assets and of the tangency portfolio. It also provides the *p*-value and associated significance level for the test on the equality of the ratios across regimes given by equation (7).

3.1.1 Governing Party

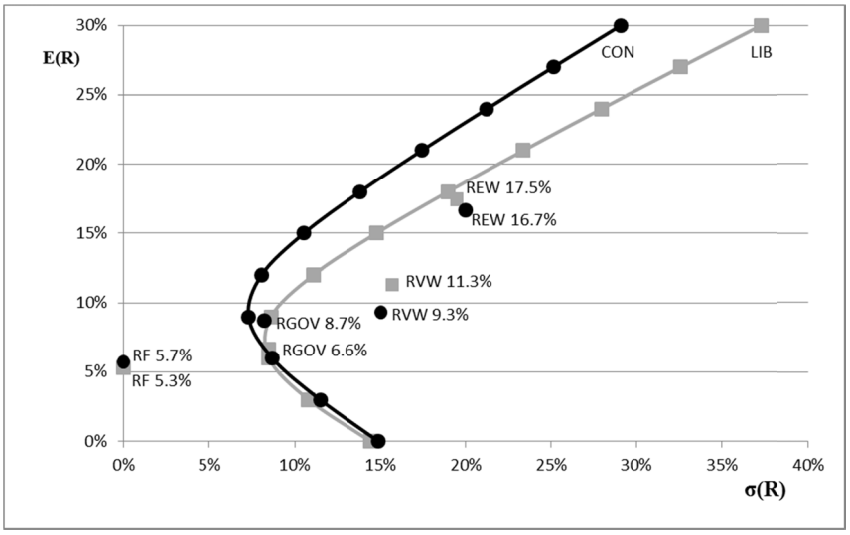

Figure 2. Investment opportunities and governing party

Note. This figure shows the risk free return (RF) and the investment opportunities in RGOV, RVW, REW and their MV efficient frontier, for Liberal (LIB) versus Conservative (CON) governing party regimes. Black circle (grey square) markers represent investment opportunities in the Conservative (Liberal) regime.

Figure 2 and Table 2 show the results for the Liberal versus Conservative government regimes. Although all four assets are located similarly under both regimes in Figure 2, the resulting MV frontiers show better opportunities in Conservative versus Liberal regimes. Accordingly, the tangency portfolio shows a significantly better Sharpe ratio in the Conservative regime (0.88 versus 0.66). The better opportunities appear to come from the bond market, as the RGOV Sharpe ratios (0.37 versus 0.16) are significantly different at the 1% level. In contrast, the Sharpe ratios for RVW and REW are slightly higher in the Liberal regime, although the differences are not statistically different at the 5% level.

Table 2. Sharpe ratios and governing party

	LIB	CON	Diff p-val
RGOV	0.156	0.365	0.008 ***
RVW	0.381	0.240	0.074 *
REW	0.622	0.549	0.376
Maximum	0.662	0.877	0.016 **

Note. This table presents Sharpe ratios for RGOV, RVW, REW and their MV efficient frontier tangency portfolio (Maximum) for Liberal (LIB) versus Conservative (CON) governing party regimes, and p-values on tests for the equality of Sharpe ratios across regimes (Diff p-val). ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

We thus find some evidence that the right-leaning Conservative policies and the left-leaning Liberal policies produce different investment opportunities, especially for the bond market. This is consistent with the US bond market results of Booth and Booth (2003), as well as the analysis of Alesina and Sachs (1988) that suggests that leftist parties generate higher inflation. However, our findings do not fully support the US evidence that the stock market performs better under a left-leaning leadership, as there is only weak evidence of better stock market opportunities in the Liberal regime.

3.1.2 Electoral Strength

Figure 3 and Table 3 show the results for the minority versus majority government regimes. Figure 3 shows that the MV frontiers are relatively similar across government strength regimes. The most noticeable difference is for bonds, as RGOV provides a higher mean return in majority than minority situations (8.8% versus 3.5%). Table 3 confirms these impressions. While the resulting RGOV Sharpe ratios (0.31 versus -0.06) are significantly different at the 1% level, the other Sharpe ratio differences are not significant. In particular, the test for the maximum Sharpe ratio portfolios indicates that the optimal MV opportunities are equivalent across government strength regimes. Hence, with regards to overall investment opportunities, our results do not support the commonly-stated request by politicians that they should be given "strong mandate" to reduce uncertainty, although there is some evidence that the bond market performs worst in minority parliament.

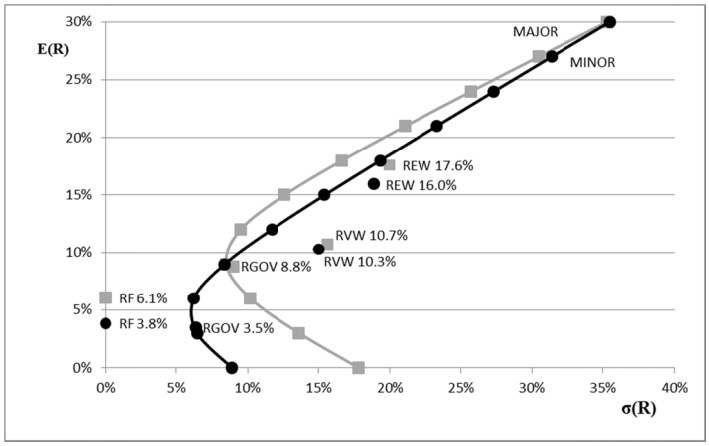

Figure 3. Investment opportunities and electoral strength

Note. This figure shows the risk free return (RF) and the investment opportunities in RGOV, RVW, REW and their MV efficient frontier, for majority (MAJOR) versus minority (MINOR) electoral strength regimes. Black circle (grey square) markers represent investment opportunities in the minority (majority) regime.

Table 3. Sharpe ratios and electoral strength

	MAJOR	MINOR	Diff p-val
RGOV	0.305	-0.056	0.000 ***
RVW	0.298	0.431	0.127
REW	0.579	0.646	0.466
Maximum	0.712	0.718	0.952

Note. This table presents Sharpe ratios for RGOV, RVW, REW and their MV efficient frontier tangency portfolio (Maximum) for majority (MAJOR) versus minority (MINOR) electoral strength regimes, and p-values on tests for the equality of Sharpe ratios across regimes (Diff p-val). ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

3.1.3 Canadian Election Cycle

Figure 4 and Table 4 show the results for the late versus early parts of the Canadian election cycle. Figure 4 illustrates striking differences in investment opportunities. In particular, there is strong evidence that the stock market performs much better in the LATE regime. Without any difference in their standard deviation, the historical returns on RVW and REW average, respectively, 13.3% and 22.1% in the LATE regime versus 5.5% and 7.9% in the EARLY regime. These return differences, combined with the lower risk of RGOV in the LATE versus EARLY regimes (7.5% versus 10.0%), produce materially better opportunities in the months leading to an election.

Table 4 confirms the significance of these differences. RVW has Sharpe ratios of 0.57 in late mandate and -0.07 in early mandate, while the values for the tangency portfolio are 0.96 and 0.31, respectively. Hence, the Sharpe ratio of the stock market in the LATE regime is higher than the optimal Sharpe ratio of the efficient frontier in the EARLY regime. While the Sharpe ratio of RGOV is two times higher in the LATE regime, the difference is only statistically significant at the 10% level.

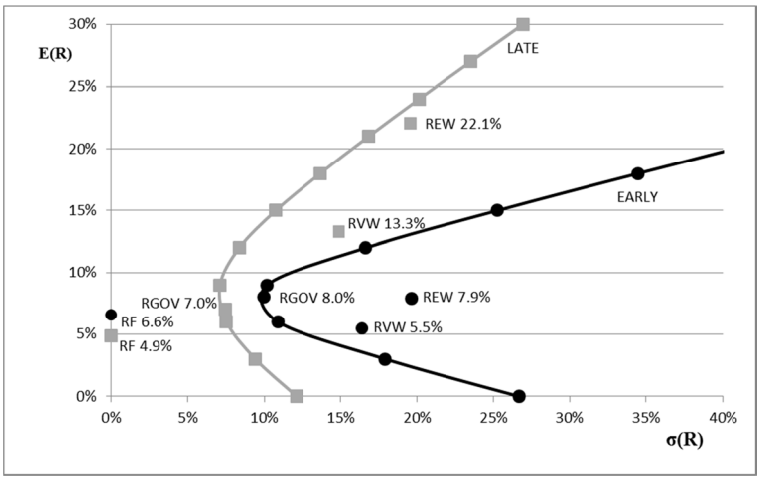

Figure 4. Investment opportunities and Canadian election cycle

Note. This figure shows the risk free return (RF) and the investment opportunities in RGOV, RVW, REW and their MV efficient frontier, for late (LATE) versus early (EARLY) election cycle regimes. Black circle (grey square) markers represent investment opportunities in the early (late) regime.

Table 4. Sharpe ratios and Canadian election cycle

	LATE	EARLY	Diff p-val
RGOV	0.292	0.144	0.060 *
RVW	0.567	-0.067	0.000 ***
REW	0.880	0.068	0.000 ***
Maximum	0.955	0.311	0.000 ***

Note. This table presents Sharpe ratios for RGOV, RVW, REW and their efficient frontier tangency portfolio (Maximum) for late (LATE) versus early (EARLY) Canadian election cycle regimes, and p-values on tests for the equality of Sharpe ratios across regimes (Diff p-val). ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

While confirming these hypotheses is beyond our scope, plausible explanations in the literature include strategic policy timing and opportunistic election calling. Governments have an incentive to choose "tough" policies in early mandate and to delay more popular measures to late mandate, near the next election (Smith, 2004; Kayser, 2005). They also have the option to call an election at the right moment, including when markets are performing well or before anticipated difficult times (Ellis & Thoma, 1991; Heckelman, 2001).

3.1.4 US President Party

Figure 5 and Table 5 explore the Democratic versus Republican US presidential regimes. Figure 5 indicates that the Canadian MV frontier under Democratic US presidents is convincingly better located. This finding is the consequence of the differential in stock market performance. For apparently similar risk, RVW and REW earn 11.2% and 20.7% higher mean returns, respectively. The corresponding Sharpe ratios confirm that the stock market performance difference is significant at the 1% level, leading to a similar conclusion for the overall investment opportunities. The reward per unit of risk available on the MV frontier is more than three times higher under Democratic versus Republican administrations. In fact, both stock indices in in the DEM regime fall outside the MV frontier for the REP regime.

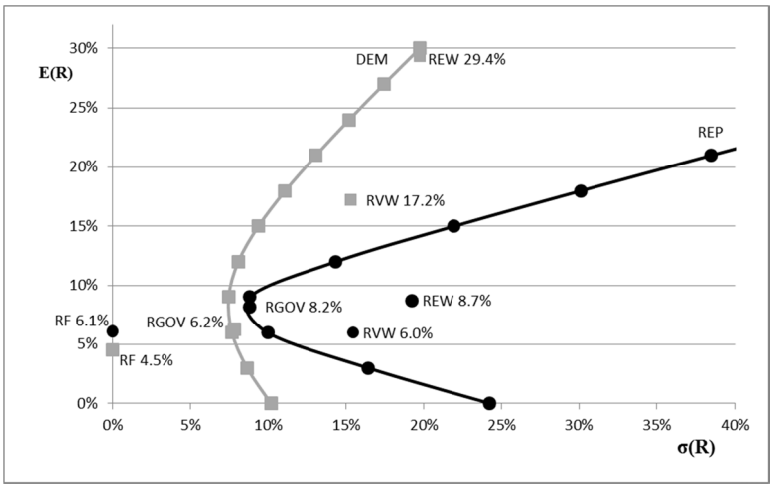

Figure 5. Investment opportunities and US president party

Note. This figure shows the risk free return (RF) and the investment opportunities in RGOV, RVW, REW and their MV efficient frontier, for Democratic (DEM) versus Republican (REP) US President party regimes. Black circle (grey square) markers represent investment opportunities in the Republican (Democratic) regime.

Table 5. Sharpe ratios and US president party

	DEM	REP	Diff p-val
RGOV	0.220	0.235	0.845
RVW	0.830	-0.007	0.000 ***
REW	1.258	0.136	0.000 ***
Maximum	1.275	0.401	0.000 ***

Note. This table presents Sharpe ratios for RGOV, RVW, REW and their MV efficient frontier tangency portfolio (Maximum) for Democratic (DEM) versus Republican (REP) US president party regimes, and p-values on tests for the equality of Sharpe ratios across regimes (Diff p-val). ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

This finding provides a striking result on the effect of US election outcomes on Canadian financial markets. It adds to the literature by showing that American politics have a significant influence on foreign capital market returns. Although its explanation is as puzzling as the so-called Democratic equity premium documented in the US stock market, it is expected given the ties between both countries. The Canadian and US capital markets are correlated (correlations are from 0.7 to 0.8 between the bond markets or the stock markets of both countries in our sample), and there exists related works on the cross-border effect of US politics and on Canada-US financial markets integration (for examples, Mittoo, 1992; Foerster & Schmitz, 1997; Normandin, 2004).

3.1.5 US Election Cycle

Figure 6 and Table 6 examine the late versus early US presidential mandate regimes. Figure 6 illustrates that late mandate opportunities dominate the early mandate opportunities for all expected returns. While the MV frontiers are close, there are large spreads in annualized mean return for the stock market assets. For example, RVW earns nearly twice as much return in the late versus early parts of the presidential cycle (13.8% versus 7.3%). Accordingly, the tests in Table 6 reject the equality of Sharpe ratios for RVW and REW at the 1% level. However, the Sharpe ratios for the bond market and the optimal MV portfolio are not significantly different across the US election cycle regimes, confirming that the MV frontiers are similar. While our results are consistent with the US literature on the presidential cycle effect, they highlight that the presidential cycle has a spill over effect "north of the border" for equities, but not for the overall Canadian investment opportunities.

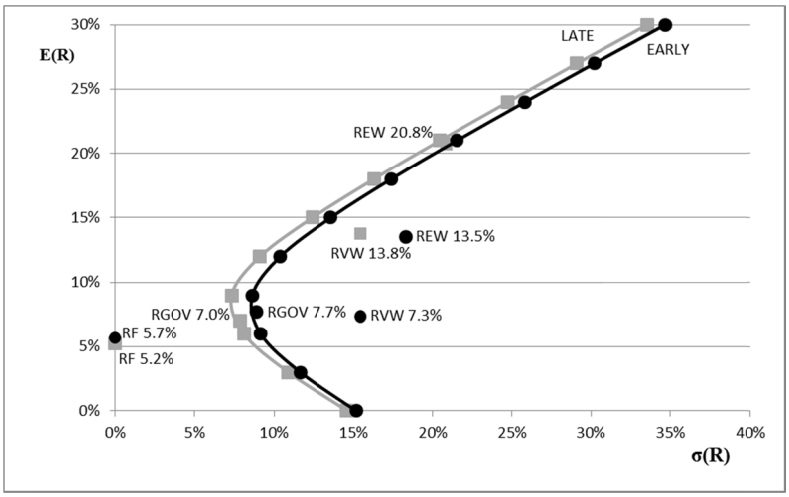

Figure 6. Investment opportunities and US election cycle

Note. This figure shows the risk free return (RF) and the investment opportunities in RGOV, RVW, REW and their MV efficient frontier, for late (LATE) versus early (EARLY) US Presidential election cycle regimes. Black circle (grey square) markers represent investment opportunities in the early (late) regime.

Table 6. Sharpe ratios and US election cycle

	LATE	EARLY	Diff p-val
RGOV	0.227	0.231	0.964
RVW	0.551	0.108	0.000 ***
REW	0.743	0.427	0.000 ***
Maximum	0.777	0.701	0.359

Note. This table presents Sharpe ratios for RGOV, RVW, REW and their MV efficient frontier tangency portfolio (Maximum) for late (LATE) versus early (EARLY) US presidential election cycle regimes, and p-values on tests for the equality of Sharpe ratios across regimes (Diff p-val). ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

3.2 Further Considerations

This section summarizes the findings of a number of additional steps taken to expand our results by refining our electoral regimes. Table 7 reports the results.

First, we re-examine the investment opportunities in the Liberal versus Conservative regimes, focusing on majority governments, where policies are more likely to be effectively implemented. Panel A of Table 7 shows little differences with Table 3. The bond market (0.50 versus 0.22) and the tangency portfolio (0.97 versus 0.66) still present significantly higher Sharpe ratios in Conservative versus Liberal governments.

Second, we examine the investment opportunities when Canada and the US have ideologically aligned leaderships. In support of the results of Table 2 and Table 5, Panel B of Table 7 shows that the stock market Sharpe ratios are higher and the bond market Sharpe ratio is lower in the left-leaning Liberal-Democratic combination than in the right-leaning Conservative-Republican combination. Similar to Table 5, but in contrast

to Table 2, the optimal Sharpe ratio is significantly higher for left-leaning leaderships. Overall, having ideologically aligned leaderships preserves but does not reinforce the effects found previously.

Table 7. Additional results on sharpe ratios and electoral regimes

Panel A. Governing party in majority electoral strength regime

	LIB-MAJOR (T = 371)	CON-MAJOR (T = 167)	Diff p-val
RGOV	0.223	0.502	0.004 ***
RVW	0.361	0.130	0.015 **
REW	0.605	0.516	0.374
Maximum	0.656	0.968	0.005 ***

Panel B. Joint Canada-US governing party / US president party

	LIB-DEM (T = 214)	CON-DEM (T = 86)	Diff p-val
RGOV	0.108	0.490	0.004 ***
RVW	0.683	1.197	0.001 **
REW	0.971	1.988	0.000 ***
Maximum	0.965	2.280	0.000 ***

Panel C. Joint Canada-US election cycles

	LATE-LATE (T = 280)	EARLY-EARLY (T = 161)	Diff p-val
RGOV	0.219	0.095	0.213
RVW	0.557	-0.385	0.000 ***
REW	0.715	-0.376	0.000 ***
Maximum	0.739	0.418	0.003 ***

Note. This table presents Sharpe ratios for RGOV, RVW, REW and their MV efficient frontier tangency portfolio (Maximum) for Liberal (LIB) versus Conservative (CON) governing party regimes in majority (MAJOR) parliaments (Panel A), for the governing party / US president party joint left-leaning Liberal / Democratic (LIB-DEM) versus right-leaning Conservative / Republican (CON-REP) regimes (Panel B), and for the joint Canada-US late (LATE-LATE) versus early (EARLY-EARLY) election cycle regimes (Panel C), and p-values on tests for the equality of Sharpe ratios across regimes (Diff p-val). ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively. The number of observations (T) for each regime is in parentheses.

Third, in Panel C of Table 7, the effect of the combined Canadian and US election cycles is stronger than each effect taken separately, especially for the stock market. For example, RVW has Sharpe ratios of 0.56 when both countries are in late mandate and -0.39 when they are in early mandate, a difference statistically significant at the 1% level. The stock market tends to perform very poorly when both countries are simultaneously in the first two post-election years.

3.3 Controls for the State of the Economy

Our analysis has thus far documented numerous significant Sharpe ratio differences between the electoral regimes. Following Santa-Clara and Valkanov (2003), this section uses predetermined information variables to control our results for the anticipated state of the Canadian economy, using the methodology described previously. Table 8 presents the results when considering either Canadian controls (left side of the table) or US controls (right side of the table) as instruments for variations in the Canadian business cycle.

Table 8. Sharpe ratios and electoral regimes with controls for the state of the economy

	Canadian Controls			*US Controls*		
Panel A. Governing Party						
	LIB	CON	Diff p-val	LIB	CON	Diff p-val
RGOV	0.162	0.355	0.015 **	0.225	0.241	0.835
RVW	0.368	0.273	0.232	0.392	0.223	0.032 **
REW	0.641	0.543	0.244	0.679	0.461	0.009 ***
Maximum	0.701	0.829	0.147	0.751	0.682	0.428
Panel B. Electoral Strength						
	MAJOR	MINOR	Diff p-val	MAJOR	MINOR	Diff p-val
RGOV	0.300	-0.035	0.000 ***	0.257	0.138	0.158
RVW	0.252	0.576	0.000 ***	0.248	0.579	0.000 ***
REW	0.535	0.809	0.004 ***	0.522	0.825	0.001 ***
Maximum	0.690	0.870	0.064 *	0.656	0.929	0.005 ***
Panel C. Canadian Election Cycle						
	LATE	EARLY	Diff p-val	LATE	EARLY	Diff p-val
RGOV	0.258	0.195	0.422	0.292	0.151	0.074 *
RVW	0.512	0.031	0.000 ***	0.577	-0.083	0.000 ***
REW	0.797	0.241	0.000 ***	0.888	0.059	0.000 ***
Maximum	0.868	0.488	0.000 ***	0.967	0.330	0.000 ***
Panel D. US President Party						
	DEM	REP	Diff p-val	DEM	REP	Diff p-val
RGOV	0.230	0.229	0.997	0.319	0.175	0.060 *
RVW	0.788	0.022	0.000 ***	0.893	-0.047	0.000 ***
REW	1.267	0.142	0.000 ***	1.360	0.073	0.000 ***
Maximum	1.305	0.367	0.000 ***	1.391	0.324	0.000 ***
Panel E. US Election Cycle						
	LATE	EARLY	Diff p-val	LATE	EARLY	Diff p-val
RGOV	0.209	0.248	0.603	0.201	0.258	0.448
RVW	0.508	0.156	0.000 ***	0.543	0.118	0.000 ***
REW	0.685	0.514	0.033 **	0.716	0.466	0.002 ***
Maximum	0.713	0.812	0.240	0.736	0.789	0.527

Note. This table presents Sharpe ratios for RGOV, RVW, REW and their MV efficient frontier tangency portfolio (Maximum) for different electoral regimes after controlling for the state of the economy, and p-values on tests for the equality of Sharpe ratios across regimes (Diff p-val). The variables for the electoral regimes are described in Tables 2 to 6. The control variables are the dividend-price ratio, term spread, credit spread and relative interest rate. The results under Canadian and US Controls use respectively Canadian and US versions of the variables. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

Table 8 documents that most of our results are robust to controls for the state of the economy. Our findings on the effect of the Canadian governing party regimes are the most affected by the controls. In particular, compare to the ones in Table 2, the results in Panel A of Table 8 show that the higher Sharpe ratio for the bond market in Liberal versus Conservative governments is robust to Canadian controls, but not to US controls. The addition of US controls also renders the Sharpe ratio of the stock market under Liberals significantly higher than the one under Conservatives.

With respect to electoral strength, Panel B of Table 8 confirms that the bond market performs better in majority versus minority governments, although the statistical significance weakens with the use of US controls. While the other Sharpe ratio differences were not significant in Table 3, the inclusion of Canadian or US controls makes the stock market and optimal Sharpe ratios significantly higher in minority versus majority governments. For the stock market, it thus appears that, after controlling for the state of the economy, there is a higher reward per unit of risk in minority governments.

As the rest of Table 8 shows, whether using Canadian or US control variables, our main findings on the Canadian election cycle (Panel C), the US President party (Panel D) and the US election cycle (Panel E) are robust, so that they do not appear to have been expected due to measurable business cycle variations. In particular, the stock market has significantly higher Sharpe ratios in the late versus early part of the Canadian or

US election cycles, and under Democratic versus Republican administrations, even after controlling for the state of the economy.

3.4 Optimal Asset Allocation

Figure 7 shows the optimal MV asset allocation between bills, bonds and stocks across regimes for an investor with a 15% annualized required return, a value in between the annualized mean returns on the RVW and REW stock indexes for the period studied. While the portfolio weights for bills and bonds are based on RF and RGOV, respectively, the stock allocation is the sum of the portfolio weights on RVW and REW. Although not illustrated, a decrease in the investor's required return generally results in a larger allocation to bills with proportionally smaller allocations to bonds and stocks. For example, while the allocation to bills averages around 20% in Figure 7, it increases to around 60% if the required return is set to 10%.

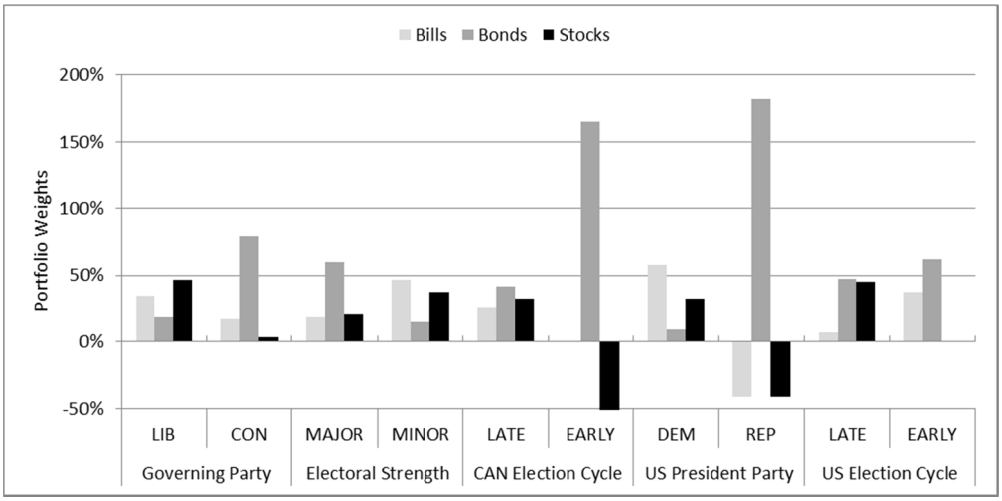

Figure 7. Optimal asset allocation and electoral regimes

Note. This figure shows portfolio weights across different regimes for the optimal asset allocation between bills (light grey bars), bonds (dark grey bars) and stocks (black bars) for an investor with an annualized required return of 15%.

The main conclusion from the figure is that an optimally managed portfolio would require considerable shifts in asset allocation across electoral regimes, even in situations where there was little statistical evidence of differential investment opportunities. In accordance with the results presented earlier, we observe large rebalancing of stocks. In particular, while their allocations in the LIB, DEM and LATE regimes are around 40%, they are liquidated or even sold short in the CON, REP and EARLY regimes. The allocations in bills and bonds also vary greatly, especially in the electoral strength and US president party regimes. Finally, the allocation shifts in Canadian portfolios appear as important across US election regimes than across Canadian ones, once again highlighting the significant role of American politics for investors in Canada.

4. Concluding Remarks

This paper starts by asking whether investors in Canadian financial markets should pay attention to election outcomes. Our findings show that they would gain considerably by following electoral regime signals and that doing so optimally would result in large asset allocation shifts.

The five elements we consider are the Canadian governing party, the Canadian electoral strength, the Canadian election cycle, the US presidential administration and the US presidential cycle. Our findings can be summarized as follow. First, optimal mean-variance investment opportunities are significantly better in Conservative versus Liberal federal governments, based on the strength of the bond market, although this result can be explained by controls for the state of the economy. Second, the bond market performs better in majority versus minority governments. The inclusion of Canadian or US controls also makes the stock market ratio and optimal Sharpe ratio significantly higher in minority versus majority governments. Third, optimal investment opportunities are significantly better in the late versus early parts of the Canadian election cycles, mostly due to the stock market performance. Fourth, the stock market similarly leads optimal investment opportunities to be significantly better in Democratic versus Republican White Houses. Finally, stock market opportunities are significantly better in the

late versus early US presidential election cycles. Controls for the state of the economy do not explain these last three findings.

While historical in nature, and thus subject to the difficulty of extrapolating from past returns, our performance results involve investable, low turnover, portfolio strategies, using start-of-the-month information to invest for the month. As no apparent variation in business cycle risk accounts for the results, the large differences in returns per unit of risk that we document are somewhat puzzling. Given that electoral information is public and easily available, the efficient market theory states that investors should not be able to profit from it, yet portfolio managers following some of the electoral signals would have made important gains. Since rational explanations for our results are not well developed and are left for future research, it remains to be seen if such opportunities will materialize again in the coming years.

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Notes

Note 1. During our sample period, there is no fixed election date in Canada. While the dissolution of Parliament can occur at any time within the five-year electoral mandate, the shortest observed majority term is 41 months, a longer period than the longest observed minority term. In 2007, the Parliament adopted a bill for fixed election dates, with the first scheduled fixed date set for 2015.

Note 2. For simplicity, we assume that RF has a standard deviation of zero and correlations of zero with the other assets. These assumptions are commonly made and do not affect our results, given that three-month Treasury bill returns have a standard deviation and correlations with other assets that are close to zero.

Note 3. More precisely, the Canadian information variables are constructed as follow. The annualized log dividend-price ratio is the difference between the one-year total return of the S&P/TSX Composite Index and its one-year price return, multiplied by the value of the index one year ago, and divided by its current value, with data from CFMRC. The term spread is the difference between the average yield-to-maturity of the Canada Treasury bonds with a maturity of ten years or more (CANSIM series V122487) and the yield-to-maturity of the three-month Canada Treasury bill (CANSIM series V122541). The default spread is the difference between the yield on long-term corporate bonds and the government bond yield from series V122487. To construct a long history for the corporate bond yield, we combine three different series. From February 1950 to October 1977, we use the CANSIM series V35752, the Scotia-McLeod Canada Long-Term All-Corporate Yield Index. From November 1977 to June 2007, we take the Scotia Capital Canada All-Corporations Long-Term bond yield CANSIM series V122518. From July 2007, we take the yield from the Merrill Lynch Canada Long-Term Corporate Bond Index (F9C0) from Bloomberg. The relative interest rate is the deviation of the three-month Treasury bill rate from its one-year moving average using the previously introduced series V122541.

Note 4. The US variables are defined as in Santa-Clara and Valkanov (2003). They are the annualized log dividend-price ratio on the S&P 500, the term spread between yields of 10-year US Treasury notes and three-month US Treasury bills, the default spread between yields of BAA- and AAA-rated US bonds, and the relative interest rate given by the deviation of the three-month US Treasury bill rate from its one-year moving average. The data are available on the Professor Goyal's website, with the sources described in Welch and Goyal (2008).

Note 5. It is useful to observe that our approach is not designed to capture the abnormal returns associated with changes in regimes, which would necessitate, for example, an event study methodology. Instead, it focuses on measuring the risk-return opportunities and asset allocations across various electoral regimes, exploiting the large number of observations in each regime for more precise estimation. A study of the market responses to election events is beyond the scope of the paper.

Appendix A. Canadian Federal Election Outcomes, 1949 to 2011

Date	Government		BQ	CCF	IND	LIB	NDP	CON	REF	SC	Total	Prime Minister	Parliament
Jun 27, 1949	LIB	Major	0	13	8	**190**	0	41	0	10	**262**	St Laurent	21st
Aug 10, 1953	LIB	Major	0	23	5	**171**	0	51	0	15	**265**	St Laurent	22nd
Jun 10, 1957	CON	**Minor**	0	25	4	105	0	**112**	0	19	**265**	Diefenbaker	23rd
Mar 31, 1958	CON	Major	0	8	0	49	0	**208**	0	0	**265**	Diefenbaker	24th
Jun 18, 1962	CON	**Minor**	0	0	1	99	19	**116**	0	30	**265**	Diefenbaker	25th
Apr 8, 1963	LIB	**Minor**	0	0	0	**129**	17	95	0	24	**265**	Pearson	26th
Nov 8, 1965	LIB	**Minor**	0	0	2	**131**	21	97	0	14	**265**	Pearson	27th
Jun 25, 1968	LIB	Major	0	0	1	**155**	22	72	0	14	**264**	Trudeau	28th
Oct 30, 1972	LIB	**Minor**	0	0	2	**109**	31	107	0	15	**264**	Trudeau	29th
Jul 8, 1974	LIB	Major	0	0	1	**141**	16	95	0	11	**264**	Trudeau	30th
May 22, 1979	CON	**Minor**	0	0	0	114	26	**136**	0	6	**282**	Clark	31st
Feb 18, 1980	LIB	Major	0	0	0	**147**	32	103	0	0	**282**	Trudeau	32nd
Sep 4, 1984	CON	Major	0	0	1	40	30	**211**	0	0	**282**	Mulroney	33rd
Nov 21, 1988	CON	Major	0	0	0	83	43	**169**	0	0	**295**	Mulroney	34th
Oct 25, 1993	LIB	Major	54	0	1	**177**	9	2	52	0	**295**	Chrétien	35th
Jun 2, 1997	LIB	Major	44	0	1	**155**	21	20	60	0	**301**	Chrétien	36th
Nov 27, 2000	LIB	Major	38	0	0	**172**	13	12	66	0	**301**	Chrétien	37th
Jun 28, 2004	LIB	**Minor**	54	0	1	**135**	19	99	0	0	**308**	Martin	38th

Jan 23, 2006	CON	**Minor**	51	0	1	103	29	**124**	0	0	**308**	Harper	39th
Oct 14, 2008	CON	**Minor**	49	0	2	77	37	**143**	0	0	**308**	Harper	40th
May 2, 2011	CON	Major	4	0	1	34	103	**166**	0	0	**308**	Harper	41st

Note. Source: www2.parl.gc.ca/Parlinfo/compilations/ElectionsAndRidings/ResultsParty.aspx?Language=E. Abbreviations are BQ = Bloc Québécois, CCF = Co-operative Commonwealth Federation, IND = Independents and other political parties that do not ever achieve parliamentary standing (i.e., requisite of more than 12 seats), LIB = Liberal Party of Canada, NDP = New Democratic Party, CON = Conservative Party of Canada (Progressive Conservative Party before the 38th Parliament), REF = Canadian Reform Conservative Alliance (Reform Party before the 37th Parliament), SC = Social Credit Party and Ralliement Créditiste, Major = Majority government, Minor = Minority government.

Appendix B. American Presidential Election Outcomes, 1945 to 2011

Elected Candidate	**Party**	Inaugurated	Regime Ends
TRUMAN, Harry	Democratic	12 Apr 1945	20 Jan 1953
EISENHOWER, Dwight	Republican	20 Jan 1953	20 Jan 1961
KENNEDY, John F.*	Democratic	20 Jan 1961	22 Nov 1963
JOHNSON, Lyndon B.	Democratic	22 Nov 1963	20 Jan 1969
NIXON, Richard M.*	Republican	20 Jan 1969	9 Aug 1974
FORD, Gerald	Republican	9 Aug 1974	20 Jan 1977
CARTER, Jimmy	Democratic	20 Jan 1977	20 Jan 1981
REAGAN, Ronald	Republican	20 Jan 1981	20 Jan 1989
BUSH, George H.W.	Republican	20 Jan 1989	20 Jan 1993
CLINTON, William J.	Democratic	20 Jan 1993	20 Jan 2001
BUSH, George W.	Republican	20 Jan 2001	20 Jan 2009
OBAMA, Barrack	Democrat	20 Jan 2009	

Note. * indicates a premature end to the presidency, in all cases succeeded by the vice-president.

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The Debt Choices of the Firms in Developed Countries: Evidence from G-7

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Abstract

This study examines the main determinants that affect the firm's debt choices. Based on a panel data of non-financial listed firms in G-7 countries in the period 1994-2013, the study shows that the firm's choices about debt level are functions of several previsions over time about, on the one hand, to the firm's characteristics and its expected performances and, on the other hand, to the economic, financial and institutional system of country's reference.

Keywords: capital structure, debt level, leverage, debt capacity

1. Introduction

The firm's debt level choice is one of the most relevant problems for managers and financial economists. It is still open despite relevant theoretical literature and decades of empirical tests.

Modigliani-Miller's theory (1958, 1963) is considered the starting point of the modern theory of the capital structure. They argue that capital structure choices are irrelevant both on the value of the firm than on its cost of capital (Proposition I and II). Over the years, removing some restrictions assumptions and introducing other variables has developed many theories and emprirical researches that postulate the relevance of the firm's capital structure on its value.

The trade-off theory (Kraus & Litzenberger, 1973) tries to find the "optimal capital structure" by balancing benefits and costs of the debt with regard mainly to the tax shield and bankruptcy costs. Usually in this context also the agency costs of equity and debt are considered (Morellec et al., 2010, 2004). Based on the agency theory (Jensen, 1986; Jensen & Meckling, 1976) debt has positive effect on agency cost of equity, reducing the conflicts between shareholders and management, due to its discipline effect on management (Jensen, 1986), but, at the same time, also a negative effect on agency cost of debt, increasing the conflicts between shareholders and debtholders due to the moral hazard and asset-substitutions.

Other theories assume that the "optimal capital structure" is not due to the trade-off between benefits and costs of debt. The pecking order theory (Baker & Wurgler, 2002; Fama & French, 2002, 1998; Shyam-Sunder & Myers, 1999; Myers, 2001, 1984; Myers & Majluf, 1984) argues that the firm's choices about capital structure are based on a source hierarchy: firm prefers first internal sources and if external one are required, debt is preferred to equity. Also the market time theory (Baker & Wurgler, 2002) argues that the firm's choices about capital structure are due to the capital market conditions and the manager decisions over time. Firm's capital structure evolves as the cumulative outcome of past attempts to time the equity market (Frank & Goyal, 2009; Hovakimian, 2006; Ritter, 2003; Baker & Wurgler, 2002; Baker & Wurgler, 2002; Korajczyk et al., 2003; Myers & Majluf, 1984).

The empirical researches have highlighted many determinants, in addition to the models, that could affect the capital structure choices (Frank & Goyal, 2009, 2003; Rajan & Zingales, 1995; Harris & Raviv, 1991; Titman & Wessels, 1988). The problem is due to their identification and their effects (positive or negative) on the capital structure. It is not unusual that a single determinant has a positive impact on the capital structure choices in some studies while negative in others.

Theories and empirical researches seem to explain some aspects under certain condition of the firm's behaviour. Actually there is still no theory that can fully explain the firm's behaviour on capital structure or, even more, be

able to define the optimal capital structure.

This paper is a part of the debate. It draws on the most recent literature about the relevance of the economic, financial and institutional conditions of the country on the firm debt choices (Fan et al., 2012; Frank & Goyal, 2009; Beck et al., 2002; Booth et al., 2001; Demirguc-Kunt & Maksimovic, 1999). The studies show that the economic and financial development of the country and the quality of its institutional system affect the firm's debt level choices. These effects are usually considered separately. The originality of the paper lies in considering jointly these effects. In this sense, the paper's theoretical hypothesis is that the firm's choices about debt level are functions of several previsions over time related, on the one hand, the firm's characteristics and its expected performances and, on the other hand, the general development of the economy, capital markets and institutional system of country's reference.

This theoretical hypothesis is tested using a panel data of non-financial listed firms in G-7 countries (USA, UK, Canada, Japan, Germany, France and Italy) in the period 1994-2013.

The paper is organized as follows. Section 2 discusses the theoretical background in which it is made explicit the research theoretical hypothesis and its limitations. Section 3 discusses the analysis metholodogy and the dataset. Section 4 presents and discusses the analysis results. Section 5 draws the conclusions of the study.

2. The Theoretical Background

In literature many studies have focused on the identification and analysis of the main determinants that affects the firm's choices about debt level. The well-known determinants are the firm asset, size, growth, risk, financial deficit and surplus, profitability, stock price, taxation and the debt level of the industry's reference (Denis & McKeon, 2012; DeAngelo & Roll, 2011; Muzir, 2011; Rauh & Sufi, 2010; Frank & Goyal, 2003, 2009; Lemmon et al., 2008; De Jong et al., 2008; Byoun, 2008; Kayhan & Titman, 2007; Brounen at al., 2006; Claessens & Klapper, 2005; Welch, 2004; Bancel & Mittoo, 2004; Hall et al., 2004; Graham & Harvey, 2001; Rajan & Zingales, 1995; Harris & Raviv, 1991). These determinants are functions of the firm's structure and characteristics. Recent studies have expanded the perspective. They have investigated the effects of the economic, financial and institutional system of the country's reference on the firm's debt choices (Fan et al., 2012; Frank & Goyal, 2009; Masulis & Nahata, 2009; De Jong et al., 2008; Davydenko & Franks, 2008; Dinc, 2005; Degryse & Ongena, 2005; Johnson & Mitton, 2003; Beck et al., 2002; Djankov et al., 2002; La Porta et al., 2002; Booth et al., 2001; Fisman, 2001; Demirguc-Kunt & Maksimovic, 1999).

The originality of the paper lies in considering all these determinants jointly. The paper's theoretical hypothesis is that firms' debt level choices are based not only on its characteristics and performances, but also on the economic, financial and institutional system of country's references. Therefore, firm has to define and evaluate its debt level sustainability over time based on the systemic and dynamic combination of three main variables:

1) Firm Fundamentals (FF), that groups determinants that affect the firm's debt level choices and refers to its structural characheristics and performances over time. In this context the determinants used are: the firm asset, size, growth, risk, financial deficit and surplus, profitability, stock price, taxation and the debt level of the industry's reference. Therefore the variable groups determinants that are endogenous to the firm and thus under its control;
2) Economic and Financial Conditions (EFC), that groups determinants that affect the firm's debt level choices and refers to the economic and capital markets performances of the country's reference of the firm. In this context, country's economic performances refer to the GDP and inflations rate. The first, has impact on the domestic consumptions, then on the domestic demand, and thus on the firm's ability to develop in the country over time. The second, has effects on the firm's capability to face debt obligation making it less onerous during inflation periods while lot in deflation one. The capital market and bank sector development of the country's reference affect the firm's choices about debt level, because they define the access conditions to debt in terms of amount, time and cost. Greater is the capital market and the bank sector development, greater is the capital movements, and easier is the access to the debt at favorable conditions by competitive firms. Therefore the variable groups determinants are exogenous to the firm and then out of its control. Thus, the firm can only try to manage their effects over time;
3) Institutional Conditions (IC), that groups determinants that affect firm's choices about debt level and refers to the quality and efficiency of legal, bureaucracy and taxation system of the country's reference of the firm. These significantly affect the investors' choices, both in equity and debt, due to the protection of their rights, semplicity of their actions and the weight of overall tax burden. More efficient is the legal system, lower is the bureaucracy and lower is the corporate and personal taxes, greater is the investors' attention on the

competitive firms. Therefore higher is the competitive firms capability to raise capital if their performances are in line with investors' expectations. Also in this case, the variable groups determinats are exogenous to the firm and then out of its control. Therefore in this case too, the firm can only try to manage their effects over time.

The empirical model proposed has limitations due to some assumptions made that it is necessary to say immediately. These can generate potential sources of bias. The main are the following:

a) it is used a linear model. It is easy to use although not able to grasp the complexity of the problem about debt level;

b) it is assumed that the capital structure's choices of the firm reflect its choices about leverage. Also it is assumed that the leverage refers to the firm's financial debt (both short, medium and long-term). Finally, it is omitted the specification "financial debt" that becomes simply "debt level" of the firm;

c) the total debt of the firm is measured by the ratio of Total Debt (both short, medium and long term) / Total Assets (book value);

d) the firm's debt level is defined based on its book-value. In literature some scholars advocate the book-leverage while others the market-value (Welch, 2004; Myers, 2001, 1984; Shyaman-Sunder & Myers, 1999; Titman & Wessels, 1988; Rajan & Zingales, 1995). Two are the main reasons for the use of market-value: i) the book value is primarily a plug number used to balance the left-hand side and the right-hand side of the balance sheet rather than a managerially relevant number; ii) the book-value is backward-looking by measuring what has taken place while market-value is forward-looking by measuring what will be on the base of expectations and market perspectives. Despite these strong arguments, in this paper it is used book value based on equally strong arguments. Among these, the main are the following: i) market-value of the firm is difficult to determinate in each moment, subject to the market volatility and the data choices by reference to the market value is arbitrary; ii) managers tend to think in term of book value rather than market value because it is more easily accessible, more accurately recorded and not subject to market volatility; iii) the measurement of the firm's economic performances are usually based on income statements and the book value measure of leverage is considered as best proxy of market value; iv) debt is better supported by asset in place than by growth opportunities; v) the main cost of debt is the expected cost of financial distress in the bankruptcy event. In this case the accurate measure of debtholders' liabilities is the book value of debt and not of market value;

e) the dataset are based only on firms reported in Datastream, listed since 1994 and until 2013. With regard to the sample two basic assumptions are needed. First, the percentage of listed firms differs widely across the G-7 countries as well as the average size of firms listed. Also, in each of the G-7 country listed firms may represent only a small part of all firms in the country. But if it is assumed that common institutions in a country can influence both the listed firms and non-listed firms, the information gathered from an analysis of listed firms will have broader implications (Rajan & Zingales, 1995). Second, it is possible that the firms between the G-7 countries are not perfectly homogeneous because there are not perfectly homogeneous the international data despite the use of a international database as data source;

f) the sample is made from many observations. Material errors can be possible. Also, in order to manage exceptional value for each determinant fluctuation bands allowed are defined. These are built in such a way to consider outliers the values out of band in reasonable way. However the data that are not considered in the analysis do not change the results significantly;

g) there are restrictive assumptions on some determinants. First, it is assumed that the development of bond market is equal to the stock market one. Therefore the development of the stock market can be used as a proxy of the development of the equity and bond market. Second, the determinant legal and bureaucracy system is measured by an index called "Institutional conditions – composit index". It is defined based on information cointained in the Busing Doing annual report of The World Bank. In details, for each year it is calculated as a sum of Strength of legal rights index, Depth of credit information index, Strength of investor protection index, Enforcing Contracts – Time, Enforcing Contracts – Cost, Resolving Insolvency – Time, Resolving Insolvency – Cost, Resolving Insolvency – Recovery rate. For the year data notavailable, they are assumed equal to the data of the first year available;

h) each determinant is usually measured by more than one measuring-indicator. The determinant's sign of correlation (positive or negative) is defined based on the prevailing correlation sign of the joint observation of its measuring-indicators.

3. Dataset and Methodology

Based on the theoretical hypothesis and limitations as discussed in the previous Section, the firm's debt level is function of the three variables as following:

$$D_{i,t} = f(FF_{i,t}; EFC_{i,t}; IC_{i,t}) \quad (1)$$

where: $D_{i,t}$ is the debt level of the i-firm in t-time and it is the dependent variable; $FF_{i,t}$ is the variable Firm Fundaments for the i-firm in t-time; $EFC_{i,t}$ is the variable Economic and Financial Conditions for the i-firm in t-time; $IC_{i,t}$ is the variable Institutional Conditions for the i-firm in t-time.

In this context, the determinants grouped in the variable Firm Fundamentals (FF) are the following: Asset (TA), Industry (I), Size (S), Growth (G), Stock Price (SP), Profitability (P), Financial Deficit-Surplus (FDS), Risk (R) and corporate tax (TC). The determinants grouped in the variable Economic and Financial Context (EFC) are the following: Bank sector conditions (BS), Stock market conditions (SM) and Macroeconomic conditions (MC). Finally, the determinants grouped in the variable Institutional Conditions (IC) are the following: Legal and bureaucracy system (LS) and Taxations system (TS).

Based on a panel data, the empirical regression model is the following:

$$D_{i,t} = \alpha + \beta_1 FDS_{i,t} + \beta_2 \cdot P_{i,t} + \beta_3 \cdot R_{i,t} + \beta_4 \cdot G_{i,t} + \beta_5 \cdot TA_{i,t} + \beta_6 \cdot TC_{i,t} + \beta_7 \cdot S_{i,t} + \beta_8 \cdot SP_{i,t} + \beta_9 \cdot I_{i,t} + \beta_{10} \cdot BS_{i,t} + \beta_{11} \cdot SM_{i,t} + \beta_{12} \cdot MC_{i,t} + \beta_{13} \cdot LS_{i,t} + \beta_{14} \cdot TS_{i,t} + \varepsilon_{i,t} \quad (2)$$

Each of the determinant grouped in the three variables, is measured by several measuring-indicators as reported in Table 1.

Table 1. Variables, determinants and measuring-indicators

Variable	Determinant	Masuring-Indicator
Dependente variable	Debt level (D)	Total Debt (short, medium and long term) / Total Asset
Firm Fundamentals (FF)	Asset (TA)	TA.1: Tangible Asset / Total Asset
		TA.2: Annual percentage change of total asset
	Industry (I)	I.1: Average industry ratio of Total Debt / Total Capital
		I.2: Average industry ratio of Net Debt / Total Capital
	Size (S)	S.1: natural logaritm of Revenues
		S.2: natural logaritm of Total Asset
	Growth (G)	G.1: Enterprice value / Total Asset
	Stock Price (SP)	SP.1: Price volatility
		SP.2: Price / Book Value
		SP.3: Price / Earnings
	Profitability (P)	P.1: ROI
		P.2: ROA
		P.3: ROE
		P.4: annual percentage change of Enterproce Value
	Financial Deficit-Surplus (FDS)	FDS.1: Net Cash Flow Investing / EBIT
		FDS.2: Net Cash Flow Operating / EBIT
		FDS.3: Net Cash Flow Financing / EBIT
	Risk (R)	R.1: EBITDA / Interest Expenses on Debt
		R.2: EBIT / Interest Expenses on Debt
		R.3: EBIT / (EBIT – Interest Expenses on Debt)
	Firm Taxation (TC)	TC.1: Corporate tax rate
		TC.2: Income Tax / Net income before preferred dividend
Economic and Financial Conditions (EFC)	Bank Sector Conditions (BS)	BS.1: Domestic credit to private sector / GDP
		BS.2: Domestic credit to private sector by banks / GDP
		BS.3: Loans to residents / GDP
	Stock Market Conditions (SM)	SM.1: Market capitalization of listed company / GDP
		SM.2: number of listed company
		SM.3: Annual percentage change of S&P global equity indices
	Macroeconomic conditions (MC)	MC.1: Annual percentage change of the GDP
		MC.2: Annal inflation rate

Institutional (IC)	Conditions	Legal Bureaucracy System (LS)	LS.0: Institutional conditions – composit index
		Taxation System (TS)	TS.1: Total tax rate
			TS.2: Timing of paying taxes

The sample is a panel data of non-financial firms listed in the G-7 countries (USA, UK, Canada, Japan, Germany, France, Italy) in a period 1994-2013. The choice of G-7 countries is mainly due to the fact that they are the major industrialized countries (Rajan & Zingales, 1995) with differences in the economic, financial and institutional system. The choice of long period, from 1994 to 2013, is mainly due because the choices about debt level required a long period in order to be fully implemented.

The data source is database Datastream. Other informations are obtained by the World Bank, Organisation for Economic Co-operation and Development (OECD), European Central Bank (ECB), International Moneraty Found (IMF), Eurostat.

The dataset include 4.142 firms for a total observationsof 82.840 as following: 1.220 firms in USA (24.400 observations); 305 firms in UK (6.100 observations); 613 firms in Canada (12.260 observations); 1.616 firms in Japan (32.320 observations); 194 firms in Germany (3.880 observations); 159 firms in France (3.180 observations) and 35 firms in Italy (700 observations). The Table 2 reports the firms included in the dataset Datastream distinguished by industry.

Table 2. Dataset

Industry	USA	UK	Canada	Japan	Germany	France	Italy	Tot
Aerospace & Defense	41	7	5	4	1	7	1	66
Alternative energy	5							5
Automobiles & parts	13	1	4	88	9	9	4	128
Beverage	12	5	5	12	12	6		52
Chemicals	52	9	4	135	10	5		215
Construction & Materials	50	18	12	197	18	13	8	316
Electricity	37	2	7	10	3	3		62
Electronic & electrical equipment	113	16	7	143	8	7		294
Fixed line telecommunications	9	2	1	1			1	14
Food & drug retailers	14	5	6	35	2	4		66
Food producers	37	11	8	95	10	10		171
Forestry & paper	8	1	5	10	2	2		28
Gas, water & multiutilities	34	3	3	13	5	2	2	62
General industrials	28	8	4	30	3	4	2	79
General retailers	72	19	10	68	9	6	1	185
Health care equipment & service	96	4	7	20	9	1		137
Household goods & home construction	54	17	1	53	14	4	2	145
Industrial engineering		25	9	209	32	6	1	282
Industrial metals & mining	17	1	38	55	4	3	1	119
Industrial transportation	27	6	4	55	5	5	1	103
Leisure goods	15	4		23	1	3		46
Media	34	23	10	17	2	10	4	100
Mining	10	8	328	4	3	2		355
Mobile telecommunications	3	1	2	1				7
Oil & gas producers	53	7	74	8		3		145
Oil equipment & services	33	4	13	1		2	1	54
Personal goods	21	7	1	72	14	10	2	127
Pharmaceuticals & biotechnology	66	5	10	32		3	1	117
Software & computer services	47	13	10	30	1	9		110
Support services	69	49	12	52	2	6	1	191
Technology hardware & equipment	96	7	6	73	4	4		190
Tobacco	3	1						4
Travel & leisure	51	16	7	70	11	10	2	167
Total Firms	1.220	305	613	1.616	194	159	35	4.142
Number of observations	24.400	6.100	12.260	32.320	3.880	3.180	700	82.840

The Table 3 reports the descriptive statistics of the measuring-indicators of the determinants grouped in the three variables.

Table 3. Descriptive statistics

	USA		UK		Canada		Japan		Germany		France		Italy	
	Mean	Std.Dev	Mean	Std.Dev	Mean	Std.Dev	Mean	Std.Dev	Mean	Std.Dev	Mean	Std.Dev	Mean	Std.Dev
D	0,22	0,21	0,18	0,16	0,08	0,16	0,24	0,19	0,19	0,18	0,21	0,15	0,27	0,14
FDS.1	0,60	2,25	0,58	2,13	-0,10	2,13	0,49	2,03	0,49	1,85	0,67	1,97	0,69	1,81
FDS.2	0,79	1,98	0,81	1,97	0,39	1,48	0,82	2,29	0,63	1,83	0,78	1,79	0,83	1,66
FDS.3	-0,12	2,13	-0,18	2,14	-0,47	2,18	-0,29	2,04	-0,08	1,64	-0,05	1,61	-0,12	1,72
P.1	4,04	24,07	9,07	20,30	-7,82	27,07	2,38	7,10	5,74	17,34	6,32	10,80	3,55	7,27
P.2	2,00	20,87	5,08	13,07	-8,29	25,92	1,63	5,03	3,16	11,25	3,89	7,08	2,27	4,48
P.3	5,57	29,32	10,90	26,85	-7,96	28,95	2,24	14,44	4,75	27,19	7,71	16,97	2,01	19,09
P.4	0,15	0,55	0,12	0,50	0,10	0,59	0,01	0,45	0,06	0,42	0,10	0,47	0,06	0,52
R.1	13,26	32,62	17,55	31,51	-3,24	30,46	25,75	36,02	13,90	27,48	17,05	24,86	8,80	12,98
R.2	9,10	31,67	13,15	30,73	-5,49	30,81	18,29	34,59	9,47	25,39	11,77	23,36	5,00	12,15
R.3	1,12	3,79	1,19	2,60	0,57	2,19	1,19	3,98	1,13	5,44	1,13	4,27	1,40	6,71
G.1	1,31	0,85	1,08	0,76	0,82	1,02	0,59	0,42	0,73	0,66	0,74	0,57	0,60	0,36
TA.1	0,29	0,25	0,30	0,24	0,30	0,35	0,31	0,18	0,28	0,21	0,22	0,18	0,29	0,16
TA.2	0,10	0,34	0,09	0,29	0,12	0,47	0,01	0,12	0,05	0,24	0,07	0,23	0,03	0,27
TC.1	23,62	18,73	22,91	16,82	5,86	13,88	34,17	23,18	20,63	20,88	25,89	18,25	26,00	22,39
TC.2	0,46	1,51	0,44	1,80	0,18	1,45	0,96	2,89	0,52	2,39	0,63	2,14	1,15	5,36
S.1	5,38	1,58	5,10	1,40	1,64	2,47	7,32	1,50	4,69	2,12	5,56	1,52	5,80	1,05
S.2	5,47	1,47	5,15	1,29	2,69	2,47	7,33	1,50	4,69	2,06	5,56	1,62	6,02	1,05
SP.1	30,54	13,94	26,93	11,95	19,14	21,88	25,22	11,39	20,40	13,13	21,23	11,96	27,58	7,84
SP.2	2,46	2,85	2,22	2,76	1,25	2,66	1,22	1,30	1,88	2,45	1,59	1,72	1,44	1,32
SP.3	12,45	28,43	11,63	21,41	-0,65	20,64	19,65	34,25	13,04	29,09	13,28	22,30	12,42	28,04
I.1	0,43	0,16	0,46	0,18	0,27	0,17	0,55	0,20	0,55	0,21	0,53	0,20	0,61	0,19
I.2	0,26	0,23	0,22	0,20	0,12	0,22	0,30	0,24	0,26	0,26	0,28	0,25	0,37	0,22
BS.1	171,68	23,12	151,69	33,85	128,68	31,66	193,50	16,38	109,84	6,44	95,93	12,96	87,26	24,36
BS.2	50,92	4,30	151,25	33,79	107,35	22,23	132,48	40,30	109,84	6,45	95,87	12,99	86,95	24,32
BS.3	0,39	0,05	1,26	0,24	0,11	0,01	0,86	0,10	1,05	0,07	0,79	0,12	1,13	0,28
SM.1	119,35	24,34	133,73	24,77	102,21	25,49	72,95	17,15	43,58	13,19	71,57	23,07	35,18	16,23
SM.2	6047,40	1592,48	2248,75	278,03	2798,80	1211,21	2997,35	542,19	687,60	118,77	794,70	146,02	273,20	21,52
SM.3	8,99	18,80	5,91	19,52	10,33	24,51	4,84	26,24	11,56	25,57	6,73	22,40	6,19	24,98
MC.1	2,57	1,77	2,36	2,22	2,65	1,67	0,96	2,07	1,40	1,92	1,56	1,49	0,74	2,06
MC.2	2,43	0,92	2,18	0,89	1,83	0,74	-0,02	0,73	1,60	0,60	1,58	0,63	2,51	1,03
LS.0	108,15	2,07	131,77	5,20	121,84	0,60	138,62	2,52	105,81	2,37	77,76	1,03	106,18	12,75
TS.1	46,04	0,41	34,83	0,45	43,58	7,49	52,16	1,76	47,41	1,13	64,99	0,18	75,62	4,85
TS.2	289,90	60,84	106,00	2,00	120,80	4,29	326,00	16,25	198,75	6,91	132,00	0,00	328,35	22,07

4. Analysis Results

The Table 4 reports the regression analysis results. Only significant value of coefficient estimate are reported.

Table 4. Regression analysis results

	USA	JAPAN	UK	CANADA	GERMANY	ITALY	FRANCE
FDS.1	2,224e-03**	2,421e-03***	2,781e-03**	2,446e-03**		4,361e-03.	2,963e-03*
	(7,333e-04)	(4,915e-04)	(1,068e-03)	(8,404e-04)		(2,545e-03)	(1,438e-03)
FDS.2	-2,224e-03**						
	(7,521e-04)						
FDS.3	3,406e-03***		3,270e-03**		4,379e-03*		
	(7,104e-04)		(1,051e-03)		(1,860e-03)		
P.1	9,704e-04***	2,640e-03***	-7,806e-04***		-5,188e-04*	3,760e-03.	

	(1,210e-04)	(3,919e-04)	(1,905e-04)		(2,444e-04)	(2,169e-03)	
P.2	-2,712e-03***	-1,431e-03**	1,073e-03***		1,400e-03***		-2,246e-03***
	(1,197e-04)	(5,308e-04)	(2,673e-049		(3,058e-04)		(5,660e-04)
P.3	6,199e-04***	-1,123e-03***	1,847e-04.	-8,123e-04***	-3,406e-04*	-2,005e-03***	-3,297e-04.
	(6,674e-05)	(7,917e-05)	(1,108e-04)	(1,098e-04)	(1,330e-04)	(4,070e-04)	(1,958e-04)
P.4	-4,513e-03.	-8,242e-03***	-8,237e-03*				
	(2,393e-03)	(1,849e-03)	(3,930e-03)				
R.1	-4,033e-03***	-3,308e-03***	-3,513e-03***	-1,250e-03***	-5,029e-03***	-5,233e-03***	-3,873e-03***
	(1,181e-04)	(5,810e-05)	(2,078e-04)	(1,119e-04)	(2,706e-04)	(6,524e-04)	(2,283e-04)
R.2	2,901e-03***	1,101e-03***	1,832e-03***	1,032e-03***	3,054e-03***	2,316e-03***	1,756e-03***
	(1,228e-04)	(6,079e-05)	(2,158e-04)	(1,101e-04)	(2,983e-04)	(6,923e-04)	(2,512e-04)
R.3	1,478e-08***	1,993e-03***	2,699e-03***				
	(2,970e-04)	(1,945e-04)	(6,658e-04)				
G.1	3,378e-02***	5,822e-02***	6,814e-02***	2,310e-02***	4,087e-02***	1,227e-01***	7,214e-02***
	(1,692e-03)	(2,562e-03)	(2,851e-03)	(1,793e-03)	(4,438e-03)	(1,691e-02)	(5,010e-03)
TA.1	1,866e-01***	3,395e-01***	1,014e-01***	4,048e-02***	3,015e-01***		1,742e-01***
	(5,387e-03)	(5,276e-03)	(7,911e-039	(4,895e-03)	(1,244e-02)		(1,269e-02)
TA.2	1,549e-02***						6,178e-02***
	(3,729e-03)						(1,009e-02)
TC.1	-1,055e-03***	-4,782e-04***	-7,364e-04***	-1,080e-03***			
	(7,605e-05)	(4,342e-05)	(1,252e-04)	(1,183e-04)			
TC.2	1,744e-03*	2,228e-03***		3,033e-03***			1,703e-03.
	(7,473e-04)	(2,829e-04)		(7,825e-04)			(9,869e-04)
S.1	2,574e-02***	2,965e-02***	3,871e-02***	3,684e-02***	2,460e-02***	3,047e-02**	-6,815e-03*
	(2,138e-03)	(3,364e-03)	(2,938e-03)	(1,030e-03)	(3,960e-03)	(9,602e-03)	(2,990e-03)
S.2	9,467e-03***	-1,010e-02**	-9,875e-03**	5,119e-03***			3,551e-02***
	(2,284e-03)	(3,400e-03)	(3,272e-03)	(1,294e-03)			(2,884e-03)
SP.1	1,088e-03***	1,481e-03***	1,043e-03***		5,741e-04**	1,255e-03*	1,025e-03***
	(9,281e-05)	(7,936e-05)	(1,620e-04)		(2,033e-04)	(5,808e-04)	(1,948e-04)
SP.2	-1,787e-02***	1,238e-02***	-1,333e-02***	-1,107e-02***	-1,229e-02***	-9,046e-03*	-1,776e-02***
	(4,786e-04)	(7,602e-04)	(7,594e-04)	(5,413e-04)	(1,134e-03)	(4,439e-03)	(1,700e-03)
SP.3	-1,539e-04***	-1,937e-04***			-1,592e-04.		-2,001e-04*
	(4,288e-05)	(2,581e-05)			(8,524e-05)		(1,009e-04)
I.1	7,847e-02***		4,559e-02**	1,044e-01***	-4,693e-02**	9,607e-02**	
	(1,665e-02)		(1,472e-02)	(1,640e-02)	(1,678e-02)	(3,388e-02)	
I.2	8,951e-02***	7,673e-02***	9,412e-02***	3,206e-02**	1,074e-01***		6,969e-02***
	(1,254e-02)	(1,160e-02)	(1,375e-02)	(1,199e-02)	(1,368e-02)		(1,475e-02)
BS.1		6,525e-04*		4,766e-04*	-8,377e-01**		
		(2,876e-04)		(1,888e-04)	(2,819e-01)		
BS.2	-5,617e-03.			-7,642e-04.	8,396e-01**		
	(3,028e-03)			(4,601e-04)	(2,825e-01)		
BS.3	6,285e-01*	-9,149e-02*			-3,398e-01.		
	(2,458e-01)	(3,602e-02)			(1,940e-01)		
SM.1	5,912e-04*	-6,379e-04***		-2,806e-04**			
	(2,808e-04)	(7,207e-05)		(1,055e-04)			
SM.2	-1,300e-05**	-1,390e-05.					
	(4,295e-06)	(7,137e-06)					
SM.3		2,136e-04***					
		(3,784e-05)					
MC.1		2,108e-03***					
		(6,249e-04)					
MC.2		-3,304e-03**					
		(1,242e-03)					
LS.0		2,020e-03***			-3,572e-03*		
		(3,225e-04)			(1,768e-03)		
TS.1		-3,048e-03***					

		(7,913e-04)					
TS.2	4,456e-04**					1,091e-03.	
	(1,450e-04)					(5,904e-04)	
N. Obs	24.400	32.320	6.100	12.260	3.880	700	3.180
Adjusted R^2	0,31	0,50	0,34	0,44	0,42	0,47	0,45

Note. Dependent variable: D. The first number is the estimate and the second in brackets is the standard error.

The coefficient estimate is significantly different from zero at: 0 '***'; 0,001 '**'; 0,01 '*'; 0,05 '.'.

The analysis shows that the debt choices for the firms in UK and France are based only on the variable Firm Fundamentals. Otherwise for the firms in USA, Canada, Japan, Germany and Italy, the debt choices are based also on the variable Economic and Financial Conditions and the variable Institutional Conditions with differente relevance.

The determinant Asset (TA) is statistically significant and relevant for the firms in G-7 countries except for the firms in Italy. The analysis founds a positive relationship between firm's debt level and the determinant with regard to its measuring-indicators in all countries. Two are the main reasons: first, debt is a primarily source to finance investment in asset; second, asset are usually used as a collateral debt because provide guarantees to creditors due their liquidity.

The determinant Industry (I) is statistically significant and relevant for the firms in all G-7 countries. The analysis founds a positive relationship between firm's debt level and the determinant with regard to its measuring-indicators in all countries except in part in Germany (with regard I.1). The relationship is explained mainly due to the fact that investments and financing needs tend to be the same in the industry and, thus, the choices about debt level tend to be homogeneus among firms.

The determinant Size (S) is statistically significant and relevant for the firms in all G-7 countries. The analysis founds a positive relationship between the firm's debt level and the determinant with regard its measuring-indicators in all countries. The relationship is explained to the fact that firm's size are usually considered by the investors a good indicator about the firm's capabilities to face debt and its obligations.

The determinant Growth (G) is statistically significant and relevant for the firms in all G-7 countries. The analysis found a positive relationship between firm's debt level and the determinant with regard its measuring-indicators in all country. Two are the main reasons: first, debt is a one of the mainly source to finance the firm's growth over time; second, firm's growth opportunities are a good indicator about the firm's capabilities to face debt and its obbligations.

The determinant Stock Price (SP) is statistically significant and relevant for the firms in all G-7 countries. The analysis found a positive relationship between firm's debt level and its price volatility (SP.1) while negative with ratios price/book value and price/earning (SP.2 and SP.3) in all countries. The positive relationship is due to the fact that the increase (decrease) in price indicates greater (lower) firm's growth prospects and therefore greater (lower) debt capacity. Otherwise the negative relationship could be due to the fact that the higher the price compared to book value and earnings, the greater the manager's propensity to finance the firm's activites through equity rather than debt.

The determinant Profitability (P) is statistically significant and relevant for the firms in all G-7 countries. The analysis finds a positive relationship between firm's debt level and its ROI (P.1) for the firms in USA, Japan and Italy while negative for the firms in UK and Germany. Otherwise there is a positive relationship between debt level and ROA (P.2) for the firms in UK and Germany, while negative for the firms in USA, Japan and France. There is also a positive relationship between debt level and ROE (P.3) for the firms in USA and UK, while negative for the firms in Canada, Japan, Germany, France and Italy. Finally, there is a positive relationship between the debt level and the change in enterprice value (P.4) for the firms in USA and UK. The analysis finds discordant results with regard to the relationship between firm's debt level and its performance in line with the literature. The causes of these findings may be many. One possible interpretation is due to the self-financing on the one hand, and the financing of investment on the other hand. Therefore, the negative relationship is due to the fact that higher are the firm's performances, greater is the self-financing and then lower is the debt level. Otherwise the positive relationship is due to the fact that higher is the debt level, greater are sources to invest and then higher are the firm's performances.

The determinant Financial Deficit and Surplus (FDS) is statistically significant and relevant for the firms in all G-7 countries. The analysis finds a positive relationship between the firm's debt level and its net cash-flow

investing (FDS.1) and financing (FDS.3) in all countries while it's negative with net cash-flow operating (FDS.2) only for firms in USA where measuring-indicator is statistically significant. The positive relationship is due to the fact that debt is a primarily source to cover firm's financial needs. The negative relationship could be explained considering that for firms in USA the net cash-flow from operations are used to finance the firm's activities reducing its debt reliance.

The determinant Risk (R) is statistically significant and relevant for the firms in all G-7 countries. The analysis finds a positive relationship between the firm's debt level and the ratio of EBIT to interest expenses on debt (R.2 and R.3) in all countries. Therefore, higher is the EBIT compared to interest expenses on debt, higher is the firm's capabilities to cover the cost of debt and, lower is the firm's risk and then greater is the firm debt capabilities. Otherwise the analysis finds a negative relationship between firm's debt level and the ratio of EBITDA to interest expenses on debt (R.1) in all countries except in UK. In this case the negative relationship is not related to the firm's risk but to the firm's self-financing capability due to the high EBITDA.

The determinant Taxation (TC) is statistically significant for the firms in USA, UK, Canada and Japan. In this context the determinant refers to the firm's corporate taxes by distinguished between the income taxes that firm should pay in order to its tax rate (TC.1) and the income taxes that the firm pays on the basis of the fiscal and accounting policies adopted (TC.2). The analysis finds a negative relationship between firm's debt level and its tax rate on income, while a positive relationship with income taxes paid on the bases of its fiscal and accounting policies adopted. The positive relationship is due to the real application of the tax shield on the base of the accounting and fiscal policies adopted by the firm. Otherwise the negative relationship is due to the fact that higher is the tax rate on income, higher is the potential taxes to be paid by firm and greater is the risk of losses on income and then lower is the firm's debt capacity.

The determinant Country Bank Sector Conditions (BS), is statistically significant for the firms in Germany, USA, Japan and Canada. In this context the determinant's correlation sign is defined based on the measuring-indicators' weigh in regression equation. The analysis finds a positive relationship between firm's debt level and determinant in USA while negative in Canada, Japan and Germany. The difference is probably due to the different role of the bank system in firms financing. Therefore, the negative relationship is due to the fact that in bank-oriented economy, the banking system controls about debt level of the firm are rigorous to the limit point, in some cases, to be the bank itself to define the firm's optimal debt level. In this case the bank tends to keep down the debt level of the firm. Otherwise the positive relationship is due to the fact that in market-oriented economy, the bank system finances the firm but the market usually to make judgments about the degree of firm's solvency. This interpretation seems confirmed also by the average level of debt that is higher for the firms in USA, where the correlation is positive, than firms in Canada, Germany and Japan, where the correlation is negative.

The determinant Country Stock Market Conditions (SM), is statistically significant for the firms in USA, Canada and Japan. Also in this case the determinant's correlation sign is defined based on the measuring-indicators' weigh in regression equation. The analysis finds a positive relationship between firm's debt level and determinant in USA while negative in Canada and Japan. In market-oriented economy the relationship is positive where is the market to evaluate the firm and its choices about debt level. Otherwise in bank-oriented economy the relationship tend to be negative where is the bank to evalutate and to define the debt level of the firm.

The determinant Country macroeconomic conditions (MC), is statistically significant only for the firms in Japan. The analysis finds a positive relationship between firm's debt level and the GDP (MC.1) while negative with inflation rate (MC.2). The positive relationship is due to the fact that the GDP growth enables the development of firms and therefore the need for funding sources to support the development. Otherwise the negative relationship is due to the fact that the growth of inflation reduces the value of the debt at the expense of the creditors.

The determinant Country Taxation System is statistically significant for the firms in Japan, Italy and USA. In this context the determinant refers to the taxation system of the country's reference of the firm with regard to the general both debtholders and shareholders personal taxes differently from the determinant taxation (TC) that refers to the firm's corporate taxes. The analysis finds a positive relationship between firm's debt level and the determinant in USA and Italy while negative in Japan. The sign of the correlation is mainly due to the real tax, net of evasion and avoidance, on bondholders and equityholders. Therefore, if the taxation on bondholders is less than equityholders, the relationship is positive otherwise it is negative.

The determinant Country Legality and Bureaucracy System (LS) is statistically relevant for the firms in Japan and Germany. The analysis finds a positive relationship between firm's debt level and the determinant in Japan

while negative in Germany. It is mainly due to the differences in the institutional system between two countries.

5. Conclusions

The theoretical hypothesis of the paper is that the firm's debt level choices are functions of systemic and dynamic combination of previsions over time about, on the one hand, the firm's characteristics and its expected performances and, on the other hand, the economic and capital markets performances and the institutional system quality of the country's reference. Therefore the firm has to define the debt level considering not only the perspectives about firm's fundamentals, related to its characteristics and performances, but also perspectives about economic and capital market performances and institutional system development of the country's reference.

The analysis finds evidence of the theoretical hypothesis in USA, Canada, Japan, Germany and Italy with different relevance while not in UK and France where the firm's debt choices are based only on its fundamentals.

The empirical model proposed is suitable for extensions. It can be improved by identifying new determinants in the three variable and/or differences determinants' measuring-indicators without this changes the logical and methodological approach.

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Apropos of Accounting Information Indicators as Determinants of Cash Dividend Policy Decision: A Comparative Study on Amman Stock Exchange (2001-2013)

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Abstract

Investor's psychological behavior normally seek to invest in companies that are characterized by stable and positive dividend stream. Dividend policy is related to the decision of whether to distribute or not to distribute cash to shareholder. This type of decision is not taken in isolation from other related financial factors, as such decision is considered an integrated part of the company's overall financial decisions. This study aims at investigating the apropos of accounting information indicators (financial indicators) and their role in determining cash dividend policy adopted by companies listed within the major sectors of Amman Stock exchange. Extracting the accounting information indicators pertaining to the three main sectors (Banking, Industrial and Services) of ASE, and by applying the simple linear regression statistical approach, the results indicated that the dividend policy adopted by the three sectors were mainly determined by accounting information indicators and that the impact of these indicators on cash dividend policy vary due to dissimilarity of the sectors' nature, whereas the results pointed out that different indicator affect different sector, which means that the impact of the accounting information is not identical on cash dividend policy decision.

Keywords: dividend policy, indicators, sectors, accounting information, ASE

1. Introduction

The term dividend can take different forms – cash dividend, stock dividend and dividend repurchase were the company can buy a portion of its outstanding stocks from securities market. The decision of whether a company should distribute all its net profit as dividends, or to plow back all or certain portion of it for the purpose of reinvestment, is a significant decision. As if the company is aiming at pleasing the shareholder they will go with high dividend rate, but such decision might tend to be costly if the company is going to seek external finance to fund its future investment plans. But, low dividend rate or no dividend at all will refrains expected investors from acquiring such companies' shares, especially short term investors who are attracted by current returns.

Various dividend theories have been introduced in an attempt explain how dividend policy decisions are concluded and whether they have an influence on the firm value. Some of the approaches were conservative that support that the increase in dividend payment will lead to an increase in the company's value, while other groups do believe that it will affect the company's value adversely, and the group who stand in the middle believe that it has no effect on company's value (Anupam, 2012). This was first introduced by Modigliani and Miller in 1961 in which they opposed the idea that dividend payment, were perfect market exist has no effect on firms value–which is called irrelevant theory. While (Al-Makawi, 2007) confirmed that dividend payment do have an impact on the company's value–relevant theory, which was suggested by Myron J. Gordon and John linter.

Baker (2009), stated that dividend decision do affect the amount of returns to be distributed to shareholders in the form of cash dividend and the amount of profit to be retained, thus dividend policy is mainly concerned with determining the amount and pattern of cash payment to shareholders during certain time horizon. Generally speaking, Financial managers are supposed to take many important decisions related to investment, financing and development in an effort to increase company's market value (Afza & Mirza, 2011). Moreover mangers have to decide as how much of the company's end of year profit should be distributed among shareholders and how

much percentage should be retained for reinvestment.

Cash dividend policy is judged as one of the major issues that were addressed at large scale topics in modern financial literature. Dividend policy does play a significant and remarkable role in determining corporate market value. Thus dividend policy behavior tendency is affected by internal factors such as cash flow, investment opportunities, liquidity and profitability of the company, and also its affected by external factor such as economic macro factors, economic stability and growth, technological changes and governmental rules and regulation (Roberto, 2002).

Amman Stock Exchange - ASE is considered as the only market in Jordan where securities (Common Stocks and Bonds) are traded. Selection of ASE was due to the fact that the market has witnessed a remarkable changes and events especially during the last 10 years that affected dramatically the performance of all companies listed in the market, and these events may be attributed to 2008 financial crisis or the political issues in countries surrounding Jordan. As a result of these events, many corporations profitability was adversely affected, which means decline in corporations cash flow and as a consequence to this cash dividend policy adopted by the various number of corporations listed in ASE will be affected.

Based on the above mentioned discussion, this study will focus on the financial factors (indicators) that may or may not affect corporation's dividend decision policy. The study will be conducted on a comparative basis between the three major sectors of ASE - banking sector, industrial sector and services sector for the period (2001-2013). The main goals of this research is to determine as which independent factor (financial / accounting indicators) may impact dividend policy decision and to identify whether or whether not the industry type do have any influence on dividend decision policy?

2. Theoretical Framework

Company's end of year profits can be either distributed in the form of dividend to shareholders or re-invested in the company in different forms as per the company's requirements, such as for capitalization purpose.

Dividend payment decision is tied-up with many parties involved that may be affected by such decision, parties such as - shareholders, management, lenders as well as suppliers. Conflict between these parties interests do prevail, as shareholders prefer to be paid the highest possible dividend ratio as they are the only recipient of cash dividend, while creditors they prefer that companies profit is better to be plowed back into the company so the company will not default installment payment on due time. From the company's management point of view they also in favor of retaining end of year profit in order to be able to meet and absorb the consequences of unexpected events and circumstances, and also to equip them with more capabilities in grapping investments opportunities.

Profit may be considered as the main and ultimate determinant of the company's capacity in dividend payment. In previous empirical researches many factors have been recognized to impact company's dividend payment decisions. Numbers of factors have been identified in previous empirical studies to influence the dividend policy decisions of the firm. Profit is regarded as the major indicator of the firm's capacity to pay dividends. According to (Lintner, 1956) on his study on manger's dividend policy in USA, he found that current year profit and previous year profit do affect dividend decision. Miller & Modigliani (1961) argued that dividend policy decision is irrelevant to companies' value. It is rather affected by investment decision under perfect market theory, this was asserted by (Ang & Ciccone, 2009). Gordon (1963) nullified Miller & Modigliani argument by presenting his Bird in hand assumption, as increase in dividends rate will influence shareholder wealth positively because of market uncertainty and imperfect information.

3. Literature Preview

Ross et al. (2007) has defined dividend as that part of payment made out of the company's after tax profit to the company's owner in the form of stock dividend or cash dividend. While (Lease et al., 2000) has defined dividend policy as the practice of management that is adopted in deciding dividend payout ratio, which means the pattern and amount of cash distribution to the company's owners.

The most common type of dividend is a cash dividend. A public company's board of directors determines the amount of the firm's dividend. The board sets the amount per share that will be paid and decides when the payment will occur.

Cash Dividend policy has been discussed and investigated by many researchers, in an attempt to dig into the factors and determinants that define corporate cash policy strategy. Lintner (1956) has discussed many financial and non-financial factors that determine corporate cash dividend policy, (Rozeff, 1982); (Baker & Powell, 1999) studied the influence of costs – transaction costs and agency costs in comparison to external financing on the

firm's dividend decision of a firm. He pointed out that there should be a balance between transaction costs and agency costs in order to achieve an optimum cash dividend policy. While (Fama, 1974) discussed financial theories that is related to trade-off between investment and financing opportunities. (Han at el., 1999) investigated cash dividend behavior based on the theory of agency cost as well as tax-based theory. (Easterbrook, 1984; Jensen, 1986), supported the existence of relationship between ownership structure and dividend policy is attributed to "Agency problem", that was first discussed its relation to dividend policy by (Rozeff, 1982) and (Easterbrook, 1984).

Alkuwar (2009), Anil and Kapoor (2008) pointed out that the company profitability ratio reflected a very strong and statistically significant determinant of dividend ratio. (Carlson, 2001) has investigated into some variables that may have an impact on dividend decisions. In his study he pointed out that Stock repurchase only explains a small portion of the decrease in dividend yield and that an increase in the retained earnings and investment opportunities may also explain the reason behind decrease in dividend yield.

Ho (2002) in his comparative study between Australia and Japan found that dividend decision is influenced positively by company size in Australia and by liquidity in Japan but in both countries industry has a major effect.

(Ahmed & Javad, 2009) on their research on 320 companies listed in KSE indicated that companies with positive and stable earnings are paying higher dividend, also they indicated that ownership concentration and company's liquidity have a strong positive influence on dividend payment. (Arnott & Asness, 2012) on their research on American Stock Markets, concluded that higher aggregate dividend payment ratio ratios were associated with higher future earnings growth expectation. In another study by (Nuhu et al., 2014) on financial and non-financial companies in Ghanaian market they found that dividend payout ratio is mainly affected by leverage, profitability, board size and tax rate.

AL-Shubiri (2011) studied the dividend policy behavior within the industrial sector in Amman Stock Exchange –ASE, and found that factors such as profitability, growth opportunities and the companies size increase the opportunity of paying dividend, while assets liquidity and free cash flow –FCF has no significant effect on dividend payment.

Musiega at el. (2013) investigated the determinants of dividend policy for non-financial sector companies listed in Nairobi securities exchange, as they found that ROE, Company's current earnings and companies rate of growth are positively correlated to dividend decision policy.

Arif and Akbar (2013) in their attempt to identify and evaluate dividend policy determinants on non-financial companies listed in Pakistan – Karachi securities market, they identified that the most significant determinants to dividend policy are attributed to profitability, size, tax and investments opportunities.

Hossain et al. (2014) search into company specific oriented factors impact on dividend payout ratio decision in Dhaka Stock Exchange (Bangladesh), they found that company's profitability reflect a positive and significant effect on dividend payout ratio while earning volatility and ownership do have a negative significant influence on dividend payment decision and factors such as growth opportunities, company's size and company's liquidity didn't explain any change in dividend policy payment adopted by the company.

Previous literatures have discussed dividend policy from different aspects (financial and non-financial), and the different results they concluded were contradicting with each others, and this may be attributed to the specific nature of each market and the period of the study, as some of the previous studies were conducted on developed market while other studies were performed in developing or emerging market and this for sure will lead to different conclusion. Nevertheless of this, many studies agreed mainly on profitability as one of the major determinants of cash dividend policy.

4. Major Determinants of Dividend Policy

Company's dividend rate decision is considered as one of the most important decisions taken by financial management. The main objective of dividend decision is to maximize ownership wealth. There were many attempt adopted by various researchers as an endeavor to try to find out the mystery that conceal dividend policy determinants. Brealey and Myers (2005) described dividend decision as one of the most difficult top ten unsolved dilemma in financial management. This description comes in consistency with Black (1976) who mentioned that "The harder we look at the dividend picture, the more it seems like a puzzle, with pieces that don't fit together". Thus there was no consensus on the exact factors that have significant effect on dividend policies According to these various literatures and studies, some of the most important determinants of dividend policy decision can be summarized as follow.

4.1 Profitability

Company's profitability is a critical factor that determine dividend ratio, as higher is the profitability of the company will increase the opportunity of dividend payment, in order to reflect its sound and solid financial position, this is considered as the main concern for both investor to measure their return on investment and for shareholder to measure their holding reward. According to Baker et al. (2006); Ahmed and Javad (2009) asserted that stability of current earnings plays as a major determinant of dividend payout ratio. This positive relationship between profitability and dividend policy was supported by Ho (2003) and Aivazian et al. (2003).

4.2 Leverage

Leverage plays a main role in defining company's dividend policy. Aivazian et al. (2003) stated that companies with low leverage rate are more willing to pay dividend than other companies with higher debt ratio, as higher leverage ratio will weaken the company's capability in paying dividend, as they have to retain profit to serve debts dues.

4.3 Company Size

Company's size is a major factor that demonstrate cash dividend policy. As large sized companies are characterized by an easy access to financial market to obtain the required finance, so they tend to rely less on internally generated funds, this will allow them to pay higher dividend amount. This type of relationship between dividend payout ratio and company's size is supported by the transaction cost explanation of dividend payment policy (Chang & Rhee, 1990).

4.4 Investment Opportunity

It represent the company's option to adopt any future investment and growth opportunities. Therefore the higher are investment and growth opportunities, the higher will be the need for financial resources, this means higher retention rate and lower dividend rate.

4.5 Tax Rate

Investors in general don't prefer high dividend rate if tax bracket levied on dividend is high, instead they tend to search for capital gain, so in general tax rate have an adverse effect on dividend rate. Fortunately, in Jordan share dividend as well as shares' capital gain are tax exempted in order to encourage foreign investors. As higher the tax rate on share dividend than on capital gain will lead to decline in dividend payout ratio (Casey & Dickens, 2000).

4.6 Liquidity

Another major determinant of dividend payout ratio is company's liquidity position. (Anupam, 2012) on his study on UAE companies and (Hafeez & Attiya, 2008) on their study on Karachi non-financial listed companies found that liquidity is considered as the most significant determinant of dividend policy decision and it poses a statistically positive impact on dividend policy decision. Companies' with higher liquidity ratio are more capable of paying high dividend rate more than companies with poor liquidity stand.

4.7 Legal Constraints

This mainly related to protecting the right of creditors. In general, countries' rules and regulations inhibit companies that are characterized with high liabilities rate or insolvent or going into bankruptcy from paying cash dividend, as it may affect adversely its ability to meet its overdue debts.

4.8 Ownership Consideration

Bokpin (2011) stated that the larger the size of board membership, the higher is dividend rate that is paid to shareholders. Ownership consideration is tackled from three dimensions the first one is the tax status of the company's owners, as if they have a large income they will prefer low dividend rate, the second one is big owners investment opportunities, whether it seems that they can earn more than what if they reinvested the amount in the company in this case they will vote for higher dividend rate, while the third and last dimension, the dilution of ownership as high dividend rate will attract more investor which may lead to ownership dilution.

5. Amman Stock Exchange

It was called Amman Financial Market - AFM which was established during 1976 and started its active operation on January 1978, since then the AFM witnessed a remarkable development and progress as secondary market trading rose from J.D. 7.8 million ($ 11.00 million) in 1978 and reached J.D. 3.00 billion ($ 4.23 billion) in 2013, also the number of listed companies rose from 68 companies in 1978 to 240 companies by end of year 2013. In 1999 AFM was divided into three major bodies – Amman Stock Exchange - ASE, Securities Depository Center

and Jordan Securities Commission. Table 1 below high lights the progress that ASE witnessed during last 12 years (2002-2013) related to number of listed companies and its market value:

Table 1. Number of listed companies and its market value (million US Dollar) during 2002-2013

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
No. of listed companies	258	161	192	201	227	245	262	272	277	247	243	240
Listed Companies market value	7,091	10,960	18,378	37,600	29,720	41,192	35,822	31,763	30,820	27,175	26,990	25,710

Source: Amman Stock Exchange Annual Reports.

6. Research Hypothesis

Since the previous factors may or may not affect and determine the dividend policy decision of Jordanian corporations, and as Amman Stock Exchange (ASE) is still considered as emerging market in which these effects may vary from one sector to another, the best way to express the research problem is by phrasing the following two main hypotheses:

H_1: Dividend policy of Jordanian Corporations is determined by accounting information indicators.

H_2: Impacts of accounting information indicators on dividend policy vary from one sector to another.

7. Research Methodology

When we talk about Dividend policy, dividend size or dividend pattern we are coming across the most debatable issue that have been discussed by a large number of researchers and academicians. It was debated from two point of view, first one it was discussed as the dividend policy effect on some financial indicators and the other point of view was the search for the factors / variables whether financial or non-financial that affect dividend policy decision. The argument that we rely on within this study based on the concept that if the company can't or don't have the capacity to reinvest its earning in order to generate earning that overtop its cost of capital, so it's better for the company to distribute its earning amongst its shareholder in the form of dividend.

The study is based on a comparative statistical analysis taking into account all companies that paid cash dividend during the study period (2001-2013). The said companies are listed in three sectors (Banking Sector, Industrial Sector and Service Sector. These sector are the major three sectors of ASE as they constitute the major portion of the total securities market value. Table -2 below illustrate the percentage of each of the three sectors to the total market value of ASE for the last 10 years:

Table 2. % of each of the three sectors to the total market value (2004-2013)

Year	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004
% of Service Sector Market Value	18%	18%	18%	17%	17%	14%	14%	14%	20%	19%
% of Industrial Sector Market Value	24%	32%	31%	29%	27%	24%	21%	16%	5%	26%
% of Banking Sector Market Value	50%	44%	44%	46%	47%	50%	53%	57%	62%	54%
% of Total Three Sectors	**92%**	**93%**	**93%**	**91%**	**90%**	**88%**	**88%**	**86%**	**87%**	**98%**

Source:- Appendix 1.

8. Data Analysis and Statistical Approach

In order to measure how dividend policy is determined, several accounting information indicators were calculated and used for this study purposes, the study's indicators are calculated for the period (2001-2013) based on the annual reports pertaining to corporations listed in ASE that are affiliated to the three major sectors.

- The accounting indicators are divided into two major variables: (Refer to Appendix – 2, A, B &C for variables values): First the independent variables that consist of the following indicators:

- Fixed Assets / Total Assets - FTA,
- Earnings per share - EPS (End of Year profit / No. of Outstanding Stocks),
- Book value per share – BV (Equity Rights / No. of Outstanding Stocks),

- Price earnings ratio- P/E (Market Value Per Stock / EPS),
- Price/book value – P/B (Market Value Per Stock / BV),
- Return on assets – ROA (End of Year profit / Total Assets),
- Return on equity – ROE (End of Year profit / Equity Rights),
- Company's leverage / Debt ratio - LVR (Long term liabilities / Total Assets),
- Natural logarithm of operational cash flow - OPC, Liquidity ratio -LQR (Cash and quasi cash / current liabilities)

While the second variable is cash dividend percentage DPs which will incorporate the study dependant variables, it's calculated as follow:

- DPS = Dividend Paid / No. of Outstanding Stocks.

Simple Linear Regression analysis is deemed as a suitable statistical approach to be employed in order to analyze whether the accounting information indicators mentioned above may or may assist decision makers in determining their dividend policy regarding Jordanian companies listed within the three sectors of the study. The aim of regression analysis is to measure the impact power of each accounting indicator on corporation's dividend policy for each sector separately, and if the same accounting indicators affect the corporation's dividend policy associated with each sector differently by each single accounting indicator.

9. Regression Results and Discussion

Running simple linear regression on each of the three sectors we obtain the following results.

9.1 Services Sector Analysis and Results

Regression analysis results showed that the R^2 between the accounting indicators as independent variables and the dividend per share as dependent variable is 0.835, which means that the accounting information indicators determine 0.835 of the behavior of Dividend policy of Jordanian Services Corporations.

The impact of accounting information indicators on dividend policy of Services sector corporations vary as illustrated in the following table 4 below:

Table 4. Service sector statistical analysis outputs

Accounting Indicator	B	Sig t
Fixed Assets/Total Assets	-0.196	0.066
Earnings Per Share	0.239	0.028
Book Value Per Share	0.096	0.055
Price Earnings Ratio	-0.002	0.004
Price/book Value	0.042	0.020
Return On Assets	0.578	0.027
Return On Equity	0.353	0.037
Debt Ratio	0.061	0.494
Operational Cash Flow	0.029	0.005
Liquidity Ratio	0.031	0.536

Table 4 above shows that not all the accounting information indicators do posses significant impact on dividend policy decision in relation to services sector corporations in Jordan, only those independent variables that have significance level ≤ 0.05, in other words the accounting indicators that affect positively the dividend policy of services sector are: earning per share, price/book value, return on assets, return on equity and operational cash flow, while the price earnings ratio has negative impact on dividend policy.

9.2 Industrial Sector Analysis and Results

Regarding the industry sector analysis, the regression results showed that the coefficient of determination - $\mathbf{R^2}$ between the accounting indicators as independent variables and the dividend per share as dependent variable is 0.960, which means that the accounting information indicators determine 96% of the behavior of Dividend policy of Jordanian Industrial Corporations.

Table 5 below demonstrate the influence of accounting information indicators pertaining to corporations listed

within the industrial sector on dividend rate decision, as we can notice the degree of influence that vary between different variables as follow:

Table 5. Industrial sector statistical analysis outputs

Accounting Indicator	B	Sig t
Fixed Assets/Total Assets	-0.489	0.106
Earnings Per Share	0.253	0.021
Book Value Per Share	0.089	0.010
Price Earnings Ratio	-0.002	0.217
Price/book Value	0.012	0.672
Return On Assets	0.905	0.033
Return On Equity	0.531	0.079
Debt Ratio	-0.935	0.011
Operational Cash Flow	0.072	0.059
Liquidity Ratio	0.423	0.007

The aforementioned Table 5 above shows that there exist a significant impact of some of the accounting information indicators on dividend policy of industrial listed corporations in Jordan related to those indicators which have significance level ≤ 0.05, which means that the accounting indicators that affect positively the dividend policy of industrial listed corporations sector are: earning per share, book value per share, return on assets, return on assets and liquidity ratio, but debt ratio (degree of leverage) do dominate a negative impact on dividend policy.

9.3 Banking Sector Analysis and Results

It's important to indicate that banking sector analysis outputs showed different statistical results. The regression results showed that the $\mathbf{R^2}$ between accounting indicators as independent variables from one side and the dividend per share as dependent variable from the other side is 0.986, which means that the accounting information indicators determine 98.6% of the behavior of Dividend policy of Jordanian Banking Corporations. Also we can notice from Table 6 below, that debt ratio (degree of leverage) is the only variable that own a negative statistical impact on dividend decision in relation to banking sector listed companies.

The degree of influence and its range of accounting information indicators on dividend policy decision related to banking sector listed corporations also incongruous as illustrated in the following Table 6 below:

Table 6. Banking sector statistical analysis output

Accounting Indicator	B	Sig t
Fixed Assets/Total Assets	-6.194	0.331
Earnings Per Share	-0.118	0.068
Book Value Per Share	-0.044	0.083
Price Earnings Ratio	-0.001	0.252
Price/book Value	-0.010	0.125
Return On Assets	3.388	0.067
Return On Equity	-0.217	0.520
Debt Ratio	-0.650	0.001
Operational Cash Flow	-0.001	0.377
Liquidity Ratio	-0.007	0.963

The above table shows that there is only one factor significantly affecting the dividend policy of banking corporations (The debt ratio) with significance level ≤ 0.05, this impact is negative, which means that as the debt increases the dividend per share decreases, while the other independent variables have no any significant impact on dividend policy.

Based on the above results, we can point out that the first hypothesis has been approved since the dividend policy of the three main sectors listed in Amman Stock Exchange (Services, Industry and Banking) were determined by the accounting information indicators.

Regarding the second hypothesis, it is also approved since the results showed that the impact of accounting information indicators on dividend policy vary as the sectors vary.

10. Conclusion

The research concluded that the dividend policy of Jordanian Corporations is mainly determined by accounting information indicators and that the impact of accounting information indicators on dividend policy decision do contrast from one sector to another, since the dividend policy of services sector has been affected positively by earning per share, price/book value, return on assets, return on equity and operational cash flow and negatively by price earnings ratio. This is a logical result in case the company decides to pay cash dividend the impact of such decision will affect the stock price adversely which means that stock price will decline by the same rate of dividend rate. Regarding dividend decision of industrial sector which has been influenced positively by earning per share, book value per share, return on assets and liquidity ratio and negatively by debt ratio, this may be attributed to the fact that the increase in debts means an increase in risk degree which at the end if such external sources invested efficiently will lead to increase in expected return above the cost of borrowed fund and will leave for companies a reasonable amount to be distributed in the form of cash dividend. Banking sector dividend policy has been affected negatively by only debt ratio, while the effect of other indicators was insignificant. Banking sector is characterized by the fact that its main source of finance is deposits which will levy a high burden on banks in the form of debit interest to be paid for account holders as this deposit volume increases such burden will also increase which will hinder banks ability to pay high dividend. Moreover the study period do contain implicitly the effect of the financial crisis and its significant effect on financial institutions in general and banking institutions in particular, where during financial crisis period the Central Bank of Jordan directed commercial banks to increase their reserves and cut their dividend to protect themselves from unexpected events and from the financial crisis aftermath.

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Appendix A. Market Value of Stock Market & the Main Three Sectors of ASE (US Million Dollars)

Year	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004
ASE market Value	25,709	26,990	27,175	30,820	31,763	35,823	41,192	29,720	37,601	18,378
Service Sector Market Value	4,562	4,727	4,922	5,158	5,401	5,057	5,708	4,074	7,441	3,430
Industrial Sector Market Value	6,159	8,700	8,368	8,820	8,454	8,560	8,452	4,671	1,918	4,761
Banking Sector Market Value	12,983	11,788	12,010	14,098	14,823	18,043	21,955	16,793	23,453	9,854

Source:- Amman Securities Depository Center.

Appendix B. A, B & C Demonstrate the Study Variables of the Three Sectors

Table B1. Banking sector variables

Year	FTA	EPS	BV	P/E	PBV	ROA	ROE	LVR	LN OPCF	LQR	DPS
2013	0.013	0.316	3.26	12.12	1.17	0.014	0.097	0.854	21.36	0.359	0.153
2012	0.014	0.265	3.18	13.39	1.11	0.012	0.083	0.853	18.77	0.388	0.143
2011	0.013	0.261	3.25	14.76	1.18	0.012	0.080	0.854	21.16	0.408	0.144
2010	0.014	0.222	3.34	21.48	1.42	0.010	0.066	0.852	21.04	0.427	0.128
2009	0.013	0.253	3.39	20.53	1.53	0.011	0.075	0.849	21.79	0.414	0.117
2008	0.012	0.361	3.32	18.47	2.01	0.016	0.109	0.852	21.34	0.404	0.142
2007	0.011	0.401	3.80	24.06	2.54	0.016	0.106	0.846	20.27	0.486	0.163
2006	0.011	0.387	3.68	21.09	2.22	0.016	0.105	0.844	-20.85	0.526	0.149
2005	0.012	0.573	3.85	32.63	4.86	0.017	0.149	0.887	19.19	0.416	0.097
2004	0.012	0.502	3.75	24.69	3.30	0.010	0.104	0.901	20.92	0.431	0.097
2003	0.013	0.396	3.94	21.58	2.17	0.008	0.086	0.909	20.46	0.475	0.106
2002	0.014	0.373	3.71	13.53	1.36	0.007	0.086	0.913	21.08	0.461	0.118
2001	0.014	0.428	3.66	13.17	1.54	0.008	0.099	0.915	19.86	0.442	0.100

Source: Amman Stock Exchange (ASE).

Table B2. Industrial sector variables

Year	FTA	EPS	BV	P/E	PBV	ROA	ROE	LVR	LN OPCF	LQR	DPS
2013	0.285	0.139	2.45	28.29	1.60	0.045	0.057	0.338	19.43	0.469	0.162
2012	0.302	0.277	2.50	19.65	2.18	0.085	0.111	0.315	19.41	0.514	0.241
2011	0.332	0.447	2.52	11.73	2.08	0.126	0.178	0.350	20.10	0.706	0.296
2010	0.372	0.216	2.29	25.30	2.39	0.072	0.094	0.353	19.45	0.540	0.129
2009	0.267	0.275	2.48	21.96	2.44	0.081	0.111	0.347	19.90	0.535	0.144
2008	0.250	0.586	2.35	10.40	2.60	0.162	0.250	0.380	20.05	0.495	0.159
2007	0.280	0.337	2.04	19.73	3.26	0.115	0.165	0.375	19.19	0.537	0.130
2006	0.293	0.176	1.81	22.15	2.15	0.073	0.097	0.387	19.01	0.534	0.135
2005	0.290	0.397	3.26	7.21	0.88	0.083	0.122	0.403	18.80	0.641	0.189
2004	0.333	0.181	1.76	9.74	2.62	0.058	0.103	0.438	19.07	0.583	0.132
2003	0.381	0.030	1.68	55.67	1.75	0.010	0.018	0.422	19.36	0.489	0.079
2002	0.420	0.122	1.65	13.56	1.21	0.040	0.074	0.453	18.72	0.374	0.082
2001	0.439	0.111	1.64	14.80	1.09	0.037	0.068	0.452	18.82	0.293	0.084

Source: Amman Stock Exchange (ASE).

Table B3. Services sector variables

Year	FTA	EPS	BV	P/E	PBV	ROA	ROE	LVR	LN OPCF	LQR	DPS
2013	0.317	0.100	1.30	20.00	1.53	0.046	0.076	0.661	18.94	0.170	0.092
2012	0.339	0.128	1.34	16.03	1.53	0.052	0.095	0.636	19.38	0.170	0.117
2011	0.368	0.071	1.30	29.28	1.59	0.035	0.054	0.628	18.76	0.182	0.105
2010	0.433	0.116	1.35	19.16	1.64	0.050	0.086	0.555	19.03	0.254	0.098
2009	0.412	0.128	1.38	18.53	1.72	0.054	0.093	0.541	20.09	0.356	0.097
2008	0.407	0.122	1.42	19.98	1.72	0.053	0.086	0.548	19.74	0.354	0.137
2007	0.441	0.130	1.64	22.97	1.82	0.050	0.079	0.534	19.75	0.374	0.118
2006	0.467	0.119	1.70	20.58	1.44	0.045	0.070	0.533	19.75	0.420	0.106
2005	0.314	0.289	1.51	14.55	2.65	0.122	0.191	0.371	19.14	0.705	0.125
2004	0.417	0.166	1.38	16.83	1.90	0.068	0.120	0.431	19.34	0.509	0.085
2003	0.499	0.094	1.30	20.20	1.46	0.039	0.072	0.462	19.24	0.444	0.091
2002	0.513	0.047	1.28	34.35	1.27	0.020	0.037	0.464	18.73	0.260	0.071
2001	0.481	0.032	1.25	42.19	1.08	0.013	0.025	0.473	17.65	0.323	0.041

Source: Amman Stock exchange (ASE).

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Optimal Central Bank Intervention in the Foreign Exchange Market of Iran

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Abstract

The article pioneers the designing of a theoretical model for the optimal foreign exchange intervention in Iran. The model used is a nonlinear dynamic programming model with stochastic continuous functions to solve which the Uhlig program has been used. The results indicate that determining the best volume of intervention depends on the economic objectives of policymakers, the exchange rate of the present time, and the future exchange rate expected by the monetary authorities. Due to the monopolistic condition of the government in the foreign exchange market, the volume of the foreign exchange intervention in the market depends on the level the government is trying to keep the exchange rate at the present time as well as the next period. The exchange rate in Iran is not solely determined on the basis of the market mechanisms; therefore, the determinant of the volume of intervention by the monetary authority at the present time is the level that the government attempts to keep the exchange rate at present and in the future. The present and future levels of the exchange rate depend on the government budget expenditures. This in turn depends on the government size and its reliance on foreign exchange revenues received from the sale of oil.

Keywords: exchange rate, foreign exchange market of Iran, central bank intervention, Uhlig program, Nonlinear Dynamic Stochastic programming

1. Introduction

Foreign exchange market intervention is, most broadly defined, any transaction or announcement by an official agent of a government that is intended to influence the value of an exchange rate or the country's stock of foreign exchange reserves. In most countries, intervention operations are implemented by the monetary authority, although the decision to intervene can often also be made by authorities in the finance ministry or treasury department, depending on the country.

Foreign exchange intervention in Iran is different from intervention in other economies with a market mechanism, as the Iranian economy is strongly oil-reliant. Foreign exchange intervention in Iran is directed by the Central Bank, due to its legal obligation to finance the resources required by the government. In other words, annual budget laws of the government delineate the network for the management of foreign exchange resources upon the determination of the amount of the foreign exchange to be allocated, issuance of the license for the allocation of oil revenue, issuance of the license for the financing of the contracts, and confirmation of receipt and payment channels of foreign exchange by the Central Bank. Based on Section B, note 2, Single Article of the Budget Law for 2014/15, the Ministry of Petroleum is obliged, through competent governmental subsidiaries, to deposit all the revenues received from the exports of crude oil and gas condensates into relevant accounts in the Treasury General, through the Central Bank directly.

According to Paragraph B, Note 2, Single Article of the Budget Law for 1393 (2014/15), the share of the National Iranian Oil Company (NIOC) in the value of oil production (including crude oil and gas condensate) is set at 14.5 percent. Therefore, on the basis of the Budget Bill for 2014/15, the share of the NIOC, including oil and gas buyback contracts, is determined at $7.5 billion.

Based on Paragraph H, Article 84 of the 5th Five-Year Development Plan, the share of the National Development Fund of Iran (NDFI) in total exports of crude oil, gas condensate, and natural gas was set to increase by 3 percentage points in each year compared with the year before. Thus, it was determined that the

mentioned share should rise to 20 percent in 1389 (2010/11) and 1390 (2011/12), 23 percent in 1391 (2012/13), and 26 percent in total exports of crude oil and gas condensate in 1392 (2013/14). On the basis of the 2013/14 Budget Amendment, however, it was envisaged that NDFI's share should decrease to 20 percent. On this basis, it was decided that the resources thereby received (emanating from the difference of 20 and 26 percent) should be left at the government's disposal to be allocated for the financing of relevant projects. According to Paragraph B, Note 2, Single Article of the Budget Law for 2014/15, the amount deposited to the NDFI's account is set at 29 percent of the value of crude oil and gas condensate exports.

In the Budget Law for 2013/14, it was projected that 2 percent of the resources received from the exports of crude oil and gas condensate should be allocated for the payment of Nowrouz bonus to the civil servants, workers, and pensioners in 1391 (2012/13). As this budgetary item was not actualized, the mentioned 2 percent was eliminated from the Budget Amendment of 2013/14. With the inclusion of the mentioned 2 percent in the Budget Law for 1393 (2014/15), NDFI's share increases to 31 percent.

Considering the 29 percent share in the total cash value of the exports of crude oil and gas condensate as well as the 2 percent share for the payment of Nowrouz bonus, the share of NDFI is set at $14.7 billion. Therefore, given the share of the NIOC at $7.5 billion, share of the NDFI at $14.7 billion, and the 2 percent share for Nowrouz bonus, the share of the government general budget (less: repayments for oil and gas buyback contracts) is determined at $29.4 billion.

In the Budget Law for 1393 (2014/15), revenues from the sale of crude oil (budgetary item 210101) is set at Rls. 752 902.6 billion ($28 411.4 million), and the equivalent value of the 2 percent share of the deprived and oil-producing regions in the sales of crude oil and gas condensate (budgetary item 210109) is determined at Rls. 25 090.5 billion ($946.8 million), totaling Rls. 777 993 billion ($29 358.2 million).

After realization of the share of government general revenues and upon the sale of the foreign exchange on spot prices, subject of Budgetary Item No. 210101 (as stipulated in Table No. 5) as well as 2 percent of the funds received from crude oil exports, subject of Article 132 of the 5th Five-Year Economic, Social, and Cultural Development Plan, the Central Bank is obliged to deposit the excess foreign exchange received from the sale of oil to the Oil Stabilization Fund (OSF), after financing the uses of the subject of Paragraph 2 of the Budget Law for 2014/15, and implementing its Notes.

As the Central Bank is obliged to finance the Budget (in Rials), excess supply of foreign exchange as compared to market demand is purchased by the Central Bank for the purpose of the management of foreign exchange, as in previous years.

However, according to Paragraph B, Note 2, Single Article of the Budget Law for 1393 (2014/15), the Central Bank is required to deposit the differential of foreign exchange sales (in Rials), based on the benchmark stipulated in the Budgetary Item No. 210101 (sale of crude oil) and the daily exchange rate, to the Treasury General Accounts. Meanwhile, the ceiling for budgetary items (in Rials) to which foreign exchange revenues are deposited is annually set in budget laws. Therefore, setting the foreign exchange rate in the Budget Law and its increase or decrease will not affect the ceilings in Rials (for instance, budget law for 1393 (2014/15) was set at Rls. 26 500 per dollar in comparison with Rls. 24 500 per dollar in the year before). It is of special note that the Central Bank is implicitly obliged to prevent the fall in the foreign exchange rate in the aftermath of the injection of proceeds received from the sale of oil (in dollars) into the market. In other words, the central bank of Iran is responsible for financing of government's budget. It means that the central bank is not separate from the ministry of finance. That's the reason why, political decisions has already influenced the central bank operations.

When the market faces an excess supply, the Central Bank purchases the government foreign exchange so that it could finance the resources required by the government (in Rials); at the expense of the increase in monetary base and liquidity. The most important factor behind the rise in the monetary base over the recent years is Central Bank's net foreign assets which is in turn due to the rise in Central Bank foreign assets as a result of purchasing foreign exchange from the government for the financing of Budget resources (in Rials), and frequent withdrawals from the OSF and its impartial sale in the market. It is clear that increase in the utilization of the oil revenue in annual budget laws of the government requires more foreign exchange purchases from the government by the Central Bank, for the financing of the Budget (in Rials). The higher the share of government foreign exchange revenues in compensating for the under-realization of Rial revenues, the higher the pressures on the Central Bank to purchase government foreign exchange. The central bank must reduce the danger of large budget if oil prices decline suddenly, and is now being done by, manipulating of foreign exchange market.

Determination of the optimal level of foreign exchange intervention merits a special attention in Iran as government budget is highly reliant on oil. Increase in government reliance on oil revenue makes the

government vulnerable against oil and the global economy. In this respect, the government should have an optimal presence so that the "non-government" sector could have a positive contribution to the economy. Therefore, the most significant objectives of foreign exchange intervention could be outlined as: (1) optimization of the presence of the "government" in the economy, and (2) facilitation of the presence of the "non-government" sector in the foreign exchange market. Foreign exchange intervention policy will be effective only if the market logic accepts it. Furthermore, Central Bank intervention as a policy instrument will play a pivotal role when the market logic is congruent. In other words, foreign exchange intervention is not independent of other economic policies and therefore its effectiveness depends on the optimal utilization of economic, monetary and fiscal policies. This article casts a special look on the government intervention in the market and aims at designing an appropriate model for the determination of the optimal level of foreign exchange intervention in Iran.

2. Literature Review

A few research studies have been conducted on the estimation of the optimal level of intervention in the foreign exchange market. Most studies of this nature aim at designing a one-dimensional model for stochastic impulse control. Mundaca and Oksendal (1998) came up with the optimal control model of the exchange rate under uncertainty. On the other hand, Cadenillas and Zapatero (1999) designed the optimal foreign exchange control model based on the supposition of exchange rate target zones. On this basis, the foreign exchange rate is supposed to be kept close to its mean value. In another study, Cadenillas and Zapatero (2000) formulated an optimal stochastic control problem by which intervention and interest rate are used as two policy instruments to achieve the foreign exchange objective. The goal of Onishi and Tsujimura (2006) was to find an optimal control of minimization of the total expected costs in an infinite time horizon. Overall, such studies are solely focusing on designing a stochastic control model. The article, however, utilizes a nonlinear dynamic programming model with continuous stochastic functions, which is solved by Uhlig Program. The model used is based on Cadenillas and Zapatero model (2000), with a dynamic and multidimensional design specific to the economy of Iran, which is extended and solved based on Uhlig program. The paper shows that huge injection of oil revenues directly to economy and also the absence of potent structure of output are inclusively caused the central bank intervention in the form of foreign exchange buying in the market. This direct to high inflation and low output. After that, the optimal foreign exchange intervention model based on analysis has been designed mathematically. The structure of the paper is as follows: in section 2, the exchange rate, inflation rate, output dynamics, and the Central Bank objective are designed; in section 3, the value function has been characterized; and in section 4, the Uhlig Program is utilized to solve the model. Later, the optimal control law of variables and elasticities are extracted and interpreted. Finally, the conclusion is given.

3. Model

The model designed for this article, tailored to the requirements of Iran for the first time, is a nonlinear dynamic programming model with stochastic and continuous functions. It is hypothesized that state variables in this article namely, foreign exchange rate, output, and inflation rate follow the Brownian motion (Karatzas & Shreve, 1991). The control variable is the amount of foreign exchange intervention in the market which follows an autoregressive process. What follows is the formulation of the laws of motion of the state and control variables in the nonlinear dynamic programming model of intervention in the foreign exchange market in Iran.

3.1 Foreign Exchange Rate Dynamics

In the economy of Iran, Central Bank liabilities to the financing of government foreign exchange resources, in national currency, has led to Central Bank intervention in the market through the purchasing of the excess supply of foreign exchange. Financing of a remarkable share of Budget uses in Iran is implemented out of the revenues received from oil exports, as well as the balance of the OSF. Therefore, Central Bank commitment to financing the Rial resources of the budget gives the Central Bank no choice but to purchase foreign exchange in the market at a predetermined rate in order to settle the market. Therefore, determination of the foreign exchange rate in the economy of Iran is fulfilled with due consideration of financing government budget resources. In fact, government intervention in the market is aimed, by purchasing the excess foreign exchange, to stabilize the foreign exchange rate. We assume that foreign exchange rate (x) is an adapted stochastic process given by:

$$x_{t+1} = x_0 + \int_0^t \mu_s \, ds + \int_0^t \sigma_s \, dw_s + \sum_0^{t-1} I(\zeta_s) \tag{1}$$

Based on the equation, (x) is just a geometric Brownian motion which is affected by the exogenous economic pressure (μ), like the financing of government general budget (in Rials) ($\mu_s \in R$). Therefore, $\mu_s > 0$ will indicate

devaluatory pressures as a result of political reasons for instance, and $\mu_s < 0$ will indicate the opposite. Parameter $\sigma_s > 0$ is the exogenous fluctuation of the foreign exchange variable due to other political and economic variables (such as oil price fluctuations and international sanctions). According to economic literature, parameter μ_s is called drift and parameter σ_s is known as volatility. x_0 is the foreign exchange rate at the starting time, w_s is the foreign exchange shock with the Wiener process and the function $I(\zeta_s)$ is the impact of foreign exchange intervention on the foreign exchange rate. μ_s, σ_s are Brownian stochastic motion parameters which depend on the volume of foreign exchange rate and time. Therefore, foreign exchange rate is affected by the pressures emanating from financing of government budget (in Rials) and the amount of Central Bank intervention in the foreign exchange market (ζ_s). The larger the amount of government budget and its reliance on oil revenue, the higher the pressure on the Central Bank for the Rial financing of the Budget.

The exchange rate at time t+1 is a function of the starting exchange rate, total exogenous economic pressures until t, total exogenous foreign exchange rate fluctuations until t, and the impact of the intervention on the exchange rate. The impact of foreign exchange intervention explained below is assumed as a discontinuous process. This is due to the fact that intervention takes place when the exchange rate deviates from the exchange rate target. Based on the Riemann-Stieltjes integration (L.C Evans, 2010), the exchange rate function x_t could be explained as in the following discontinuous function:

$$x_{t+1} = x_t + \mu_t^x \; x_{t-1} + \sigma_t^x \; x_{t-1} \; dw_t + I(\zeta_{t-1})$$

Where $dw_t = \varepsilon_t \sqrt{dt}$ and ε_t is the foreign exchange shock which is identically and independently distributed $(i.i.d)$. x_{t+1} is the exchange rate at time $t+1$, x_t is the exchange rate at time t, x_{t-1} is the exchange rate at time $t-1$, the function $I(\zeta_{t-1})$ is the impact of the foreign exchange intervention of the previous period on the exchange rate, μ_t^x is drift (mean) and σ_t^x is the exchange rate fluctuation at time t (variance).

3.2 Inflation Rate Dynamics

$$\pi_{t+1} = \pi_0 + \int_0^t \mu_s \, ds + \int_0^t \sigma_s \, dw_s + q \int_0^t (x_s - \bar{x}) \, ds + f \int_0^t (y_s - \bar{y}) \, ds \quad (2)$$

As seen in the above equation, the inflation rate follows the geometric Brownian motion. π_0 is the inflation rate at time 0, μ_s is the exogenous economic pressure on the inflation rate, σ_s is the exogenous fluctuation in inflation due to other economic and political variables, w_s is the inflation shock with the Wiener process. Constant coefficients q and f illustrate the impact of the foreign exchange rate fluctuations and output gap on the inflation rate, respectively. x_t is the exchange rate at time t, $\bar{x}$ is the exchange rate target, y_t is the value of output at time t, and $\bar{y}$ is the equilibrium output or target. μ_s, σ_s are the Brownian motion parameters which depend on the inflation rate and time.

Many economists design three-gap models for the developing economies so that they could emphasize the impact of foreign exchange variations, which play a significant role in the economy, on the strengthening of inflationary dynamics (Taylor, 1991). Inflation is by nature a two-dimensional dynamic flow. Although inflation has an inevitable monetary dimension, prices are determined by government expenses. Therefore, in order to explain inflation, expenses and their determining factors should be taken into consideration in addition to liquidity and monetary variables.

Exchange rate changes influence the general level of prices through total supply and demand. On the supply side, the exchange rate directly affects import prices. The intensity and timing of the impact on domestic prices is not certain as they depend on the nature of long-run contracts, non-price responses of foreign firms to exchange rate changes, and the share of imports in total economy. Meanwhile, exchange rate fluctuations could have an indirect supply effect on domestic prices. The contingent rise in the expenses of imported inputs (in dollars) due to the currency depreciation will raise the marginal cost which will in turn lead to an increase in the price of domestically-manufactured commodities. Firms will raise prices in order to improve their profit margins. The amount of price rise depends on the market structure, number of domestic and foreign firms in the market, and the degree of substitutability between goods.

Exchange rate also affects inflation through the aggregate demand. For example, a depreciation of the domestic currency can lead to a rise in inflation because of the pass-through from higher import prices and greater demand for the country's exports. With the rise in the aggregate demand, the level of prices increases which leads to a

rise in output. With the growth in the output, demand for inputs and labor force will rise, which has an ensuing effect on the increase of the price of inputs and wages. Increase in wages is devoted to the price rise fueled by economic firms. Price rises resulting from currency depreciation are added to price-wage dynamics (Kan, 1987; Huffer, 1989; Deravi & Gregorowicz et al., 1995).

As this paper tries to design a theoretical model for the optimal foreign exchange intervention in the market of Iran, not all determinants of the inflation model are considered in detail. In other words, all factors affecting inflation namely, money, liquidity, wages, etc., are included in σ_s and μ_s fluctuation parameters. On this basis, inflation is influenced by exogenous economic pressures, foreign exchange rate, output gap, and inflationary shocks.

Based on the Riemann-Stieltjes integration, inflation rate discontinuous function is as follows:

$$\pi_{t+1} = \pi_t + \mu_t^{\pi}\ \pi_{t-1} + \sigma_t^{\pi}\ \pi_{t-1}\ dw_t + q\ x_{t-1}(x_t - \bar{x}) + f\ y_{t-1}(y_t - \bar{y})$$

where $dw_t = u_t\sqrt{dt}$ and u_t is the inflation shock $(i.i.d)$.

3.3 Output Dynamics

$$y_{t+1} = y_0 + \int_0^t \mu_s\ ds + \int_0^t \sigma_s\ dw_s + h\int_0^t(\pi_s - \bar{\pi})\ ds \tag{3}$$

Assume that output follows the Brownian stochastic motion where y_0 denotes the output of the economy at time 0, μ_s is the exogenous economic pressure on the output, σ_s is the exogenous output fluctuation due to other economic and political variables and w_s is the output shock. μ_s , σ_s are the Brownian stochastic motion parameters, depending on the output level and time. Constant coefficient h demonstrates the effect of inflation on output. π_s is the inflation rate at time s and $\bar{\pi}$ is the aimed inflation rate. Deviation of inflation target affects output. Due to scarcity of inputs, inflation affects output through the marginal cost. In fact, marginal cost is an increasing function of output (Jagjit & Nolan, 2004). Based on this relation, output is affected by exogenous economic pressures, inflation, and output shocks.

As before, based on Riemann-Stieltjes integration, output discontinuous function is as follows:

$$y_{t+1} = y_t + \mu_t^{y}\ y_{t-1} + \sigma_t^{y}\ y_{t-1}\ dw_t + h\ \pi_{t-1}(\pi_t - \bar{\pi})$$

where $dw_t = v_t\sqrt{dt}$, and v_t is the output shock which is identically and independently distributed $(i.i.d)$.

Now, discontinuous forms of the exchange rate, inflation and output equations, known as "Restriction Equations", are considered as stochastic equations as follows:

$$x_{t+1} = x_t + x_{t-1}\ \mu_t^{x} + x_{t-1}\ \sigma_t^{x} + I(\zeta_{t-1}) + \varepsilon_t \tag{4}$$

$$\pi_{t+1} = \pi_t + \pi_{t-1}\ \mu_t^{\pi} + \pi_{t-1}\ \sigma_t^{\pi} + q\ x_{t-1}(x_t - \bar{x}) + f\ y_{t-1}\ (y_t - \bar{y}) + u_t \tag{5}$$

$$y_{t+1} = y_t + y_{t-1}\ \mu_t^{y} + y_{t-1}\ \sigma_t^{y} + h\ \pi_{t-1}(\pi_t - \bar{\pi}) + v_t \tag{6}$$

Here, ε_t, u_t, and v_t are the stochastic shocks of the exchange rate, inflation, and output, respectively $(i.i.d)$. Before we continue, we have to make an assumption about the exchange rate intervention, ζ_τ at time τ. In case of zero intervention in the foreign exchange market, the exchange rate will only be affected by exogenous economic pressures (pressure of financing of government general budget in Rials) and the exogenous fluctuations of the exchange rate due to other economic and political variables. It has been hypothesized that inflation fluctuations affect output, on the one hand, and the output gap and the exchange rate will affect inflation, on the other hand. It is also hypothesized that ζ_τ follows an AR process as follows:

$$\zeta_t = \theta\ \zeta_{t-1} + w_t$$

Where, $|\theta| < 1$, and w_t is an $(i.i.d)$ process. Meanwhile, it is assumed that $I(\zeta_t) = \lambda\zeta_t$, where, $\lambda \le 1$ and the coefficient λ illustrates the effect of foreign exchange intervention on the exchange rate. At this point, dynamic processes of state and control variables are designed. At this point, the Central Bank objective function must be designed.

3.4 Central Bank Objective Function

Central Bank, as the monetary authority, should aim at minimizing its loss function. Based on the following relation, the loss function of the central bank is a function of the exchange rate fluctuations (first term), inflation rate fluctuations (second term), output gap (Taylor Rule) (third term), and organizational costs of foreign exchange interventions (fourth term):

$$Min \quad J = E\left\{\int_0^{\infty} e^{-\lambda t}[\alpha_{\delta}(x_t-\rho)^{2\delta} + k\{(1-\iota)(\pi_t-\bar{\pi})^2 + \iota(y_t-\bar{y})^2\}]dt + \sum_{i=1}^{\tau<\infty} e^{-\lambda\tau_i} g(\zeta_i)\right\}$$

Here, J is the loss function of the central bank, E is the expected value (mathematical expectation), α_{δ} is the relative weight given by the Central Bank to foreign exchange fluctuations from the targeted or equilibrium exchange rate. x_t is the exchange rate at time t, ρ is the exchange rate targeted by the Central Bank, $\delta = \pm 1$ is an index to show the different effects of exchange rate fluctuations above and below the exchange rate target, k is the effect parameter of output gap and inflation on the loss of the Central Bank, ι is the relative weight given by the Central Bank to output fluctuations against the inflation fluctuations, $1-t$ is the relative weight given by the Central Bank to inflation fluctuations against the output fluctuations, $\bar{\pi}$ is the inflation target, $\bar{y}$ is the output target, ζ is the intensity of foreign exchange intervention in the foreign exchange market, τ is the time of the foreign exchange intervention in the market, $g(\zeta)$ is the cost function of Central Bank intervention. As is seen in the equations of exchange rate, inflation, and output, x_{t+1} is a function of ζ_t. However, π_{t+1}, y_{t+1} do not have such a characteristic.

$g(\zeta_t)$ is a cost function. If we hypothesize that the Central Bank is aiming at minimizing its intervention in the foreign exchange market, the optimal change in the exchange rate resulted from the Central Bank intervention will be equal to zero. Therefore, function g can be defined as follows:

$$g(\zeta_t) = \psi\ (\zeta_t - 0)^2 = \psi\ \zeta_t^2$$

Meanwhile, Central Bank's loss function can be rewritten as follows:

$$Min \quad J = E\left\{\int_0^{\infty} e^{-\lambda t}[\alpha_{\delta}\ (x_t-\rho)^{2\delta} + k\{(1-\iota)(\pi_t-\bar{\pi})^2 + \iota(y_t-\bar{y})^2\}]\ dt + \psi \sum_{\tau=1}^{\tau<\infty} e^{-\lambda\tau}\ \zeta_{\tau}^2\right\}$$

$$\tau = 1, 2, \ldots, t-1$$

Since the objective is minimizing the expected loss function of the Central Bank, mathematically, some hypotheses must be made on the bounded functions (Note 1). In fact, in order to find acceptable responses, bounded loss function of the Central Bank must be hypothesized. The hypothesis for the bounded measurable functions of exchange rate fluctuations, inflation, and output leads to the following relations:

$$E\left\{\int_0^{\infty} e^{-\lambda t}\alpha_{\delta}\ (x_t-\rho)^{2\delta} dt\right\} < \infty$$

$$E\left\{\int_0^{\infty} e^{-\lambda t} k\{(1-\iota)(\pi_t-\bar{\pi})^2 + \iota(y_t-\bar{y})^2\}\ dt\right\} < \infty$$

Bounded expectation of intervention costs shows the following:

$$E\left\{\psi\sum_{\tau=1}^{\tau<\infty} e^{-\lambda\tau}\zeta_{\tau}^2\right\} < \infty$$

The above inequality states: $P\{Lim_{n\to\infty}\ \tau_n \le T\} = 0 \quad \forall T \in [0,\infty)$. The three inequalities above show: (Cadenillas & Zapatero, 2000).

$$Lim \underset{T\to\infty}{E}[e^{-\lambda T}X(T+)] = 0$$

Therefore, in this problem, we are looking for an admissible impulse stochastic control (foreign exchange intervention) to set the necessary conditions. By and large, finite solutions are considered.

Generally, integrals in the Central Bank's loss function are stochastic integrals. Solving this type of integrals is

different from solving ordinary integrals by using conventional methods. For stochastic integrals, there is no exact numerical solution. In this paper, the problem is solved using nonlinear dynamic stochastic models (Uhlig, 1999).

4. Method

We need to take the following steps to solve the dynamic stochastic systems with the method of Uhlig. First of all, central Bank's loss function can be written in the discontinuous form as follows (whether continuous or discontinuous, this function does not change the result):

$$Min \quad J = E\sum_{t=0}^{\infty}\beta^t\left[\alpha_\delta(x_t-\rho)^{2\delta}+k\{(1-\iota)(\pi_t-\bar{\pi})^2+\iota(y_t-\bar{y})^2\}+\psi\,\zeta_{t-1}^2\right] \quad (7)$$

Foreign exchange rate (x_t), inflation (π_t) and output (y_t) are state variables and foreign exchange intervention (ζ_{t-1}) is the control variable. Supposing that this is a recursive problem, Bellman equation can be written as follows (Gong & Smeller, 2004; Ljungqvist & Sargent, 2000):

$$V(x_t,\pi_t,y_t)=\underset{\zeta_{t-1}}{Min}\left\{\alpha_\delta(x_t-\rho)^{2\delta}+k\{(1-\iota)(\pi_t-\bar{\pi})^2+\iota(y_t-\bar{y})^2\}+\psi\zeta_{t-1}^2+\beta EV(x_{t+1},\pi_{t+1},y_{t+1})\right\} \quad (8)$$

Here, V function which solves Bellman equation is called the value function. The value function explains the optimal value of the problem in the form of a function of the state variable x.

Foreign exchange (x_{t+1}), inflation (π_{t+1}) and output dynamics (y_{t+1}) were previously introduced. Now it is time to take the derivative of Bellman equation (8) with respect to the control variable ζ_{t-1}. Based on the exchange rate equation, x_{t+1} is a function of ζ_t; however, y_{t+1} and π_{t+1} do not enjoy this feature. If we take the derivative of Bellman equation (8) with respect to the control variable ζ_{t-1}, the usual first order condition (FOC) is resulted:

$$\frac{\partial V}{\partial\zeta_{t-1}}=2\psi\,\zeta_{t-1}+\beta E\left[\frac{\partial V}{\partial x_{t+1}}\times\frac{\partial x_{t+1}}{\partial\zeta_{t-1}}+\frac{\partial V}{\partial\pi_{t+1}}\times\frac{\partial\pi_{t+1}}{\partial\zeta_{t-1}}+\frac{\partial V}{\partial y_{t+1}}\times\frac{\partial y_{t+1}}{\partial\zeta_{t-1}}\right]=0$$

Considering equations (4), (5), and (6), and $I(\zeta_{t-1})=\gamma\,\zeta_{t-1}$, it can be said:

$$2\psi\zeta_{t-1}+\beta\gamma E\frac{\partial V}{\partial x_{t+1}}=0 \quad (9)$$

Taking the derivative of Bellman equation (8) with respect to the state variable x_t, we get to the famous B-S equation (Benveniste-Schenkman, 1979), or envelope theorem:

$$\frac{\partial V}{\partial x_t}=2\delta\alpha_\delta(x_t-\rho)^{2\delta-1}$$

Lead this equation to t+1 and substitute in (9):

$$2\psi\zeta_{t-1}+2\delta\alpha_\delta\beta\gamma\,E(x_{t+1}-\rho)^{2\delta-1}=0 \quad (10)$$

Equation (10) is known as Euler Equation. This equation along with (4), (5) and (6), known as restriction equations, are the necessary conditions for solving the problem of minimizing the Central Bank's expected loss function. Therefore, first of all, these equations need to be linearized and then the Uhlig program must be applied to solve them.

To this end, we use the log-linear approximation, which is based on Taylor approximation around the steady state, to replace the equations by approximations which are linear functions in the log-deviations of the variables as follows (Campbell & Cochrane, 1998).

A. Log-Linearizing the Euler Equation (10): In this equation, only the second term is nonlinear which is approximated as follows:

$$(X_{t+1} - \rho)^{2\delta-1} \approx (\overline{X} - \rho)^{2\delta-1}\left\{1 + (2\delta - 1)(\overline{X} - \rho)^{2\delta-2} \frac{\overline{X}}{(\overline{X} - \rho)^{2\delta-1}} X_{t+1}\right\}$$

It can still be written in a simpler way:

$$(X_{t+1} - \rho)^{2\delta-1} \approx (\overline{X} - \rho)^{2\delta-1} + (2\delta - 1)(\overline{X} - \rho)^{2\delta-2}\overline{X} \quad X_{t+1}$$

Now, we put the estimation in Euler equation (10):

$$2\psi\zeta_{t-1} + 2\delta\alpha_{\delta}\beta\gamma(\overline{X} - \rho)^{2\delta-1} + 2\delta\alpha_{\delta}\beta\gamma(2\delta - 1)(\overline{X} - \rho)^{2\delta-2}\overline{X} \quad E(X_{t+1}) = 0 \tag{11}$$

Therefore, relation (11) the log-linearizing the Euler equation is the problem of minimizing the monetary authority's expected loss function.

B. Log-Linearizing the Restriction Equations: Considering (4);

$$X_{t+1} = X_t + X_{t-1}\mu_t^X + X_{t-1}\sigma_t^X + \gamma(\zeta_{t-1}) + \varepsilon_t \tag{4}$$

All the terms are linear. Exchange rate equation can also be considered as this:

$$X_{t+1} = X_t + (\mu_t^X + \sigma_t^X) X_{t-1} + \gamma(\zeta_{t-1}) + \varepsilon_t \tag{12}$$

Now, we consider the inflation equation (5):

$$\pi_{t+1} = \pi_t + \pi_{t-1}\mu_t^{\pi} + \pi_{t-1}\sigma_t^{\pi} + q\ X_{t-1}(X_t - \overline{X}) + f\ y_{t-1}\ (y_t - \overline{y}) + u_t \tag{5}$$

The fourth term to the right of the inflation equation (5) using the Taylor approximation is:

$$\begin{aligned} X_{t-1}(X_t - \overline{X}) &\approx \overline{X}\ e^{X_{t-1}}(\overline{X}\ e^{X_t} - \overline{X}) \\ &\approx \overline{X}^2\ e^{X_{t-1}}(e^{X_t} - 1) \\ &\approx \overline{X}^2\ (e^{X_{t-1}}e^{X_t} - e^{X_{t-1}}) \\ &\approx \overline{X}^2\ (1 + X_{t-1} + X_t - 1 - X_{t-1}) = \overline{X}^2\ X_t \end{aligned}$$

The fifth term to the right of the inflation equation using the Taylor approximation is:

$$y_{t-1}(y_t - \overline{y}) \approx \overline{y}^2\ y_t$$

Therefore, the log-linearizing the inflation equation is:

$$\pi_{t+1} = \pi_t + (\mu_t^{\pi} + \sigma_t^{\pi})\pi_{t-1} + q\ \overline{X}^2\ X_t + f\ \overline{y}^2\ y_t + u_t \tag{13}$$

Now, we consider the output equation (6):

$$y_{t+1} = y_t + y_{t-1}\mu_t^y + y_{t-1}\sigma_t^y + h\ \pi_{t-1}(\pi_t - \overline{\pi}) + v_t$$

The fourth term to the right of the output equation above (6), using the Taylor approximation is:

$$\pi_{t-1}(\pi_t - \overline{\pi}) \approx \overline{\pi}^2\ \pi_t$$

Therefore, the log-linearization of the output equation is:

$$y_{t+1} = y_t + (\mu_t^y + \sigma_t^y) y_{t-1} + h\ \overline{\pi}^2\ \pi_t + v_t \tag{14}$$

5. Discussion of Results

In this round, the Nonlinear Dynamic Stochastic Model of Foreign Exchange Intervention in Iran will be solved for equilibrium laws of motion. Linear equations (11), (12), (13) and (14) are as follows:

$$2\psi\zeta_{t-1} + 2\delta\alpha_{\delta}\beta\gamma(\overline{x} - \rho)^{2\delta-1} + 2\delta\alpha_{\delta}\beta\gamma(2\delta - 1)(\overline{x} - \rho)^{2\delta-2}\overline{x}\ E(x_{t+1}) = 0$$

$$x_{t+1} = x_t + (\mu_t^x + \sigma_t^x) x_{t-1} + \gamma(\zeta_{t-1}) + \varepsilon_t$$

$$\pi_{t+1} = \pi_t + (\mu_t^{\pi} + \sigma_t^{\pi})\pi_{t-1} + q\ \overline{x}^2\ x_t + f\ \overline{y}^2\ y_t + u_t$$

$$y_{t+1} = y_t + (\mu_t^y + \sigma_t^y) y_{t-1} + h\ \overline{\pi}^2\ \pi_t + v_t$$

More simply;

$$a_1\zeta_{t-1} + c_1 + a_2 E(X_{t+1}) = 0 \tag{15}$$

$$X_{t+1} = X_t + a_3 X_{t-1} + \gamma\ \zeta_{t-1} + \varepsilon_t \tag{16}$$

$$\pi_{t+1} = \pi_t + a_4\pi_{t-1} + a_5 x_t + a_6 y_t + u_t \quad (17)$$

$$y_{t+1} = y_t + a_7 y_{t-1} + a_8\pi_t + v_t \quad (18)$$

So that,

$$2\psi = a_1 \qquad (\mu_t^{\pi} + \sigma_t^{\pi}) = a_4$$

$$2\delta\alpha_{\delta}\beta\gamma(\bar{x}-\rho)^{2\delta-1} = c_1 \qquad q\,\bar{x}^2 = a_5$$

$$2\delta\alpha_{\delta}\beta\gamma(2\delta-1)(\bar{x}-\rho)^{2\delta-2}\,\bar{x} = a_2 \qquad f\,\bar{y}^2 = a_6$$

$$(\mu_t^{x} + \sigma_t^{x}) = a_3 \qquad (\mu_t^{y} + \sigma_t^{y}) = a_7$$

$$h\bar{\pi}^2 = a_8$$

To get to the recursive equilibrium law of motion, we calculate x_t from equation (16) and then put the result in Euler equation (15):

$$x_t = -\{a_3 x_{t-1} + (\gamma + \frac{a_1}{a_2})\zeta_{t-1} + \frac{c_1}{a_2} + \varepsilon_t\} \quad (19)$$

As mentioned earlier, the basis of log-linearization is using the Taylor approximation around the steady state. Since variables are taken as log-deviations, coefficients and elasticities are the same. We take as given the exchange rate state variable in the previous period (x_{t-1}), foreign exchange intervention control variable in the previous period (ζ_{t-1}), and realized exchange rate shock at the present time (ε_t). Using the recursive equilibrium law of motion of exchange rate (19), elasticities substitution can be calculated. Current exchange rate elasticity with respect to the past one is:

$$\frac{\partial x_t}{\partial x_{t-1}} = -a_3 = -(\mu_t^{x} + \sigma_t^{x})$$

Here, $(\frac{\partial x_t}{\partial x_{t-1}})$ is a function of exogenous economic pressures (such as the pressure of financing the government general budget), (μ_t^{x}), and the exogenous fluctuation of the exchange rate due to other economic variables (σ_t^{x}), such as the oil price fluctuations in the international markets. Exogenous economic pressures are upward and downward pressures on the exchange rate. The mentioned elasticity could either be positive or negative, depending on the exogenous economic pressures on the exchange rate and the exchange rate fluctuations. If the elasticity is positive, the economy faces an appreciation of the country's exchange rate which spills over to the exchange rate of the following period. On the other hand, if the elasticity is negative, the economy encounters currency depreciation. In other words, the elasticity between the exchange rates of two consecutive periods, ceteris paribus, depends on the revaluatory or devaluatory pressures of the exchange rate and the exogenous fluctuations of the exchange rate.

Based on the recursive equilibrium law of motion of the exchange rate (19), exchange rate elasticity substitution with respect to foreign exchange intervention is:

$$\frac{\partial x_t}{\partial \zeta_{t-1}} = -(\gamma + \frac{a_1}{a_2}) = -\gamma - \frac{2\psi}{2\delta\alpha_{\delta}\beta\gamma(2\delta-1)\,(\bar{x}-\rho)^{2\delta-2}\bar{x}}$$

Exchange rate elasticity substitution with respect to foreign exchange intervention of the previous period depends on various parameters; inter alia, the effect of foreign exchange intervention on the exchange rate (γ), the relative weight given by the Central Bank to exchange rate fluctuations from the target (α_{δ}), exchange rate target of the Central Bank (ρ), different effects of upward and downward foreign exchange rate deviations from the target $(\delta = \pm 1)$, the cost factor of exchange rate intervention (ψ), the stochastic discount factor of Central Bank costs (β), and exchange rate in the steady state of the economy $(\bar{x})$. If Central Bank costs (exchange rate, inflation rate, output fluctuations, and the costs of foreign exchange intervention) are discounted with a higher factor, exchange rate elasticity with respect to the exchange rate intervention of the previous period is lower. If the effectiveness of foreign exchange market intervention is larger, this elasticity is larger too. If the

cost factor of foreign exchange intervention is larger, the elasticity is larger as well. Based on (19), supposing that no shock happens to the economy ($\varepsilon_t = 0$), and the Central Bank is aiming at determining the exchange rate at this moment and without any presupposition, the exchange rate at time zero, i.e., the exchange rate excluding the shocks and the effect of state and control variables of the previous period, will be:

$$x_{t=0} = -\frac{c_1}{a_2} = -\frac{2\delta\alpha_\delta\beta\,\gamma(\bar{x}-\rho)^{2\delta-1}}{2\delta\alpha_\delta\beta\,\gamma(2\delta-1)\,(\bar{x}-\rho)^{2\delta-2}\,\bar{x}} = \frac{-(\bar{x}-\rho)}{(2\delta-1)\bar{x}}$$

The exchange rate at time zero depends on the equilibrium exchange rate or the steady state $(\bar{x})$, exchange rate target of Central Bank (ρ), and the different effects of upward and downward foreign exchange rate fluctuations from the target $(\delta = \pm 1)$.

To come up with a numerical solution to this problem, what we need is the exact information about the value of the parameters such as $a_{i=1}^{8}$. Since the value of these parameters in the Iranian economy is unknown and just few parameters are found in other research documents, calibration cannot be applied. Furthermore, utilization of parameters estimated from similar models is not suitable to the economy of Iran, as these parameters need to be estimated from the beginning, with due consideration of the oil-reliant economy of this country. For instance, the relative weight given by the government to the exchange rate fluctuations or the one given to the inflation rate fluctuations against the output fluctuations depends on the monetary and fiscal policies of the government at any moment. Therefore, finding a numerical solution to this problem requires studies which can find the parameters of this model as regards the economic conditions of Iran.

Based on the recursive equilibrium law of motion of the exchange rate (19) and $E(\varepsilon_{t+1}) = 0$, the optimal volume of foreign exchange intervention in the market is merely a function of the exchange rate targeted by the government for the next period (future time), the exchange rate at present, and a constant as intercept:

$$\zeta_t = \frac{-a_2}{a_1 + a_2\gamma} x_{t+1} - \frac{a_2 a_3}{a_1 + a_2\gamma} x_t - \frac{c_1}{a_1 + a_2\gamma} \tag{20}$$

Ceteris paribus, intervention of the monetary authority in the market is carrried out based on the expected exchange rate (x_{t+1}). Due to the monopoly power of the government in the exchange market, the volume of foreign exchange intervention depends on the level the government attempts to maintain the foreign exchange rate in the next period. This is attributable to the fact that foreign exchange intervention affects the exchange rate both at present and in the future. In other words, elasticity of the foreign exchange intervention with respect to the exchange rate of the next period and elasticity of the foreign exchange intervention with respect to the exchange rate of the present period are:

$$\frac{\partial\zeta_t}{\partial x_{t+1}} = -\frac{a_2}{a_1 + a_2\gamma}$$

$$\frac{\partial\zeta_t}{\partial x_t} = -\frac{a_2 a_3}{a_1 + a_2\gamma}$$

Comparing these two relations indicates that the effect of the present exchange rate on the volume of intervention is more than the effect of the exchange rate in the future period. In fact, the effect of the present exchange rate on the volume of intervention, resulting from the exogenous economic pressures (pressure of the financing of the government budget), as well as exogenous economic fluctuations due to other factors, is higher than the effect of the exchange rate in the next period. Obviously, the exchange rate in Iran is not solely determined on the basis of the market mechanisms; therefore, the determinant of the volume of intervention by the monetary authority at the present time is the level that the government attempts to keep the exchange rate at present and in the future. This is due to the fact that in the Iranian economy, the government is traditionally the main supplier of foreign exchange to the market. The present and future levels of the exchange rate depend on the government budget expenditures and the government foreign exchange expenditures. This in turn depends on the government size and its reliance on foreign exchange revenues received from the sale of the national wealth. The elasticities are in fact indicative of the fact that the exchange rate in Iran is a short-term policy instrument at the disposal of the competent authorities whereas it should be a key rate emanating from the economy and the performance of the forces involved in it.

According to the Uhlig program and equations (15) and (18), the inflation rate is:

$$\pi_t = \pi_{t-1} + (a_4 + a_8 a_6)\pi_{t-2} - a_5 a_3 x_{t-2} - a_5(\gamma + \frac{a_1}{a_2})\zeta_{t-2} - \frac{a_5}{a_2} c_1 - a_5 \varepsilon_{t-1} + a_6 y_{t-2} + a_6 a_7 y_{t-3} + a_6 v_{t-2} + u_{t-1} \quad (21)$$

Inflation at the present time (π_t) is a function of the inflation of the previous period (π_{t-1}), inflation of two periods before (π_{t-2}), the exchange rate of two previous periods (x_{t-2}), volume of foreign exchange intervention in two previous periods (ζ_{t-2}), output in two previous periods (y_{t-2}), output in three previous periods (y_{t-3}), exchange rate shock of the previous period (ε_{t-1}), inflation shock of the previous period (u_{t-1}), and the output shock of two previous periods (v_{t-2}). It is of special note that the exchange rate of the previous period, output of the previous period, and the volume of the foreign exchange intervention of the previous period show its own effect through the increase in the inflation rate. Moreover, the exchange rate of the previous period exists in the foreign exchange intervention variable of two previous periods. Output rate of the previous period shows itself in inflation variable of the previous period. Therefore, they are not directly included in the above equation.

The exchange rate is a key macroeconomic indicator which has a significant effect on the inflation. In the economic literature, the exchange rate affects the inflation through three channels. First is the direct channel by which the exchange rate influences the prices of imported goods such as raw materials and intermediate goods used for domestic production, with a short time lag. Meanwhile, it indirectly affects the domestic prices of local goods competing with their imported counterparts through arbitrage. When the share of import in GDP is high, the reliance of the economy on imports is high as well; therefore, this channel will be stronger. In other words, due to the high share of import in GDP, the level of prices will be further affected by the exchange rate.

The second channel is indirect where exchange rate changes, ceteris paribus, affect the real exchange rate. This will in turn affect the economy through the aggregate demand and the output gap. With depreciation of the domestic currency, domestically produced goods and exports will be supplied to the foreigners at lower prices, leading to an expansion in the exports and aggregate demand compared with the potential output over the short run. Depreciation of domestic currency causes price level to rise. Since nominal wages are rigid in short term, real wages will decline and the output will surge. Besides these channels, there is an expectation channel based on which, continuous exchange rate fluctuations lead to the adjustment of public expectations regarding prices, as well as a growth in exchange rate pass-through effect on the inflation. There is a higher correlation between inflation and the rise in the nominal exchange rate in uncertain monetary conditions by which nominal shocks lead to high inflation and currency depreciation.

Therefore, based on the Uhlig program and equations (15) through (18), output variable is calculated as follows:

$$y_t = y_{t-1} + (a_7 + a_8 a_6) y_{t-2} + a_8 \pi_{t-2} + a_8 a_4 \pi_{t-3} + a_8 a_5 x_{t-2} + a_8 u_{t-2} + v_{t-1} \quad (22)$$

Output level at present time (y_t) depends on the output of the previous period (y_{t-1}), output of two previous periods (y_{t-2}), inflation of two previous periods (π_{t-2}), inflation of three previous periods (π_{t-3}), exchange rate of two previous periods (x_{t-2}), inflation shock of two previous periods (u_{t-2}), and output shock of the previous period (v_{t-1}). Exchange rate and inflation shock of the previous period affect output through inflation. In other words, output at present time depends on the exchange rate and inflation in addition to output in previous periods.

Rise in the exchange rate and inflation will each lead to an increase in marginal cost of production, causing uncertainty in production. Therefore, in order to maintain output at full employment level, it is deemed essential that parameters such as exchange rate and inflation should enjoy admissible stability and output institutional weaknesses should be taken into consideration.

Based on the designed model, inflation, in addition to its lags, is a function of exchange rate and the level of domestic output. Therefore, inflation targeting policy could help trigger the output and stabilize the exchange rate. Precluding the uncontrollable growth of liquidity is a prerequisite to the curbing of inflation. In the Iranian economy, government budget policies are a significant factor behind the rise in liquidity. Since the government general budget is strongly dependent on oil revenues, the Central Bank will inevitably have to finance the budget (in Rials) through the exchange of dollars received from the sale of oil. Due to the lack of capacities in the economy to absorb the foreign exchange received from the sale of oil, the Central Bank eventually enters the market to purchase the excess demand of foreign currency. If the composition of government foreign exchange

revenues and expenditures is revised and the reliance of the general budget on the revenues received from the sale of the national wealth decreases, foreign exchange intervention based on the exchange rate financing the budget will not occur, thereby reducing the pressure on the exchange rate.

6. Conclusion

The present article pioneers the designing of a theoretical model for the determination of the optimal foreign exchange intervention in the Iranian market. The model used in this article is a nonlinear dynamic programming model with stochastic continuous functions to solve which the Uhlig program has been used. The result of the model's solution indicates that determining the best volume of intervention depends on the economic objectives of policymakers, the exchange rate of the present time, and the future exchange rate expected by the monetary authorities. Due to the monopolistic condition of the government in the foreign exchange market, the volume of the foreign exchange intervention in the market depends on the level the government is trying to keep the exchange rate at the present time as well as the next period. This is attributable to the fact that foreign exchange intervention affects the exchange rate of both the present time and the future.

Results of the model depict that the exchange rate elasticity at the present time with respect to the exchange rate of the previous period is a function of exogenous economic pressures (such as financing the government general budget), and the exogenous fluctuations of the exchange rate due to other economic variables namely, the oil price fluctuations in international markets. By and large, vulnerability of the exchange rates of two consecutive periods, ceteris paribus, depends on the upward and downward pressures of the exchange rate and the exogenous fluctuations of the exchange rate.

Elasticity of the exchange rate with respect to the foreign exchange intervention of the previous period depends on a host of parameters including the coefficient of the effect of foreign exchange intervention on the exchange rate, the relative weight given by the Central Bank to exchange rate deviations from the exchange rate target, Central Bank exchange rate target, different effects of the exchange rate deviations above and below the exchange rate target, cost factor of the foreign exchange intervention, discount rate of Central Bank costs, and the volume of the exchange rate in the steady state. If Central Bank costs (costs of fluctuations of exchange rate, inflation rate, output, and then foreign exchange intervention) are discounted with a higher rate, exchange rate elasticity with respect to foreign exchange intervention of the previous period will be lower. If effects of foreign exchange intervention are high, the elasticity is high as well. If the cost factor of exchange rate intervention is higher, the elasticity is higher too.

Findings indicate that the effect of the exchange rate of the present period on the volume of intervention is more than the effect of the exchange rate of the next period. In other words, the effect of the present exchange rate on the volume of intervention depends on the exogenous economic pressures (pressures of financing of government general budget) and exogenous economic fluctuations due to other factors are higher than the effect of the exchange rate of the next period. The determinant of the volume of foreign exchange intervention by the monetary authority at the present period is the government budget which in turn depends on government foreign exchange expenditures in the economy.

Findings of the model are also indicative of the fact that current inflation rate, in addition to previous inflation rates, depends on the exchange rate, volume of foreign exchange intervention, output, and shocks in the economy. Output at the present period, in addition to the output of the previous periods, depends on the exchange rate, inflation rate, and inflationary and output shocks, at the same time. Therefore, in order to raise the amount of output, exchange rate and inflation are the two key variables which need to be taken into account on top of output institutional weaknesses. Rise in the exchange rate and inflation can each be a contributing factor to the increase in the costs of production and rise of uncertainty. As a result, to keep output at a certain level, economic fundamentals, particularly exchange rate and inflation, need to be stable.

As mentioned earlier, to find a numerical solution to this problem, the exact value of parameters must be known. This can either be achieved by extraction from the reference models or calculated specifically for the Iranian economy. The former is not really plausible in the economy of Iran. This being the case, it is advisable that studies be conducted with the aim of calculating the parameters of this model, considering the specific economic condition of Iran. This is the undertaking the future studies can take care of the problem.

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Note

Note 1. In mathematics, a function E defined on some set X with real or complex values (Metric Space) is called bounded, if the set of its values is bounded. In other words, there exists a real number M < ∞ and the point q in set X such that $d(p,q)\langle M$ for all p in E.

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The Determinants of Rating Announcements Impact on Stock Markets during Crisis Periods: The Case of the 2008 Worldwide Financial Crisis

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Abstract

Identifying the determinants of rating impact on stock markets during crisis periods allows on the one hand, explaining investors' behavior towards rating agencies, and on the other hand expecting their reaction to a rating announcement. This research reviews factors previously studied and adds three new ones: the announcement anticipation, the double rating and the foreign investors' presence in firm' shareholding. We use an event study methodology to determine the short term impact of rating announcements of 207 U.S. firms during the 2008 worldwide financial crisis. Significant reaction is measured by the cumulative abnormal return of the stock price after the rating announcement. Then, we regress the measured cumulative return on several factors related to the rating change and the rated firm.Results show that a bad rating impact on stock markets during crisis period is influenced by the anticipation of the announcement, the downgrade magnitude and firms' sizes. Good rating announcements are conditioned by the initial rating level, the upgrade magnitude and firms' sectors. Reaction to assertions only depends on anticipation and institutional presence.

Keywords: crisis, determinants, event study, rating impact

1. Introduction

Identifying the determinants of rating announcements on financial markets allows on the one hand explaining investors' behaviour towards rating agencies, and on the other hand expecting their reaction to a rating announcement.

Previous researches showed that investors tend to overreact to bad rating announcements during crisis period and to neglect good and neutral ones (Griffin & Sanvicente, 1982; Hand Holthausen & Leftwich, 1992; Boudriga, Azouz, & Mamoghli, 2011). Specifically, they react more intensively to bad and neutral expected announcements. On the contrary, good news have a more important impact when they are unexpected. Otherwise, the determinants of investors' reaction to rating announcements on stock markets have not been exhaustively studied. In fact, previous researches focused only on the influence of few factors on rating impact.

As far as we know, this research is the first one to consider all the determinants that have been studied in previous researches. Moreover, this paper considers three additional factors that could be powerful during crisis period. These new factors are the announcement anticipation, the notation type (double or single rating) and foreign investors' presence in firms' shareholdings.

First, we focus on anticipation factor. We previously found that reaction to rating announcements changes whether they are expected or not (Hand et al., 1992; Purda, 2007; Boudriga & Azouz, 2013). Indeed, difference of reaction between expected and surprise rating is of 1 day for neutral announcement. It becomes of 4 days after bad announcements. As regards good rating news, a significant difference is observed 1 day before the announcement. Investors react more to surprise upgrades than expected ones. Considering the investors' faith loss towards rating agencies, it seems that investors react more intensively to expected announcements that they have well studied than surprise changes.

Second, we consider the influence of double rating on investors' decisions. Investors know that double notation alleviates the conflicts of interests between rating agencies and rated firms. Therefore, double ratings have more impact than single ones (Micu, Remonola, & Wooldridge, 2004).

Finally, we introduce the foreign investors' presence in firms' shareholdings as a potential determinant due to the asymmetry information between local and foreign investors. The latter(s) lack informations as compared to local investors. Consequently, they tend to react intensively to rating news, which causes significant impacts on stock prices.

We use an event study methodology to determine the short term impact of rating announcements of 207 U.S. firms during the 2008 worldwide financial crisis. Significant reaction is measured by the cumulative abnormal return (CAR) of the stock price after the rating announcement. Then, we regress the measured cumulative return on several factors related to the rating change and the rated firm.

Our results show that the impact of bad rating news during the crisis period is influenced by the announcement anticipation, the rating magnitude and firms' size. Good announcements are conditioned by the initial rating level and firms' sector. Reactions to assertions depend only on anticipation criterion.

The remainder of the paper is organized as follows. Section 1 reviews literature on explanatory factors of rating impact. Section 2 develops hypotheses related to rating impact determinants. Section 3 describes the methodology and data employed. Section 4 provides empirical results while section 5 concludes.

2. Literature Review

Existing literature shows ambiguous results related to the determinants of market reaction to rating announcements during stable periods.

Hand et al. (1992) indicate that the impact of rating announcements on bond and stock prices depends on the initial rating level, the change of rating class (speculative/ investment grade), the rating magnitude and the period separating two successive ratings. Schweitzer, Szewczyk and Varma (1992) show that financial and banking securities are more sensible to rating announcements than non financial ones. In fact, financial and bank institutions do not reveal bad news in order to maintain order and stability on markets. Consequently, rating agencies provide investors with bad unknown news that generate strong negative impact on prices. These results corroborate those of Gropp and Richards (2001) and Bonini, Pettinato and Salvi (2009). However, they are in contradiction with those of Sunder (1991) who highlights that rating impact on stock markets is independent of any factor. Ederington and Goh (1993) show that the origin of rating change influences market reaction. Unlike rating changes caused by the deterioration of financial indicators which are rejected by the market, rating changes resulting from the firm leverage increase are well perceived by stock markets. Nayar and Rozeff (1994) corroborate these results. In fact, authors found that rating impact on stock markets is influenced by the initial rating level and the firm level leverage. Dichev and Piotroski (2001) and John, Ravid and Reisel (2005) point out that market reaction to rating announcements is dependent upon these factors and also the firm size and status (holding or subsidiary). Micu et al. (2004) work on the rating impact on CDS prices. They found that double and triple ratings have higher impact than single ones. Also, investors' reactions are tenacious when securities are speculative and belong to small firms. Halek and Eckles (2010) advance that bad news generate stronger reaction than good ones. Reaction depends on downgrade magnitude and institutional investors' presence in firms' shareholdings. Creighton et al. (2007) study the impact of rating announcements on Australian market. They find that ratings impact especially small and low rated firms. Linciano (2008) finds that Italian stock market intensely responds to ratings of financial firms. Avramov, Chordia, Jostova and Philipov (2009) make clear that the determinants of the rating impact on stock prices are firm size, leverage, financial performance, presence of institutional investors on shareholding, rating magnitude and the initial level of rating.

Announcement anticipation, rating type and presence of foreign investors in shareholding, have not yet been considered as determinants of rating impact on stock markets. Hand et al. (1992) and Di Cesare (2006) find that investors react differently to rating announcements whether they are expected or not. Theoretically, surprise announcements have greater effects on stock prices than expected ones. Indeed, they vehicle unknown informations to investors. On the contrary, Purda (2007) highlights the same impact for both rating types. Consequently, the anticipation influence on rating impact deserves to be studied during crisis period.

Considering rating type, Raimbourg (1990) demonstrates that double ratings are more credible than single ones. In fact, investors are aware of interest conflicts between rating agencies and firms. Due to paid fees, rating agencies tend to be complacent in rating firms. Therefore, double ratings allow alleviating these conflicts and having more impact on stock prices than single ones.

Finally, Frankel and Schmukler (1996, 1998a) advance that asymmetry information makes foreign investors more conservative when making their investment decisions. However, refer to Karolyi (2002); foreign presence has no effect on stock prices by cause of the small foreign participation in firms' shareholding.

2.1 Hypotheses

Taking into account the above literature review, we will work in the empirical part of the paper with the following hypotheses.

(1) Investors during crisis period respond more intensively to expected announcements than surprise ones.

(2) Investors care more about speculative than investment grade securities during crisis period.

(3) The impact of rating announcements on stock prices is greater when it changes securities from investment to speculative grade or *vice versa*.

(4) Investors' reaction to rating announcements during crisis period is an increasing function of the rating change magnitude.

(5) Double ratings have stronger effects on stock prices than single ones.

(6) Rating announcements of financial securities have more impact on stock prices than non financial ones.

(7) Investors respond to big firm ratings more than they do to small ones due to potential losses incurred by big firms.

(8) The most indebted firms ratings have greater impact on stock prices than less leveraged ones.

(9) Investors' reaction to rating announcements during crisis period is an increasing function of firm financial performance.

(10) Rating impact on stock price is an increasing function of institutional investors' presence in shareholding.

(11) Rating effect on stock price is an increasing function of foreign investors' presence in shareholding.

3. Data and Methodology

3.1 Data

We collect 207 rating announcements from Moodys and Standard and Poors. The period extends from 16th September to 31st December 2008. It coincides with the beginning of the 2008 worldwide financial crisis. We separate between bad news such as downgrades and revisions to downgrades, good news such as upgrades and revisions to upgrades and assertions or neutral news. Our data sources are the agencies websites and Compustat North America database.

Table 1. Descriptive statistics of the sample

News	*Bad*	*Good*	*Assertions*
Number	141	14	52
%	68.1	6.8	25.1
Total		**207**	

The firms sample contains different sectors: energy, textile, chemical, automobile, metallurgy, food and catering, health, technology, telecommunications, property development, services including transport, advertising and various consumption (leisure, drugstore, and cosmetics) and financial activities such as banks, insurance and investment companies.

Table 2. Businesses' firms of the sample

Businesses / News		*Bad*	*Good*	*Neural*
Industry	Energy (%)	6 *(4.3)*	2 *(14.3)*	3 *(5.7)*
	Textile (%)	5 *(3.5)*	0 *(0)*	0 *(0)*
	Chemistry (%)	1 *(0.7)*	0 *(0)*	2 *(3.8)*
	Automotive (%)	6 *(4.3)*	0 *(0)*	1 *(1.9)*
	Other (%)	9 *(6.4)*	2 *(14.3)*	8 *(15.5)*

Metallurgy (%)		4 *(2.8)*	1 *(7.1)*	1 *(1.9)*
Food and Catering (%)		14 *(9.9)*	0 *(0)*	1 *(1.9)*
Health (%)		8 *(5.7)*	2 *(14.3)*	3 *(5.7)*
Technology and Telecommunications (%)		13 *(9.2)*	1 *(7.1)*	7 *(13.5)*
Real Estate (%)		6 *(4.2)*	0 *(0)*	1 *(1.9)*
Services (Transportation, Advertising) (%)		7 *(5)*	1 *(7.1)*	2 *(3.8)*
Various consumption (Leisure, drugstore, cosmetics) (%)		16 *(11.3)*	2 *(14.3)*	2 *(3.8)*
Finance	Bank (%)	10 *(7)*	2 *(14.3)*	2 *(3.8)*
	Insurance (%)	4 *(2.8)*	0 *(0)*	0 *(0)*
	Investment (%)	32 *(22.9)*	1 *(7.1)*	19 *(36.8)*
Total		**141**	**14**	**52**

Table 3. Descriptive statistics of firms

Thousands$	*Mean*	*Median*	*Maximum*	*Minimum*	*Standard Error*
Total Assets	88813,7	5870,5	2187631	299,6	309454,6
Total liabilities	81640,2	3626,3	2074033	99,8	292758
Long terme debt	17661,2	1152,7	427112	0	59203
Equity	7170,3	1568,2	133176	-56970	19104,7
Net income	58,9	17,8	8915	-15471	1953

3.2 Methodology

First, we use an event study to measure the market reaction to rating news. It consists of calculating stock cumulative abnormal return before and after a rating announcement. The event window extends on 20 days symmetrically set around the day announcement (day 0). Cumulative abnormal returns are calculated by two models: the stock index adjusted model and the market adjusted model.

Moreover, rating announcements are subdivided according to whether they are expected or not. Expected announcements are preceded by a significant cumulative abnormal return on 120 days preceding the day announcement (Di Cesare, 2006).

3.2.1 Construction of Variables

Endogenous variable is the stock cumulative abnormal return (noted car) calculated on 10 days succeeding the announcement. The following explanatory variables are retained:

- The announcement anticipation (noted ant): a binary variable equal 1 if the announcement is expected, 0 otherwise.
- The initial level of rating (noted nin): a binary variable equal 1 if the equity is speculative, 0 otherwise.
- Class change of rating (noted cc1): a binary variable equal 1 if the announcement changes the equity rating class from investment to speculative or *vice versa*, 0 otherwise
- Rating change magnitude (noted amp): a quantitative variable calculated as the number of grades changed (new rating less old rating).
- Double notation (noted dn): a binary variable equal 1 if a firm is doubly rated by two agencies within a short space of time (Note 1), 0 otherwise.
- Firm business sector (noted sa): a binary variable equals 1 if the firm belongs to financial sector : banks, insurance or investment companies, 0 otherwise.
- Firm size (noted lntaille): a quantitative variable calculated as the natural logarithm of firm's total assets.
- Firm leverage (noted ne1): a quantitative variable calculated as the ratio of long term debt relative to total assets. To check the robustness of the leverage variable, we replace it in a second time by *ne2* representing the leverage ratio: total debt relative to equity.
- Financial performance (noted roe): a quantitative variable (return on equity) calculated as the ratio of net income to equity. To test the robustness of the financial performance, we replace it in a second time by *pbv* (price book value).

- Institutional investors' presence (noted nbre_ii): a quantitative variable calculated as the proportion of shares held by institutional investors. We replace it in a second time by *nbre_ii* computed as the proportion in number of institutional investors.

- Foreign investors' presence (noted nbre_ie): a quantitative variable calculated as the proportion of shares held by foreign investors. We replace it in a second time by *nbre_ie* computed as the proportion in number of foreign investors.

3.2.2 Explanatory Models

Bad news: we use least ordinary squares regression to construct a linear model. Structural variables concern rating announcements. Control variables (noted fc) involve firms' characteristics (business, size, leverage, financial performance, institutional investors' presence, foreign investors' presence).

$$CAR_j = \propto_0 + \beta_1 * ant + \beta_2 * nin + \beta_3 * \mathrm{cc}_{1(2)} + \beta_4 * amp + \beta_5 * dn + \beta_6 * fc + \varepsilon$$

We construct the variables correlation matrix and use the Variance Inflation Factors (*VIF*) to detect whether collinearity exists between variables and heteroscedasticity between errors.

Good news: As regard the little size of good news sample, we just establish the correlation matrix and perform the Chi square independence test between the cumulative abnormal return and qualitative variables of ratings and firms. Otherwise, we calculate the Spearman's rank correlation coefficient to measure dependence between endogenous variable and quantitative explanatory variables.

Neutral news or assertions: we use least ordinary squares regression to construct a linear model. We omit some structural variables related to rating due to the neutral nature of assertions. These variables are: the magnitude (assertions have no magnitude) and the rating class change (assertion maintains security in the same class).

$$CAR_j = \propto_0 + \beta_1 * ant + \beta_2 * nin + \beta_3 * dn + \beta_4 * fc + \varepsilon$$

4. Empirical Results

4.1 Bad News

The Variance Inflation Factors test invalids the presence of multicollinearity between independent variables. Also, the correlation matrix (Note 2) allows eliminating the existence of significant correlations between these variables.

Table 4. VIF test results: explanatory variables of market reaction to bad rating news during crisis period

Variables	*ant*	*nin*	*cc1*	*amp*	*dn*	*sa*	*pbv*	*ii*
VIF	1.43	1.90	1.14	1.23	1.19	1.99	1.27	1.51
Variables	*nbre_ii*	*ie*	*nbre_ie*	*ne1*	*ne2*	*lntaille*	*roe*	***MeanVIF***
VIF	1.69	2.23	2.54	1.29	1.11	2.07	1.29	1.59

Note. ant: anticipation criterion, nin:rating initial level (speculative or investment grade); cc (1): rating change class (from investment grade to speculative); amp: change amplitude; dn: double rating; sa: business firm (financial and banking or not); pbv: price book value; ii: institutional investors' presence in shareholding in terms of monetary values; nbre_ii: institutional investors' presence in shareholding in terms of shareholders number; ie: foreign investors' presence in shareholding in terms of monetary values; nbre_ie: foreign investors' presence in shareholding in terms of shareholders number; ne1: total debt / total assets; ne2: total debt / equity; lntaille: natural logarithm of total assets; roe: return on equity (Net income /equity).

In model I, we first regress the cumulative abnormal return on rating factors. In model II, we add the firm sector and size as control variables. We find that anticipation, magnitude and firm size remain significant. Also, results are the same when introducing other control factors, such as pbv (model III), roe (model IV), ne1 (model V) and ne2 (model VI), ii (model VII), nbre_ii (model VIII), ie (model IX), and nbre_ie (model X), and when replacing the endogenous variable CAR_1 by CAR_2 (Note3).

Table 5. Correlation matrix of endogenous and exogenous variables relative to bad rating news during crisis period

	car1	*car2*	*ant*	*nin*	*cc1*	*cc2*	*amp*	*dn*	*Sa*	*pbv*	*ii*	*nbre_ii*	*ie*	*nbre-ie*	*ne1*	*ne2*	*lntaille*	*roe*
car1	1	0.07	-0.07	0.07	-0.03	0.09	- 0.08	0.08	0.12	-0.05	- 0.32	0.08	-0.06	0.33	-0.02	0.09	0.27	0.16
car2		1	-0.15	-0.04	-0.09	-0.06	0.03	-0.01	0.19	-0.12	-0.03	0.02	-0.10	0.05	-0.07	0.04	0.22	0.12
Ant			1	0.20	0.00	0.01	0.13	0.01	-0.28	-0.13	-0.05	0.08	0.26	0.07	0.15	-0.12	-0.14	-0.24
Nin				1	-0.13	0.13	0.25	0.06	-0.45	-0.22	-0.20	-0.28	-0.12	-0.19	0.31	-0.09	-0.49	-0.22
cc1					1	0.33	0.16	0.07	0.02	-0.10	0.08	0.01	0.03	0.00	0.09	0.06	-0.03	0.03
cc2						1	0.21	-0.02	0.08	-0.10	-0.04	0.07	0.09	0.12	0.10	0.15	0.05	-0.02
Amp							1	-0.19	-0.13	0.01	0.06	-0.07	-0.01	-0.06	0.21	-0.00	-0.17	-0.00
Dn								1	-0.10	-0.11	-0.14	0.04	0.10	0.02	0.13	-0.08	0.05	0.08
Sa									1	-0.15	-0.01	0.16	0.05	0.18	-0.24	0.24	0.58	0.14
Pbv										1	0.14	0.11	-0.07	-0.07	0.03	-0.02	0.00	0.07
ii											1	0.40	-0.09	-0.13	-0.07	-0.07	0.06	0.17
nbre_ii												1	0.22	0.35	-0.03	0.02	0.33	0.06
ie													1	0.68	-0.02	0.00	0.13	0.12
nbre-ie														1	-0.17	0.05	0.33	0.17
ne1															1	-0.10	-0.24	-0.20
ne2																1	0.15	-0.06
lntaille																	1	0.26
roe																		1

Note. CAR (1 2) cumulative abnormal return 4 days following the announcement, relative to stock adjusted model (1) or market adjusted model (2); ant: anticipation criterion, nin: rating initial level (speculative or investment grade); cc (1): rating change class (from investment grade to speculative); amp: change amplitude; dn: double rating; sa: business firm (financial and banking or not); pbv: price book value; ii: institutional investors' presence in shareholding in terms of monetary values; nbre_ii: institutional investors' presence in shareholding in terms of shareholders number; ie: foreign investors' presence in shareholding in terms of monetary values; nbre_ie: foreign investors' presence in shareholding in terms of shareholders number; ne1: total debt / total assets; ne2: total debt / equity; lntaille: natural logarithm of total assets; roe: return on equity (Net income /equity).

Table 6. Bad news determinants during crisis period: results of CAR1 regression on rating characteristics with introduction of firm business and firm size

	Model I		Model II	
Variables	*Coef.*	*P-Val*	*Coef.*	*P-Val*
ant	-0,152	0,030**	-0,142	0,046**
nin	-0,064	0,369	0,028	0,729
cc1	-0,171	0,176	-0,140	0,265
amp	0,045	0,223	0,047	0,197
dn	-0,004	0,945	-0,010	0,875
sa			0,045	0,621
lntaille			0,037	0,092*
Const.	-0,081	0,240	-0,497	0,023**
Adjusted R^2	0,02		0,05	
Nb.Observations	139		139	

Note. ***, ** and * denote significance at 1%, 5% and 10%.

Table 7. Bad news determinants during crisis period: results of CAR1 regression on rating characteristics with introduction of financial performance and indebtedness

	Model III		Model IV		Model V		Model VI	
Variables	*Coef.*	*P-Val*	*Coef.*	*P-Val*	*Coef.*	*P-Val*	*Coef.*	*P-Val*
ant	-0,154	0,034**	-0,141	0,052*	-0,139	0,053*	-0,148	0,038**
nin	0,003	0,971	0,028	0,726	0,040	0,625	0,032	0,691
cc1	-0,157	0,215	-0,140	0,267	-0,131	0,298	-0,129	0,304
amp	0,050	0,172	0,047	0,202	0,052	0,164	0,048	0,194
dn	-0,172	0,800	-0,010	0,874	-0,002	0,970	-0,015	0,814

sa	0,018	0,845	0,045	0,619	0,040	0,655	0,061	0,502
lntaille	0,038	0,088*	0,037	0,098*	0,037	0,010*	0,039	0,081*
pbv	-0,023	0,364						
roe			0,005	0,944				
ne1					-0,127	0,409		
ne2							-0,002	0,252
Const.	-0,426	0,065*	-0,495	0,024**	-0,466	0,035**	-0,505	0,020*
Adjusted R^2	0,05		0,04		0,04		0,05	
Nb.Observations	139		139		139		139	

Note. ***, ** and * denote significance at 1%, 5% and 10%.

Table 8. Bad news determinants during crisis period: results of CAR1 regression on rating characteristics with introduction of shareholding structure (institutional and foreign investors' presence)

	Model VII		Model VIII		Model IX		Model X	
Variables	*Coef.*	*P-Val*	*Coef.*	*P-Val*	*Coef.*	*P-Val*	*Coef.*	*P-Val*
ant	-0,144	0,044**	-0,135	0 ,061*	-0,116	0 ,120	-0,141	0 ,051*
nin	0,016	0 ,839	0,017	0 ,829	0,015	0 ,845	0,027	0 ,737
cc1	-0,135	0 ,281	-0,140	0 ,265	-0,140	0 ,264	-0,140	0 ,267
amp	0,049	0 ,182	0,048	0 ,194	0,048	0 ,186	0,047	0 ,199
dn	-0,016	0 ,813	-0,008	0 ,899	-0,001	0 ,987	-0,010	0 ,877
sa	0,037	0 ,680	0,042	0 ,645	0,049	0 ,584	0,045	0 ,621
lntaille	0,038	0 ,089*	0,041	0 ,072*	0,039	0 ,082*	0,038	0 ,095*
ii	-0,099	0 ,523						
nbre_ii			-0,290	0 ,474				
ie					-0,181	0 ,231		
nbre_ie							-0,028	0 ,875
Const.	-0,407	0 ,116	-0,263	0 ,500	-0,488	0 ,025**	-0,498	0 ,023**
Adjusted R^2	0 ,04		0 ,04		0 ,05		0 ,04	
Nb.Observations	139		139		139		139	

*Note.****, ** and * denote significance at 1%, 5% and 10%.

Table 9. Bad news determinants during crisis period: results of CAR2 regression on rating characteristics with introduction of firm business and firm size

	Model I		Model II	
Variables	*Coef.*	*P-Val*	*Coef.*	*P-Val*
ant	-0,130	0,088*	-0,111	0,151
nin	-0,037	0,633	0,074	0,400
cc1	-0,165	0,229	-0,132	0,332
amp	0,036	0,372	0,038	0,334
dn	0,013	0,851	0,011	0,880
sa			0,092	0,347
lntaille			0,038	0,116
Const.	-0,042	0,570	-0,495	0,036**
Adjusted R^2	0,00		0,03	
Nb.Observations	139		139	

*Note.****, ** and * denote significance at 1%, 5% and 10%.

Table 10. Bad news determinants during crisis period: results of CAR2 regression on rating characteristics with introduction of financial performance and indebtedness

	Model III		Model IV		Model V		Model VI	
Variables	*Coef.*	*P-Val*	*Coef.*	*P-Val*	*Coef.*	*P-Val*	*Coef.*	*P-Val*
ant	-0,132	0,093*	-0,110	0,162	-0,109	0,159	-0,119	0,124
nin	0,030	0,741	0,074	0,401	0,080	0,374	0,079	0,365
ccl	-0,163	0,234	-0,132	0,333	-0,128	0,350	-0,118	0,386
amp	0,044	0,272	0,038	0,340	0,040	0,315	0,039	0,327
dn	-0,000	0,994	0,010	0,882	0,014	0,842	0,004	0,956
sa	0,046	0,651	0,093	0,348	0,090	0,360	0,115	0,249
lntaille	0,039	0,107	0,038	0,123	0,038	0,122	0,040	0,010*
pbv	-0,040	0,142						
roe			0,005	0,949				
ne1					-0,060	0,720		
ne2							-0,002	0,162
Const.	-0,371	0,136	-0,493	0,039**	-0,480	0,046**	-0,505	0,032**
Adjusted R^2	0,04		0,02		0,02		0,04	
Nb.Observations	139		139		139		139	

*Note.****, ** and * denote significance at 1%, 5% and 10%.

Table 11. Bad news determinants during crisis period: results of CAR2 regression on rating characteristics with introduction of shareholding structure (institutional and foreign investors' presence)

	Model VII		Model VIII		Model IX		Model X	
Variables	*Coef.*	*P-Val*	*Coef.*	*P-Val*	*Coef.*	*P-Val*	*Coef.*	*P-Val*
ant	-0,112	0,150	-0,109	0,161	-0,086	0,287	-0,112	0,152
nin	0,069	0,441	0,072	0,423	0,062	0,480	0,074	0,400
ccl	-0,130	0,340	-0,132	0,333	-0,132	0,331	-0,132	0,333
amp	0,039	0,327	0,038	0,334	0,039	0,320	0,038	0,335
dn	0,008	0,905	0,011	0,876	0,020	0,786	0,010	0,882
sa	0,090	0,368	0,092	0,353	0,097	0,325	0,092	0,350
lntaille	0,038	0,116	0,039	0,120	0,039	0,106	0,037	0,132
ii	-0,040	0,813						
nbre_ii			-0,059	0,893				
ie					-0,171	0,298		
nbre_ie							0,016	0,932
Const.	-0,458	0,103	-0,447	0,294	-0,486	0,040**	-0,494	0,037**
Adjusted R^2	0,02		0,02		0,03		0,02	
Nb.Observations	139		139		139		139	

*Note.****, ** and * denote significance at 1%, 5% and 10%.

With respect to doubly rated firms, we firstly focus exclusively on first bad announcements from one agency. Then, we consider only the second bad announcements following these first ones.

Table 12. Determinants of first bad announcements during crisis period: Results of CAR1 regression on rating characteristics with introduction of firm business and firm size

	Modèle I		Modèle II	
Variables	*Coef.*	*P-Val*	*Coef.*	*P-Val*
ant	0,078	0,019**	-0,162	0,034**
nin	-0,080	0,298	0,030	0,714
cc1	-0,147	0,276	-0,124	0,348
amp	0,004	0,919	0,008	0,831
dn	0,096	0,189	0,086	0,239
sa			0,071	0,461
lntaille			0,048	0,044**

Const.	-0,133	0,075*	-0,665	0,004***
Adjusted R2	0,05		0,10	
Nb.Observations	117		117	

Note. ***, ** and * denote significance at 1%, 5% and 10%.

Table 13. Determinants of first bad announcements during crisis period: results of CAR1 regression on rating characteristics with introduction of financial performance and indebtedness

	Modèle III		Modèle IV		Modèle V		Modèle VI	
Variables	*Coef.*	*P-Val*	*Coef.*	*P-Val*	*Coef.*	*P-Val*	*Coef.*	*P-Val*
ant	-0,176	0,023**	-0,168	0,032**	-0,157	0,041**	-0,167	0,029**
nin	0,005	0,953	0,027	0,750	0,040	0,634	0,034	0,680
cc1	-0,143	0,285	-0,124	0,351	-0,111	0,405	-0,113	0,395
amp	0,013	0,730	0,009	0,816	0,012	0,754	0,008	0,821
dn	0,078	0,283	0,087	0,232	0,092	0,209	0,080	0,272
sa	0,042	0,675	0,068	0,478	0,064	0,502	0,086	0,376
lntaille	0,049	0,042**	0,050	0,042**	0,048	0,048**	0,049	0,040**
pbv	-0,029	0,311						
roe			-0,032	0,692				
ne1					-0,108	0,492		
ne2							-0,002	0,291
Const.	-0,583	0,016**	-0,676	0,004***	-0,640	0,006***	-0,672	0,003***
Adjusted R^2	0,10		0,09		0,09		0,10	
Nb.Observations	117		117		117		117	

Note. ***, ** and * denote significance at 1%, 5% and 10%.

Table 14. Determinants of first bad announcements during crisis period: results of CAR1 regression on rating characteristics with introduction of shareholding structure (institutional and foreign investors')

	Modèle VII		Modèle VIII		Modèle IX		Modèle X	
Variables	*Coef.*	*P-Val*	*Coef.*	*P-Val*	*Coef.*	*P-Val*	*Coef.*	*P-Val*
ant	-0,166	0,030**	-0,150	0,051*	-0,131	0,093*	-0,159	0,037**
nin	0,006	0,942	0,011	0,896	0,017	0,836	0,032	0,703
cc1	-0,109	0,408	-0,124	0,345	-0,126	0,337	-0,133	0,314
amp	0,011	0,771	0,008	0,837	0,007	0,853	0,004	0,914
dn	0,079	0,277	0,094	0,197	0,098	0,177	0,088	0,227
sa	0,054	0,576	0,065	0,495	0,076	0,423	0,072	0,453
lntaille	0,049	0,041**	0,056	0,023**	0,051	0,032**	0,056	0,027**
ii	-0,184	0,232						
nbre_ii			-0,544	0,171				
ie					-0,244	0,109		
nbre_ie							-0,200	0,300
Const,	-0,499	0,061*	-0,236	0,538	-0,663	0,004***	-0,687	0,003***
Adjusted R^2	0,10		0,10		0,11		0,10	
Nb.Observations	117		117		117		117	

Note. ***, ** and * denote significance at 1%, 5% and 10%.

Table 15. Determinants of second bad announcements during crisis period: results of CAR1 regression on rating characteristics with introduction of firm business and firm size

	Modèle I		Modèle II	
Variables	*Coef.*	*P-Val*	*Coef.*	*P-Val*
ant	-0,113	0,140	-0,109	0,168
nin	-0,077	0,307	-0,015	0,859
cc1	-0,203	0,124	-0,186	0,160
amp	0,069	0,083*	0,069	0,084*

dn	-0,054	0,468	-0,060	0,433
sa			0,031	0,748
lntaille			0,026	0,281
Const.	-0,053	0,507	-0,342	0,150
Adjusted R^2	0,03		0,03	
Nb.Observations	117		117	

Note. ***, ** and * denote significance at 1%, 5% and 10%.

Table 16. Determinants of first bad announcements during crisis period: results of CAR1 regression on rating characteristics with introduction of financial performance and indebtedness

	Modèle III		Modèle IV		Modèle V		Modèle VI	
Variables	*Coef.*	*P-Val*	*Coef.*	*P-Val*	*Coef.*	*P-Val*	*Coef.*	*P-Val*
ant	-0,122	0,130	-0,099	0,222	-0,108	0,176	-0,115	0,149
nin	-0,040	0,656	-0,009	0,910	-0,012	0,887	-0,011	0,898
cc1	-0,205	0,127	-0,186	0,162	-0,184	0,169	-0,175	0,186
amp	0,073	0,071*	0,067	0,098*	0,070	0,084*	0,069	0,083*
dn	-0,066	0,389	-0,063	0,408	-0,057	0,459	-0,065	0,392
sa	0,004	0,962	0,034	0,724	0,029	0,761	0,048	0,622
lntaille	0,026	0,280	0,024	0,324	0,026	0,288	0,028	0,259
pbv	-0,027	0,350						
roe			0,048	0,565				
ne1					-0,028	0,860		
ne2							-0,002	0,253
Const,	-0,260	0,303	-0,324	0,178	-0,335	0,165	-0,350	0,140
Adjusted R^2	0,03		0,02		0,02		0,03	
Nb.Observations	117		117		117		117	

Note. ***, ** and * denote significance at 1%, 5% and 10%.

Table 17. Determinants of first bad announcements during crisis period: results of CAR1 regression on rating characteristics with introduction of shareholding structure (institutional and foreign investors' presence)

	Modèle VII		Modèle VIII		Modèle IX		Modèle X	
Variables	*Coef.*	*P-Val*	*Coef.*	*P-Val*	*Coef.*	*P-Val*	*Coef.*	*P-Val*
ant	-0,112	0,161	-0,106	0,187	-0,099	0,230	-0,111	0,163
nin	-0,026	0,765	-0,020	0,816	-0,019	0,820	-0,015	0,854
cc1	-0,182	0,171	-0,186	0,163	-0,185	0,165	-0,190	0,153
amp	0,071	0,078*	0,069	0,085*	0,068	0,089*	0,070	0,080*
dn	-0,062	0,417	-0,057	0,453	-0,056	0,462	-0,061	0,426
sa	0,024	0,807	0,030	0,760	0,033	0,735	0,031	0,745
lntaille	0,027	0,278	0,029	0,260	0,027	0,268	0,020	0,436
ii	-0,092	0,559						
nbre_ii			-0,148	0,717				
ie					-0,077	0,624		
nbre_ie							0,161	0,413
Const.	-0,259	0,348	-0,225	0,574	-0,340	0,154	-0,319	0,183
Adjusted R2	0,02		0,02		0,02		0,03	
Nb.Observations	117		117		117		117	

Note. ***, ** and * denote significance at 1%, 5% and 10%.

Results reveal that during crisis period expected bad rating announcements of big firms and with considerable magnitude have great impact on stock prices. Conversely, market reaction to downgrades is independent of firm financial performance, indebtedness level and shareholding structure. These findings point out once again the crisis faith towards rating agencies. First, expected announcements have stronger impact on stock prices than surprise ones. Investors respond to well thought bad announcements on what their investment decisions were

based more than they do to sudden announcements that only source is rating agencies. Thus, expected rating announcements do not guide investors on investment decisions but seem to strengthen their positions (Norden & Weber, 2004; Di Cesare, 2006). Second, magnitude is significant for repeated downgrades. This result denotes that investors are more sensitive to important successive downgrades during crisis period than slight ones. In fact, downgrade magnitude is a warning sign of firm financial health. Therefore, it seems logical that investors intensively react to downgrades with important magnitudes. The latter determinant of downgrades' impact on stock prices is the firm size. Downgrades have great impact on stock prices of big firms. Indeed, their financial difficulties lead to accentuate the financial market turmoil and to cause huge losses for investors.

4.2 Good News

The correlation matrix (Note 4) combined with independence Chi square test and Spearman correlation coefficient reveal that during crisis the factors explaining good rating announcements effects on stock prices are the initial rating level, the magnitude, the double rating and the firm sector.

Table 18. Correlation matrix of endogenous and exogenous variables relative to good rating news during crisis period

	car1	*car2*	*ant*	*nin*	*cc1*	*cc2*	*amp*	*dn*	*Sa*	*pbv*	*ii*	*nbre_ii*	*ie*	*nbre-ie*	*ne1*	*ne2*	*lntaille*	*roe*
car1	1	0.948	0.154	-0.011	0.095	0.066	0.655	0.381	0.560	-0.429	-0.715	-0.734	-0.006	-0.050	0.557	0.482	0.482	0.309
car2		1	0.315	0.043	0.242	0.085	0.834	0.321	0.589	-0.397	-0.770	-0.887	-0.049	-0.154	0.073	0.585	0.673	0.476
Ant			1	0.025	0.189	0.244	0.318	0.304	-0.026	0.350	-0.250	-0.360	-0.207	-0.317	-0.177	0.047	0.384	0.671
Nin				1	0.330	0.337	0.082	0.284	-0.152	0.261	0.064	-0.153	-0.531	0.079	-0.419	0.158	-0.246	0.237
cc1					1	0.471	0.477	-0.194	0.055	-0.102	-0.496	-0.450	-0.176	-0.293	-0.232	0.029	0.242	0.393
cc2						1	0.116	0.122	-0.337	0.180	-0.387	-0.264	-0.372	-0.556	0.295	-0.216	-0.205	0.473
Amp							1	0.064	0.553	-0.260	-0.791	-0.957	-0.043	-0.256	-0.096	0.523	0.778	0.579
Dn								1	-0.284	0.290	0.264	-0.146	-0.679	0.003	0.222	0.150	-0.172	0.122
Sa									1	-0.387	-0.282	-0.459	0.531	0.358	-0.255	0.805	0.730	0.096
Pbv										1	0.249	0.265	-0.194	-0.110	-0.095	-0.200	-0.339	0.235
ii											1	0.832	0.185	0.402	-0.418	-0.316	-0.436	-0.381
nbre_ii												1	0.119	0.384	-0.036	-0.449	-0.684	-0.619
ie													1	-0.007	-0.157	-0.029	0.343	-0.049
nbre-ie														1	-0.255	0.568	-0.099	-0.506
ne1															1	-0.182	-0.355	-0.276
ne2																1	0.525	0.028
lntaille																	1	0.494
roe																		1

Note. CAR (1 2) cumulative abnormal return one day before the announcement, relative to stock adjusted model (1) or market adjusted model (2); ant: anticipation criterion, nin: rating initial level (speculative or investment grade); cc (1): rating change class (from speculative to investment grade); amp: change amplitude; dn: double rating; sa: business firm (financial and banking or not); pbv: price book value; ii: institutional investors' presence in shareholding in terms of monetary values; nbre_ii: institutional investors' presence in shareholding in terms of shareholders number; ie: foreign investors' presence in shareholding in terms of monetary values; nbre_ie: foreign investors' presence in shareholding in terms of shareholders number; ne1: total debt / total assets; ne2: total debt / equity; lntaille: natural logarithm of total assets; roe: return on equity (Net income /equity).

Table 19. Results of Chi square test and Spearman coefficient

	Khi-carré (CAR_1)	*p-value*	*Khi-carré (CAR_2)*	*p-value*
ant	1,143	0,285	1,143	0,285
nin	4,571**	0,033	4,571**	0,033
cc1	2,571	0,109	2,571	0,109
cc2	1,143	0,285	1,143	0,285
amp	13***	0,002	13***	0,002
dn	7,143***	0,008	7,143***	0,008
sa	4,571**	0,033	4,571**	0,033
Variable	*ρs (CAR_1)*	*p-value*	*ρs (CAR_2)*	*p-value*
lntaille	-0,054	0,852	0,002	0,994

pbv	-0,389	0,169	-0,353	0,214
roe	0,068	0,817	0,112	0,702
ne1	0,389	0,169	0,345	0,226
ne2	0,380	0,179	0,287	0,318
ii	-0,279	0,333	-0,371	0,191
nbre_ii	-0,309	0,280	-0,336	0,239
ie	-0,050	0,863	0,024	0,934
nbre_ie	-0,264	0,361	-0,235	0,417

Note. ***, ** and * denote significance at 1%, 5% and 10%.

ant: anticipation criterion, nin: rating initial level (speculative or investment grade); sa: business firm (financial and banking or not); pbv: price book value; ii : institutional investors' presence in shareholding in terms of monetary values; nbre_ii : institutional investors' presence in shareholding in terms of shareholders number; ie: foreign investors' presence in shareholding in terms of monetary values; nbre_ie: foreign investors' presence in shareholding in terms of shareholders number; ne1: total debt / total assets; ne2: total debt / equity; lntaille: natural logarithm of total assets; roe: return on equity (Net income /equity).

First, it seems that investors take into account upgrades of speculative equities more than they do of investment grade ones (Hand et al., 1992; Jorion et Zangh, 2007). In the former case, the probability of default is very important and highly likely. Furthermore, the significance of double rating factor corroborates the theoretical finding of Raimbourg (1990). Double rating permits to alleviate interest conflicts between firms and rating agencies. These could perhaps be complacent in rating firms due to paid fees. That's why; multiple ratings allow thwarting this problem. This finding joins those of Hand et al. (1992) and highlights once again the important effect of double or multiple notations on investors. Otherwise, the upgrade magnitude indicates the improvement of firm's repayment ability, and thus the firm's financial soundness. Therefore, big upgrades have more impact on stock prices than small ones. Finally, as regards firm's characteristics, it seems that only firm sector and institutional presence in shareholding explain market reaction to upgrades during crisis period. Indeed, financial securities upgrades have higher repercussion on stock prices than non-financial ones. This can be explained by the banking and financial origin of 2008 crisis. Also, the correlation matrix reveals significant relation between institutional presence in shareholding and upgrades' impact on stock prices. This is explained by investment constraints imposed on institutional investors that are required to sell speculative securities and to buy investment grade ones. Consequently, they react to upgrades and generate a significant increase on stock prices (Halek & Eckles, 2010).

4.3 Neutral News or Assertions

The Variance Inflation Factors allows to invalid presence of multicollinearity between independent variables. Besides, the correlation matrix (Note 5) eliminates presence of significant variables correlations.

Table 20. VIF test results: explanatory variables of market reaction to neutral rating news during crisis period

Variables	*ant*	*nin*	*dn*	*sa*	*pbv*	*ii*	*nbre_ii*	*ie*	*nbre_ie*	*ne1*	*ne2*	*lntaille*	*roe*	***Mean VIF***
VIF	1.26	1.96	1.36	2.13	1.22	1.75	1.85	2.06	2.39	1.97	1.84	2.74	1.09	1.82

Note. ant: anticipation criterion, nin: rating initial level (speculative or investment grade); sa: business firm (financial and banking or not); pbv: price book value; ii : institutional investors' presence in shareholding in terms of monetary values; nbre_ii : institutional investors' presence in shareholding in terms of shareholders number; ie: foreign investors' presence in shareholding in terms of monetary values; nbre_ie: foreign investors' presence in shareholding in terms of shareholders number; ne1: total debt / total assets; ne2: total debt / equity; lntaille: natural logarithm of total assets; roe: return on equity (Net income /equity).

In model I, we regress the cumulative abnormal return CAR_1 on structural variables, such as anticipation, initial level of rating and double notation. After, we gradually introduce control variables, such as business and size firm (Model II), financial performance (Models III and IV), indebtedness (Models V and VI), and shareholding structure: institutional investors (Models VII and VIII) and foreign investors (Models IX and X).

Table 21. Correlation matrix of endogenous and exogenous variables relative to neutral rating news during crisis period

	car1	*car2*	*ant*	*nin*	*dn*	*Sa*	*pbv*	*ii*	*nbre_ii*	*ie*	*nbre-ie*	*ne1*	*ne2*	*lntaille*	*roe*
car1	1	0.946	-0.481	0.036	-0.100	0.120	0.165	0.251	0.066	0.021	0.081	0.009	0.031	0.011	0.053
car2		1	-0.320	0.062	-0.085	0.127	0.166	0.302	0.111	0.076	0.128	0.041	0.104	0.052	-0.023
Ant			1	0.161	0.068	-0.294	-0.077	-0.078	-0.014	-0.056	-0.033	0.202	-0.099	-0.234	-0.125
Nin				1	0.304	-0.417	-0.016	-0.086	-0.239	-0.071	-0.066	0.447	-0.151	-0.515	0.098
Dn					1	-0.293	-0.016	0.014	0.010	0.221	0.168	0.180	-0.005	-0.001	-0.061
Sa						1	-0.199	-0.050	0.178	0.197	0.231	-0.436	0.414	0.521	-0.078
Pbv							1	0.038	-0.011	-0.027	-0.096	0.224	0.051	-0.137	-0.099
ii								1	0.558	0.156	0.016	0.144	0.052	0.135	-0.116
nbre_ii									1	0.144	0.244	-0.016	0.142	0.358	-0.095
ie										1	0.658	-0.295	0.115	0.260	-0.031
nbre-ie											1	-0.357	0.235	0.403	-0.047
ne1												1	0.040	-0.314	0.069
ne2													1	0.549	-0.103
lntaille														1	-0.086
roe															1

Note. CAR (1 2) cumulative abnormal return one day before the announcement, relative to stock adjusted model (1) or market adjusted model (2); ant: anticipation criterion, nin: rating initial level (speculative or investment grade); dn: double rating; sa: business firm (financial and banking or not); pbv: price book value; ii: institutional investors' presence in shareholding in terms of monetary values; nbre_ii: institutional investors' presence in shareholding in terms of shareholders number; ie: foreign investors' presence in shareholding in terms of monetary values; nbre_ie: foreign investors' presence in shareholding in terms of shareholders number; ne1: total debt / total assets; ne2: total debt / equity; lntaille: natural logarithm of total assets; roe: return on equity (Net income /equity).

Table 22. Neutral news determinants during crisis period: results of CAR1 regression on rating characteristics with introduction of firm business and firm size

	Model I		Model II	
Variables	*Coef.*	*P-Val*	*Coef.*	*P-Val*
ant	-0.269	0.000***	-0.270	0.000***
nin	0.758	0.319	0.066	0.450
dn	-0.066	0.528	-0.058	0.615
sa			0.134	0.869
lntaille			-0.005	0.718
Const.	0.070	0.451	0.114	0.600
Adjusted R^2	0.2571		0.2586	
Nb.Observations	52		52	

Note. ***, ** and * denote significance at 1%, 5% and 10%.

Table 23. Neutral news determinants during crisis period: results of CAR1 regression on rating characteristics with introduction of financial performance and indebtedness

	Model III		Model IV		Model V		Model VI	
Variables	*Coef.*	*P-Val*	*Coef.*	*P-Val*	*Coef.*	*P-Val*	*Coef.*	*P-Val*
Ant	-0.259	0.001***	-0.271	0.001***	-0.273	0.000***	-0.271	0.001***
Nin	0.073	0.403	0.066	0.413	0.051	0.521	0.062	0.451
dn	-0.054	0.633	-0.057	0.500	-0.057	0.613	-0.058	0.498
Sa	0.030	0.717	0.012	0.877	0.026	0.771	0.009	0.908
Lntaille	-0.004	0.793	-0.005	0.760	-0.005	0.718	-0.007	0.727
Pbv	0.020	0.220						
Roe			-0.007	0.884				
ne1					0.117	0.620		
ne2							0.013	0.854
Const.	0.042	0.855	0.116	0.520	0.088	0.719	0.127	0.511

Adjusted R^2	0.2747	0.2589	0.2644	0.1604
Nb.Observations	52	52	52	52

Note. ***, ** and * denote significance at 1%, 5% and 10%.

Table 24. Neutral news determinants during crisis period: results of CAR1 regression on rating characteristics with introduction of shareholding structure (institutional and foreign investors' presence)

	Model VII		Model VIII		Model IX		Model X	
Variables	*Coef.*	*P-Val*	*Coef.*	*P-Val*	*Coef.*	*P-Val*	*Coef.*	*P-Val*
ant	-0.259	0.000***	-0.275	0.000***	-0.270	0.001***	-0.362	0.000***
nin	0.072	0.434	0.071	0.379	0.065	0.417	0.114	0.179
dn	-0.054	0.633	-0.058	0.489	-0.064	0.467	-0.072	0.413
sa	0.038	0.640	0.013	0.867	0.009	0.911	-0.104	0.232
lntaille	-0.010	0.563	-0.010	0.604	-0.006	0.740	0.003	0.870
ii	0.218	0.058*						
nbre_ii			0.214	0.386				
ie					0.059	0.784		
nbre_ie							0.161	0.432
Const.	-0.022	0.923	-0.037	0.881	0.065	0.726	0.121	0.505
Adjusted R^2	0.3157		0.1738		0.1611		0.2812	
Nb.Observations	52		52		52		52	

Note. ***, ** and * denote significance at 1%, 5% and 10%.

For results' robustness, we get back on regressions by considering CAR_2 as the endogenous variable. We find same results.

Table 25. Neutral news determinants during crisis period: results of CAR2 regression on rating characteristics with introduction of firm business and firm size

	Model I		Modele II	
Variables	*Coef.*	*P-Val*	*Coef.*	*P-Val*
ant	-0.196	0.012**	-0.183	0.034**
nin	0.081	0.365	0.105	0.336
dn	-0.068	0.562	-0.067	0.611
sa			0.033	0.698
lntaille			0.005	0.767
Const.	0.056	0.590	-0.024	0.922
Adjusted R^2	0.1265		0.2453	
Nb.Observations	52		52	

Note. ***, ** and * denote significance at 1%, 5% and 10%.

Table 26. Neutral news determinants during crisis period: results of CAR2 regression on rating characteristics with introduction of financial performance and indebtedness

	Model III		Model IV		Model V		Model VI	
Variables	*Coef.*	*P-Val*	*Coef.*	*P-Val*	*Coef.*	*P-Val*	*Coef.*	*P-Val*
ant	-0.168	0.053**	-0.190	0.032**	-0.188	0.034**	-0.186	0.033**
nin	0.115	0.220	0.107	0.258	0.086	0.391	0.096	0.325
dn	-0.062	0.528	-0.065	0.512	-0.066	0.607	-0.066	0.504
sa	0.056	0.563	0.031	0.749	0.051	0.618	0.023	0.816
lntaille	0.007	0.727	0.005	0.818	0.005	0.787	0.000	0.989
pbv	0.029	0.238						
roe			-0.029	0.627				
ne1					0.154	0.617		
ne2							0.003	0.648

Const.	-0.124	0.579	-0.016	0.938	-0.058	0.837	0.013	0.952
Adjusted R^2	0.0471		0.0220		0.1411		0.0214	
Nb.Observations	52		52		52		52	

Note. ***, ** and * denote significance at 1%, 5% and 10%.

Table 27. Bad news determinants during crisis period: results of CAR2 regression on rating characteristics with introduction of shareholding structure (institutional and foreign investors' presence)

	Model VII		Model VIII		Model IX		Model X	
Variables	*Coef.*	*P-Val*	*Coef.*	*P-Val*	*Coef.*	*P-Val*	*Coef.*	*P-Val*
ant	-0.169	0.024**	-0.190	0.029**	-0.185	0.034**	-0.190	0.029**
nin	0.114	0.327	0.112	0.236	0.105	0.268	0.093	0.388
dn	-0.062	0.630	-0.067	0.493	-0.081	0.428	-0.082	0.549
sa	0.068	0.433	0.034	0.725	0.024	0.807	0.022	0.807
lntaille	-0.001	0.944	-0.000	0.996	0.004	0.857	-0.001	0.934
ii	0.296	0.031**						
nbre_ii			0.278	0.335				
ie					0.139	0.581		
nbre_ie							0.217	0.350
Const.	-0.209	0.427	-0.221	0.448	0.007	0.971	0.021	0.932
Adjusted R^2	0.2227		0.0372		0.0235		0.1494	
Nb.Observations	52		52		52		52	

Note. ***, ** and * denote significance at 1%, 5% and 10%.

Regression results denote that the anticipation of the announcement and the presence of institutional investors are the most important determinants of market reaction to assertions during crisis period. This finding is mainly explained by investors risk aversion especially during financial turmoil. Assertions reveal constancy and not improvement of firms' repayment ability. Therefore, they maintain priority position of bondholders to stockholders especially during crisis. This enhances investors' reject to affirmed securities and their prices' decrease. Negative investor's response to assertions increases when assertion is expected. Also, affirmations could have much greater impact when there is an important institutional presence in shareholding. Indeed, institutional investors have to take short positions on risky assets, especially during crisis period. That's why an assertion pushes them to sell affirmed assets, which generates prices decline. Furthermore, it seems that market reaction to assertions is stronger for speculative than investment grade securities.

5. Conclusion

This paper aims to explain market reaction to rating announcements during crisis period. Its main contribution to previous works is twofold. Firstly, it offers a new context of rating determinants study, which is the 2008 crisis period. Secondly, this paper presents three potential determinants of market reaction to rating announcements during crisis period: the announcement anticipation, the double notation and foreign investors' presence in shareholding. An event study allows measuring market reaction to rating announcements. Its proxy is the cumulative abnormal return during the period surrounding the announcement date. For bad and neutral news, we regress the cumulative abnormal returns on structural factors related to the rating. Then, we gradually introduce firms' characteristics as control variables, such as business, size, indebtedness, financial performance and shareholding structure: institutional and foreign investors' presence. For good news, due to the small sample size, we just establish correlation matrix and Chi square independence test to check significant relation between market reaction to upgrades and both of ratings and firms' characteristics. We find firstly the influence of anticipation, rating magnitude and firm size on market reactions to bad rating news. Otherwise, good rating announcements' effects on stock prices depend on initial rating level, change magnitude and firms' sector. In fact, financial and banking stocks have greater impact on markets than non-financial ones. Besides, institutional investors' presence in shareholding enhances the stock price increase following good and neutral news announcements. Assertions' effects are also dependent upon the announcements' anticipation. Globally, results point out investors' loss faith towards rating agencies during the 2008 financial crisis. These should re-launch a favourable image on financial markets. Accordingly, they have to revise their methodologies in ratings assignments and changes. At last, rating agencies have to be cautious in rating especially large firm because they are of great interest to investors.

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Notes

Note 1. If two ratings occur during the same event window, the event is considered as a single one and the day 0 corresponds to the first announcement day.

Note 2. Please refer to table 5 in the annexes.

Note 3. CAR1 is the CAR calculated by the stock adjusted model, CAR2 is calculated by the market adjusted model.

Note 4. Please refer to table 18 in the annexes.

Note 5. Please refer to table 21 in the annexes.

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Determinants of Capital Structure and Testing of Theories: A Study on the Listed Manufacturing Companies in Bangladesh

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Abstract

The objectives of this study are to identify the significant determinants of capital structure of the listed manufacturing companies in Bangladesh and to test the relevant capital structure theories. This study used a panel dataset including 74 manufacturing companies listed under 8 industries in Dhaka Stock Exchange (DSE) for the period of 2002-2011. The Unit Root tests suggested that all series were stationary. Using Panel Corrected Standard Error Regression Model and Random Effects Tobit Regression Model, all selected variables were found significant. Managerial ownership positively and Growth rate, Profitability, Debt service coverage ratio, Non-debt tax shield, Financial costs, Free cash flow to firm, Agency costs and Dividend payment negatively affect the capital structure. Tangibility and Liquidity ratio have positive relationship with Long term debt and negative relationship with Short term debt and Total debt. It was also found that Pecking-order theory and Static Trade-off theory are the most dominant capital structure theories in Bangladesh. The policy implication is that the financial managers should consider these determinants as yardsticks before taking the leverage decisions in order to choose the most favorable capital structure for the company so that it maximizes the shareholders' value.

Keywords: Bangladesh, capital structure, debt ratio, determinants, leverage

1. Introduction

Now-a-days, optimal capital structure determination has become one of the most researched topics in both theoretical and empirical literature in the corporate finance arena. The term 'Capital Structure' refers to the amalgamation of various funding sources constituting the total assets of a company. Capital structure decisions facilitate a company to maximize its shareholders' values, allocate risks and control power among different groups of stakeholders. Proper choice of capital structure enables a company to accelerate its performance in a better way, ensure the sustainability of its operations and eventually accomplish its strategic goals. That's why the question that what factors significantly persuade the capital structure decisions of a company has got special value to the researchers as well as to the financial managers. After the pioneering publication of the Modigliani and Miller (1958) concerning the relevance of capital structure choices on firm value, several capital structure theories (i.e. Agency theory, Pecking-order theory, Static Trade-off theory, Free Cash Flow theory, Signaling theory etc.) have been emerged with a view to helping companies determine the optimal capital structure. But unfortunately, even after decades of research, none of these theories have been acknowledged as universal theory of capital structure, which leaves the topic open for further research.

In Bangladesh, one of the Least Developed Countries (LDCs) in South Asia, although there are very few researches focusing on the primary determinants of capital structure; there is still disagreement regarding the influencing factors of optimal capital structure decisions. Furthermore, all possible factors affecting capital structure decisions have not been considered in a study at a time and there is a necessity to test which capital structure theories are consistent in case of Bangladeshi companies.

The main purpose of this study is to determine the significant factors influencing the capital structure decisions of the listed manufacturing companies in Bangladesh. In addition, this study also aims at testing the relevant capital structure theories applicable in Bangladesh. Unlike the previous studies in Bangladesh, this study

includes the largest panel data set (i.e. 74 listed manufacturing companies for 10 years period (2002-2011); that means 740 observations) and three different empirical regression models having maximum independent variables at a time and also Unit Root Tests in order to check the stationarity of the variables. The rest of the paper is structured as follows: Section two represents the theoretical discussion on capital structure and Section three contains the review of relevant literature. Empirical methodology, Empirical results and Testing of capital structure theories are analyzed in Section four, five and six respectively. Finally the conclusion and policy implications are discussed in Section seven.

2. Theoretical Discussion on Capital Structure

For the first time, Modigliani and Miller (1958) argued that in a tax free world, the market value of a firm remains constant irrespective of the capital structure choice, which denotes the irrelevance of capital structure. Again in 1963, incorporating corporate tax, they argued that the value of a levered firm will be greater than the value of an unlevered firm due to the interest tax shield on debt, which makes the capital structure relevant for a firm. According to these theories, there is no optimal capital structure. On the contrary, Scott (1977) stated in the Static Trade-off theory that an optimal capital structure can be attained at the trade-off point between interest tax shield and financial distress cost. This theory implies that debt financing is preferred till the optimal level and equity is preferred after the optimal level.

Another renowned theory, called Agency Theory, introduced by Jensen and Meckling (1976), suggests that an optimal capital structure requires the minimization of the agency cost by increasing the ownership of the managers in the firm or taking more debt to control managers' tendency for excessive perk consumptions. Free Cash Flow Theory, developed by Jensen (1986), states that managers with excess free cash flows tend to invest in matured or ill-advised projects that lessen shareholders' wealth and this problem can be solved by taking more debt or paying more dividends.

Ross (1977) stated in the Signaling Theory, based on asymmetric information, that managers use leverage decision to give signal to the market because investors treat debt financing as a signal of high future performance and high future cash flows of the firm. On the contrary, The Pecking Order Theory, introduced by Myers and Majluf (1984), states that there is no optimal capital structure and managers follow a hierarchy of preferences for the issuance of new capital based on the cost of capital. They prefer retained earnings as the main source of financing due to its zero cost and then debt financing, followed by equity financing, because cost of debt is less than that of equity.

3. Literature Review

Several empirical studies regarding capital structure decisions have been concisely reviewed here in terms of two segments i.e. International evidence and Evidence from Bangladesh.

3.1 International Evidence

In USA, Rajan and Zingales (1995) found that the significant determinants of capital structure of US companies are size, growth, profitability and tangible assets. Besides these factors, Graham and Harvey (2001) and Frank and Goyal (2007) claimed that US firms emphasize more on financial flexibility, credit rating, expected inflation and stock price increase rather than asymmetric information, tax shield, transaction costs, free cash flows and they also found the evidence of the Pecking-order theory and Trade-off theory.

In UK, Bevan and Danbolt (2000) found that large companies having high growth opportunities used less bank debt compared to smaller firms. Bancel and Mittoo (2004) surveyed managerial behavior and concluded that financial flexibility, credit rating and market timing are the most significant determinants of leverage decisions of European firms.

Recently Mishra (2011), analyzing the Indian manufacturing companies, claimed asset tangibility, profitability and tax to be significant factors whereas size, volatility and non-debt tax shield to be insignificant factor affecting the capital structure decisions. On the contrary, Rao and Jijo (1992) and Pathak (2005) found that size, risk, profitability, liquidity tangibility, tax and growth rate were significant determinants of capital structure.

In Pakistan, Mazhar and Nasr (2010), Rafiq et al. (2008) and Shah and Hijazi (2004), found that earnings volatility, profitability, non-debt tax shield asset tangibility, size and growth are the major factors affecting leverage decisions.

In Nepal, Baral (2004) showed a positive influence of operating leverage, dividend payout ratio, business risk, growth rate and size but negative influence of debt service capacity and profitability on leverage ratio.

Pandey (2001) in Malaysia, Huang and Song (2002) in China and Hassan (2011) in Nigeria found that leverage

decisions are mainly influenced by ownership structure, profitability, size, growth, volatility, tangibility etc. On the contrary, Vasiliou and Daskalakis (2006) showed that financial distress, market timing and competitiveness are significant factors influencing leverage decisions in Greece.

3.2 Evidence from Bangladesh

For the first time in Bangladesh, Chowdhury (2004) investigated the cross-sectional differences in capital structure of Bangladeshi and Japanese firms based on agency cost model and found that agency cost of debt, profitability, growth rate, operating leverage and bankruptcy risk significantly influence the capital structure choice of both countries' firms. He also concluded that due to institutional differences, agency structures of these two countries' firms are different and especially Japanese firms can more effectively mitigate the agency conflicts compared to Bangladeshi firms due to better corporate governance mechanism in Japan.

On the other hand, Lima (2009), Sayeed (2011), Siddiqui (2012) and Hossain and Ali (2012) claimed that growth rate, tangibility, operating leverage, debt service capacity, managerial ownership age and size have significant influence on capital structure decisions. They also concluded that the agency cost theory and static trade-off theory are relevant for the companies in Bangladesh.

4. Methodology

4.1 Data Sources and Sample Size

To conduct this study, 10 years annual data (2002-2011) of 74 Bangladeshi manufacturing companies listed under 8 industries in Dhaka Stock Exchange (DSE) were collected from the DSE library. Table 1 shows the selected industries and number of companies from each selected industry used in this study.

Table 1. Frequency distribution of industry classification

Sl. No.	Industry name	No. of listed companies	No. of selected companies	No. of years covered	No. of observations
1	Cement	7	4	10	40
2	Ceramic	5	3	10	30
3	Engineering	25	16	10	160
4	Food and Allied	18	10	10	100
5	Jute	3	2	10	20
6	Pharmaceuticals and Chemicals	27	15	10	150
7	Tannery	5	4	10	40
8	Textile	34	20	10	200
	Total	124	74		740

4.2 Measurements of the Variables

4.2.1 Dependent Variables

Three different measurements of capital structure *i.e.* Short Term Debt Ratio (STDR), Long Term Debt Ratio (LTDR) and Total Debt Ratio (TDR) have been used as dependent variables, based on their book values, in this study. Their measurements are shown in Table 2.

Table 2. Measurements of the dependent variables

Sl. No.	Variable Indicators	Full name of the variables	Measurement (Proxy)
1	STDR	Short Term Debt Ratio	Total Short Term Debt / Total Assets
2	LTDR	Long Term Debt Ratio	Total Long Term Debt / Total Assets
3	TDR	Total Debt Ratio	Total Debt / Total Assets

4.2.2 Independent Variables

This study used 12 independent variables including two dummy variables such as- dividend dummy and industry dummy. In case of industry dummy, the engineering industry has been considered as the base industry. Table 3 represents the measurements of the independent variables used in this study.

Table 3. Measurements of the independent variables

Sl. No.	Variable Indicators	Full name of the variables	Measurement (Proxy)
1	MO	Managerial Ownership	% shareholding of directors, sponsors and managers
2	GR	Growth Rate	(Total Assets$_1$ - Total Assets$_0$) / Total Assets$_0$
3	PR	Profitability Ratio	EBIT / Total Assets
4	TANG	Tangibility Ratio	Total Fixed Assets / Total Assets
5	DSC	Debt Service Coverage Ratio	EBIT / Interests Paid
6	LQR	Liquidity Ratio	Total Current Assets / Total Current Liabilities
7	NDTS	Non-Debt Tax Shield	Annual Depreciation / Total Assets
8	FC	Financial Costs	Interest Paid / Total Debt
9	FCFF	Free Cash Flow to Firm	(EBIT + Depreciation –Tax- Dividend) / 10000 (Note 1)
10	AC	Agency Costs	Cash and Cash Equivalents / Average of 3 years Total Assets (Note 2)
11	DIV	Dividend Dummy	"1" if a company pays ≥10% cash dividend and "0" otherwise
12	d_cem	Cement & Ceramic Industry Dummy	"1" if the observation belongs to Cement and Ceramic industry and "0" otherwise
13	d_food	Food & Allied Industry Dummy	"1" if the observation belongs to Food & Allied industry and "0" otherwise
14	d_tex	Textile, Tannery & Jute Industry Dummy	"1" if the observation belongs to Textile, Jute & Tannery industry and "0" otherwise
15	d_pharma	Pharmaceuticals & Chemical Industry Dummy	"1" if the observation belongs to Pharmaceuticals & Chemical industry and "0" otherwise

4.2.3 Theoretical Expected Signs of Independent Variables

Based on the five most renowned capital structure theories *i.e.* Agency theory, Static Trade-off theory, Pecking-order theory, Signaling theory and Free Cash Flow theory, we have derived the theoretical expected relationships of the independent variables with the leverage ratio which are shown in Table 4.

Table 4. Theoretical expected signs of independent variables

Independent Variables	Expected Signs				
	Agency theory	Static Trade-off theory	Pecking-order theory	Signaling theory	Free Cash Flow theory
Managerial Ownership	-	-	+		
Growth Rate	-	-	+	+	
Profitability Ratio		+	-	+	
Tangibility Ratio		+	-		
Debt Service Coverage Ratio		+	-		
Liquidity Ratio		+	-		
Non-Debt Tax Shield		-			
Financial Costs		-			
Free Cash Flow to Firm			-		+
Agency Costs	-				
Dividend Dummy			+	-	

Source: Authors' estimation.

4.3 Specification of the Model

Based on the three dependent variables used in this study, we have designed three multiple regression models to estimate the significant determinants of capital structure. They are as follows:

Model I - STDR:

$$STDR = \alpha + \beta_1 MO_{i,t} + \beta_2 GR_{i,t} + \beta_3 PR_{i,t} + \beta_4 TANG_{i,t} + \beta_5 DSC_{i,t} + \beta_6 LQR_{i,t} + \beta_7 NDTS_{i,t} + \beta_8 FC_{i,t} + \beta_9 FCFF_{i,t} + \beta_{10} AC_{i,t} + \beta_{11} DIV_{i,t} + \beta_{12} d\_cem_{i,t} + \beta_{13} d\_food_{i,t} + \beta_{14} d\_tex_{i,t} + \beta_{15} d\_pharma_{i,t} + \varepsilon_{i,t} \quad (1)$$

Model II - LTDR:

$$LTDR = \alpha + \beta_1 MO_{i,t} + \beta_2 GR_{i,t} + \beta_3 PR_{i,t} + \beta_4 TANG_{i,t} + \beta_5 DSC_{i,t} + \beta_6 LQR_{i,t} + \beta_7 NDTS_{i,t} + \beta_8 FC_{i,t} + \beta_9 FCFF_{i,t} + \beta_{10} AC_{i,t} + \beta_{11} DIV_{i,t} + \beta_{12} d\_cem_{i,t} + \beta_{13} d\_food_{i,t} + \beta_{14} d\_tex_{i,t} + \beta_{15} d\_pharma_{i,t} + \varepsilon_{i,t} \quad (2)$$

Model III - TDR:

$$TDR = \alpha + \beta_1 MO_{i,t} + \beta_2 GR_{i,t} + \beta_3 PR_{i,t} + \beta_4 TANG_{i,t} + \beta_5 DSC_{i,t} + \beta_6 LQR_{i,t} + \beta_7 NDTS_{i,t} + \beta_8 FC_{i,t} + \beta_9 FCFF_{i,t} + \beta_{10} AC_{i,t} + \beta_{11} DIV_{i,t} + \beta_{12} d\_cem_{i,t} + \beta_{13} d\_food_{i,t} + \beta_{14} d\_tex_{i,t} + \beta_{15} d\_pharma_{i,t} + \varepsilon_{i,t} \quad (3)$$

Where, *i* refers to the individual companies and *t* refers to the time period.

4.4 Research Methods

4.4.1 Unit Root Tests

A data series is said to be non-stationary if it does not have a constant mean, variance and auto-covariance at various lags over time (Gujarati, 2007). Applying econometric models on non-stationary series produces spurious and misleading results. To check the unit root of the series, we have applied two different types of unit root tests, i.e. Levin-Lin-Chu (LLC) test and Fisher-type Augmented Dickey Fuller (ADF) test, in this study to avoid the criticisms of individual test. We have done these two tests in terms of two assumptions i.e. random walk with drift and random walk with drift around a stochastic trend.

4.4.1.1 Levin-Lin-Chu (LLC) Test

Levin, Lin and Chu (2002) proposed a unit root test named Levin-Lin-Chu (LLC) Test which is used in case of strongly balanced panel dataset (Note 3). This test is estimated assuming that there is a common unit root process (homogenous) so that AR parameter is identical across cross-sections. The null hypothesis of this test is that each panel contains unit root against the alternative that each panel is stationary. The model is given below:

$$\Delta Y_{it} = \rho_i Y_{i,t-1} + Z'_{it}\gamma_i + \sum_{j=1}^{p} \theta_{ij} \Delta Y_{i,t-j} + u_{it} \quad (4)$$

Where $i = 1, 2, \ldots, N$ cross section series; $t = 1, 2, \ldots, T$ time periods; Y_{it} is the exogenous variable being tested; ρ_i is the autoregressive coefficients; $Z'_{it} = (1, t)$ so that the term $Z'_{it}\gamma_i$ represents panel-specific means and linear time trends; and ε_{it} is a stationary error term which is assumed to be mutually independent idiosyncratic disturbance. Here, the number of lags, *p*, is selected automatically by the software that minimizes Schwarz Information Criteria (SIC).

4.4.1.2 Fisher – Type ADF Test

Choi (2001) proposed a Fisher-type test which performs a unit root test on each panel's series separately and then combines the *p*-values from each cross section to obtain an overall test statistic by using Monte Carlo simulations. Unlike LLC test, this test does not require strongly balanced panel dataset. It assumes individual unit root process (heterogeneous) so that AR parameter is different across cross-sections. We have performed Fisher-type Augmented Dickey Fuller (ADF) test in this study. This test has the following model:

$$P = -2\sum_{i-1}^{N} \ln(p_i) \rightarrow \chi^2(2N) \quad (5)$$

Here, p_i represents each cross-section panel and *ln* is the Natural Logarithm. This test is asymptotically chi-square distributed with 2N degrees of freedom.

4.4.2 Multicollinearity Test

When the exogenous variables are significantly correlated with each other, it is called Multicollinearity problem. To test Multicollinearity in the dataset, We have used Pearson (1896) Product-Moment Correlation Coefficient.

The estimate of the product-moment correlation coefficient, ρ, is:

$$\hat{\rho} = \frac{\sum_{i-1}^{n} W_i (X_i - \bar{X})(Y_i - \bar{Y})}{\sqrt{\sum_{i=1}^{n} W_i (X_i - \bar{X})^2} \sqrt{\sum_{i-1}^{n} W_i (Y_i - \bar{Y})^2}} \quad (6)$$

Here, w_i is the weights, if specified or $w_i = 1$ if weights are not specified. And $\bar{x} = \left(\sum w_i x_i\right)/\left(\sum w_i\right)$ is the mean of x and $\bar{y} = \left(\sum w_i y_i\right)/\left(\sum w_i\right)$ is the mean of y.

4.4.3 Heteroscedasticity Test

When the errors don't have constant variance, then the dataset faces the problem of heteroscedasticity and if the regression is run on the dataset having heteroscedasticity, the *t*- test and F- test give inaccurate results (Gujarati, 2007). To test heteroscedasticity, I have used White test introduced by White (1980). In this test, the squared residuals obtained from the original regression are regressed on the independent variables, their squared values and their cross-products. The null hypothesis is that there is no heteroscedasticity. In this test, the sample size (n) times the R^2 value from the regression asymptotically follows the χ^2 distribution and the *df* is the number of independent variables (excluding constant). That means, $n * R^2 \sim \chi^2_{df.}$ If the obtained χ^2 value is greater than the critical χ^2 value, the null hypothesis is rejected and vice-versa. The auxiliary regression model for White test in case of Model I is as follows:

$$(Residual\_STDR)^2 = \alpha + \beta_1 MO + \beta_2 GR + \beta_3 PR + \beta_4 TANG + \beta_5 DSC + \beta_6 LQR + \beta_7 NDTS + \beta_8 FC + \beta_9 FCFF + \beta_{10} AC + \beta_{11} MO^2 + \beta_{12} GR^2 + \beta_{13} PR^2 + \beta_{14} TANG^2 + \beta_{15} DSC^2 + \beta_{16} LQR^2 + \beta_{17} NDTS^2 + \beta_{18} FC^2 + \beta_{19} FCFF^2 + \beta_{20} AC^2 + \beta_{21} MO*GR + \beta_{22} PR*TANG + \beta_{23} DSC*LQR + \beta_{24} NDTS*FC + \beta_{25} FCFF*AC + \varepsilon_1 \quad (7)$$

In case of Model II and III, only the dependent variable is replaced by $(Residual\_LTDR)^2$ and $(Residual\_TDR)^2$ respectively.

4.4.4 Autocorrelation Test

Durbin-Watson *d* statistic, proposed by Durbin and Watson (1950), was used to test first order serial correlation in the disturbance assuming all the regressors are strictly exogenous. The Durbin-Watson d statistic can also be described in terms of ρ (rho) *i.e.* $d \approx 2\ (1 - \rho)$ (Gujarati, 2007). Here, ρ(rho) is the coefficient of first order autocorrelation. In this study, Random Effects GLS regression model has been applied to determine that value of ρ (rho) based on Durbin-Watson and then value of *d* statistic has been calculated.

4.4.5 Panel Corrected Standard Error (PCSE) Regression Model

We have used Panel Corrected Standard Error (PCSE) model to determine the significant impacts of the determinants of capital structure. PCSE is an alternative to the Feasible Generalized Least Squares (FGLS) for fitting the panel data models when the errors are not independent and identically distributed; rather the errors are either heteroscedastic across panels or heteroscedastic and contemporaneously correlated across panels, with or without autocorrelation (Kmenta, 1997). The reason for using this model is that it automatically corrects the heteroscedasticity and autocorrelation problem and provides the best estimates for the variables.

The model can be written as:

$$y_{it} = \beta x_{it} + \varepsilon_{it} \quad (8)$$

Where $i = 1, \ldots..., n$ is the number of panels; $t = 1, \ldots...., T_i$ is the number of periods in panel i and ε_{it} is the errors autocorrelated along t or contemporaneously correlated across i.

This model can also be expressed panel by panel as:

$$\begin{bmatrix} y_1 \\ y_2 \\ . \\ . \\ y_n \end{bmatrix} = \begin{bmatrix} x_1 \\ x_2 \\ . \\ . \\ x_n \end{bmatrix} \beta + \begin{bmatrix} \varepsilon_1 \\ \varepsilon_2 \\ . \\ . \\ \varepsilon_n \end{bmatrix} \quad (9)$$

If autocorrelation is specified, the parameters β are estimated by Prais-Winsten (1954).

4.4.6 Random Effects Tobit Regression Model

Since some companies didn't have long term debt (that means some of the values of dependent variable LTDR in Model II was 0), we have also run Random Effects Tobit Regression Model, developed by Honore (1992), in order to verify the results obtained from the PCSE model. This model deals with the censored outcomes i.e. when the dependent variable has a value of 0. Consider the following regression model with panel level random

effects:

$$y_{it} = x_{it}\beta + v_i + \varepsilon_{it} \quad (9)$$

Where i = 1, ….., n panels; t = 1, …., T_i periods in panel i; v_i are the random effects such that $N = (0, \sigma_v^2)$ and ε_{it} is independent of v_i such that $N = (0, \sigma_\varepsilon^2)$. The observed data, $\hat{y}_{it}$, represent the censored versions of y_{it}. If they are left-censored (i.e. $y_{it} \leq \hat{y}_{it}$), $\hat{y}_{it}$ is determined by Lower limit and if they are right-censored (i.e. $y_{it} \geq \hat{y}_{it}$), $\hat{y}_{it}$ is determined by Upper limit and if they are uncensored (i.e. $y_{it} = \hat{y}_{it}$), $\hat{y}_{it}$ is determined by the dependent variable.

5. Empirical Results Analysis

5.1 Descriptive Statistics

Table 5 represents the descriptive statistics of the variables used in this study in terms of their mean, standard deviation, minimum and maximum values. It is evident that the manufacturing companies of Bangladesh finance on an average 60.85% of total assets with debts comprising of 44.96% with short term debts and 15.89% with long term debts respectively. It indicates that the companies are more interested in short term financing than long term financing.

Table 5. Descriptive statistics of the variables

	Mean	Standard Deviation	Maximum	Minimum	Observations
STDR	0.4496	0.2110	1.8099	0.0104	740
LTDR	0.1589	0.1801	0.9433	0	740
TDR	0.6085	0.2420	1.8179	0.0427	740
MO	0.4677	0.1669	0.9167	0	740
GR	0.1278	0.3513	4.8174	-0.3429	740
PR	0.0884	0.0833	0.5671	-0.1248	740
TANG	0.4319	0.214	0.9400	-0.3977	740
DSC	73.28	1435	38794	-2163	740
LQR	1.82	3.8303	75.010	0.1387	740
NDTS	0.2507	1.8982	20.11	-0.68	740
FC	0.0590	0.0448	0.3773	0	740
FCFF	394.69 mln	698.95 mln	5640.86 mln	-292.38 mln	740
AC	0.0503	0.0977	0.8367	0	740

Note. All the variables are in ratio form except DSC & LQR are in times and FCFF is in TK (in million).

The table also shows that 46.77% of the shares are held by the directors, sponsors and managers which indicate great influencing power of these parties on the decision making of the companies. Also the companies grow on an average at 12.78% and make profit at 8.84% per year which is satisfactory indeed. The companies have about 43.19% net fixed assets and TK. 73.28 EBIT for paying TK. 1 interest on debt which indicates their strong ability to service the debts. Also they have TK. 1.82 of current assets against current liability of TK. 1 which indicates their strong liquidity position.

5.2 Results of Unit Root Tests

The results of two unit root tests i.e. LLC test and Fisher-type ADF test are given in Table 6. Here, it is evident that all the variables are stationary under these two tests. One little exception is that FCFF is non-stationary only in case of individual intercept in both tests. Since the assumption with individual intercept & trend is a better estimator of unit root compared to only individual intercept, FCFF has been treated as stationary series.

Table 6. Results of unit root tests

Variables	Levin, Lin & Chu Test *Null: Unit root (assumes common unit root process)* (With Individual Intercept)			(With Individual Intercept & Trend)		
	t-statistic	Probability	Process	t-statistic	Probability	Process
STDR	-8.45***	0.0000	S	-14.21***	0.0000	S
LTDR	-125.78***	0.0000	S	-146.18***	0.0000	S
TDR	-8.88***	0.0000	S	-13.04***	0.0000	S
MO	-71.16***	0.0000	S	-81.86***	0.0000	S
GR	-40.76***	0.0000	S	-32.79***	0.0000	S
PR	-9.56***	0.0000	S	-12.26***	0.0000	S
TANG	-6.60***	0.0000	S	-56.67***	0.0000	S
DSC	-690.62***	0.0000	S	-422.98***	0.0000	S
LQR	-3.88***	0.0001	S	-15.03***	0.0000	S
NDTS	-10.68***	0.0000	S	-75.13***	0.0000	S
FC	-27320***	0.0000	S	-28078***	0.0000	S
FCFF	5.20	1.0000	NS	-4.90***	0.0000	S
AC	-22.49***	0.0000	S	-25.85***	0.0000	S

Variables	Fisher-type ADF Test *Null: Unit root (assumes individual unit root process)* (With 0Individual Intercept)			(With Individual Intercept & Trend)		
	Chi-square statistic	Probability	Process	Chi-square statistic	Probability	Process
STDR	198.60***	0.0035	S	202.21***	0.0021	S
LTDR	228.11***	0.0000	S	214.52***	0.0001	S
TDR	201.36***	0.0023	S	188.65**	0.0134	S
MO	115.67	0.1074	NS	123.23*	0.0748	S
GR	375.40***	0.0000	S	291.06***	0.0000	S
PR	247.79***	0.0000	S	187.46**	0.0156	S
TANG	195.74***	0.0052	S	215.78***	0.0002	S
DSC	260.76***	0.0000	S	287.92***	0.0000	S
LQR	192.82***	0.0078	S	216.44***	0.0002	S
NDTS	254.76***	0.0000	S	238.11***	0.0000	S
FC	257.99***	0.0000	S	218.58***	0.0001	S
FCFF	66.30	1.0000	NS	167.84	0.0264	S
AC	308.64***	0.0000	S	295.66***	0.0000	S

Note. Here "S" means Stationary and "NS" means Non-stationary. Also *, **, *** represent 10%, 5% and 1% level of significance respectively. The lag length is automatically selected based on Schwartz Information Criterion (SIC).

5.3 Results of Multicollinearity Test

Table 7 represents the results of Multicollinearity Test. If the correlation coefficient between two independent variables is about 0.80 or larger, there is Multicollinearity problem (Lewis-Beck, 1993). It is evident from the table that none of the pair-wise correlation coefficient is 0.80 or larger. So it can be concluded that there is no multicollinearity problem in the data set.

Table 7. Pearson's product-moment correlation coefficient results

	MO	GR	PR	TANG	DSC	LQR	NDTS	FC	FCFF	AC
MO	1.00									
GR	-0.052	1.00								
PR	0.032	0.047	1.00							
TANG	-0.098	0.024	-0.088	1.00						
DSC	-0.076	0.002	0.037	0.017	1.00					
LQR	0.104	-0.002	0.008	-0.065	0.063	1.00				
NDTS	-0.090	-0.035	0.046	-0.161	-0.007	0.006	1.00			

FC	-0.070	-0.113	-0.033	0.056	-0.065	-0.008	0.038	1.00		
FCFF	-0.015	0.050	0.291	0.095	-0.020	-0.057	0.004	-0.030	1.00	
AC	0.166	0.140	0.296	-0.308	0.030	0.013	-0.008	-0.213	-0.020	1.00

5.4 Results of Heteroscedasticity Test

The results of White Test are presented in Table 8. It is evident from the table that all three models are facing the problem of heteroscedasticity.

Table 8. Results of White test

Model #	Overall R^2	No. of observations (n)	*Obtained* $\chi^2 \sim n * R^2$	Critical χ^2 @ 25 *df* & 5% Sig. level	Decision	Heterosce-dasticity
I (STDR)	0.0678	740	50.17	37.65	H_o rejected	Yes
II (LTDR)	0.1178	740	87.17	37.65	H_o rejected	Yes
III (TDR)	0.0993	740	73.48	37.65	H_o rejected	Yes

5.5 Results of Autocorrelation Test

Durbin-Watson *d* Statistic results are shown in Table 9. If the d statistic is less than the critical lower bound, there is positive autocorrelation and if the d statistic is more than the critical upper bound, there is negative autocorrelation (Gujarati, 2007). Here, in all three models, the d statistic is lower than the critical lower bound. Hence, there is positive serial autocorrelation in the dataset.

Table 9. Results of Durbin-Watson *d* statistic

Model #	ρ (rho) value	Durbin-Watson *d* Statistic $d \approx 2\ (1-\rho)$	Critical Lower bound (@ 5% sig., K=15 & T= 740)	Critical Upper bound (@ 5% sig., K=15 & T= 740)	Types of Autocorrelation
I (STDR)	0.5001	0.75	1.84	1.92	Positive
II (LTDR)	0.7027	0.65	1.84	1.92	Positive
III (TDR)	0.7236	0.64	1.84	1.92	Positive

5.6 Results of Panel Corrected Standard Error (PCSE) Model

The PCSE regression results of Model- I, II & III are given in Table 10. In all models, we have assumed that the variables are positively correlated at lag 1.

Table 10. PCSE regression results of model- I, II & III

Prais-Winsten regression, correlated panels corrected standard errors (PCSEs)
Group variable: company Number of obs. = 740
Time variable: year Number of groups = 74
Panels: correlated (balanced) Obs. per group: min. = 10
Autocorrelation: common AR (1) avg. = 10
Max. = 10
Estimated covariances = 2775
Estimated autocorrelations = 1
Estimated coefficients = 16

Variables	Model- I (STDR)		Model- II (LTDR)		Model- III (TDR)	
	Coefficients	z statistic	Coefficients	z statistic	Coefficients	z statistic
MO	-0.0182	-0.27	0.1257	2.94***	0.1457	1.90*
GR	-0.0112	-1.40	-0.0268	-4.44***	-0.0373	-3.56***
PR	-0.1365	-1.68*	-0.0026	-0.04	-0.1285	-1.38
TANG	-0.4540	-10.44***	0.1226	3.57***	-0.3303	-7.94***
DSC	-0.000003	-1.49	-0.000002	-1.58	-0.000004	-1.72*
LQR	-0.0081	-3.95***	0.0043	2.01**	-0.0030	-2.43**
NDTS	-0.0146	-2.80***	0.0003	0.11	-0.0161	-2.82***

FC	-0.2641	-1.99**	-0.7024	-7.20***	-0.9820	-8.34***
FCFF	-0.0000002	-2.59***	-0.0000001	-1.48	-0.0000003	-3.22***
AC	-0.2576	-4.66***	-0.0541	-1.29	-0.3100	-5.47***
DIV	-0.0263	-2.33**	-0.0018	-0.28	-0.0266	-2.48**
d_cem	0.0832	2.89***	-0.0630	-2.31**	0.0164	0.41
d_food	-0.0151	-0.47	0.0189	0.68	-0.0002	-0.00
d_tex	0.1154	3.68***	0.0262	1.08	0.1403	5.55***
d_pharma	0.1009	3.25***	-0.0615	-1.98**	0.0390	1.10
_cons	0.6729	13.43***	0.0948	3.23***	0.7455	13.87***
R^2	0.3510		0.1977		0.4439	
Prob.>chi^2	0.000		0.000		0.000	

Note. Here, *, ** and *** represent 10%, 5% and 1% significance level respectively.

We know that R^2 (Coefficient of determination) is the measurement of goodness of fit. It shows how well the sample regression line fits the data. It is evident from the table that the combined variation in the independent variables can explain about 35.10%, 19.77% and 44.39% variation in the dependent variable of Model- I, Model- II and Model- III respectively. These R^2 values are greater than those of other studies i.e. Sayeed (2011), Siddiqui (2012) and Hossain and Ali (2012). Also Prob. > chi^2 value (0.000) shows that the overall model is significant at 1% level in each of the three cases. All the variables' coefficients, significance and implications are discussed below:

5.6.1 Managerial Ownership

The results indicate that managerial ownership is positively related to LTDR and TDR at 1% and 10% significance level respectively. This result supports the prediction of Pecking-order theory. The reason for positive relationship is that sponsors, directors and managers holding the largest percentage of shareholding desire to concentrate ownership and control within themselves and so they don't go for equity financing, rather they take debt due to its lower cost and tax benefits. This positive result is consistent with Huang and Song (2002) and contradictory to Hossain and Ali (2012).

5.6.2 Growth Rate

Growth rate conforms to prediction of the Agency theory and Static trade-off theory since it has negative relationship with LTDR and TDR at 1% significance level. This negative relationship can be attributed to the tendency of the companies, having high growth opportunities, to use limited debt because the value of those investment opportunities will be close to zero in case of bankruptcy. This negative result is consistent with Chowdhury (2004) and Rajan and Zingales (1995) and contradictory to Lima (2009) and Hossain and Ali (2012).

5.6.3 Profitability Ratio

A negative relationship between profitability ratio and leverage ratios is observed although it is significant in case of only STDR at 10% level. It is consistent with the Pecking-order theory implying that the more profitable companies prefer using internal financing to using debt in their capital structure. This negative result is consistent with Chowdhury (2004) and Hossain and Ali (2012) and contradictory to Sayeed (2011) and Siddiqui (2012).

5.6.4 Tangibility

The results show that tangibility is a robust significant factor influencing the leverage ratios as it is significant at 1% level in all models. It negatively affects STDR and TDR which conforms to the Pecking-order theory implying that the companies with lower level of tangible assets face information asymmetry problems that reduce the price of equity and hence, they go for debt financing. On the contrary, tangibility has a positive relationship with LTDR which is consistent with the Static Trade-off theory. The reason is that companies can use fixed assets as collateral for taking long term debt and the creditors feel relaxed to give long term loan to those companies having less possibility of bankruptcy due to their large amount of net fixed assets. The positive result is consistent with Rajan and Zingales (1995) and Lima (2009) whereas the negative result is consistent with Hossain and Ali (2012).

5.6.5 Debt Service Coverage Ratio

Debt Service Coverage Ratio has a negative relationship with all leverage ratios even though it is significant only in case of TDR at 10% level. The result is consistent with the prediction of Pecking-order theory because a

company with high operating income can retain more earnings and use them in funding the future investments instead of using debts. This negative result is consistent with Siddiqui (2012) and contradictory to Lima (2009).

5.6.6 Liquidity Ratio

Liquidity Ratio has been found as a considerable determinant of capital structure as it is significant in case of all leverage ratios. The negative relationship with STDR and TDR conforms to the prediction of Pecking-order theory such that the companies with high liquidity are able to generate high cash inflows and use them for financing further investment opportunities. The negative result is consistent with Hossain and Ali (2012). On the contrary, it has a positive relationship with LTDR which is consistent with the prediction of Static Trade-off theory in such a way that the companies with high liquidity have more interest payment ability as well as less bankruptcy possibility and hence, the creditors feel comfortable to give long term loans to those companies.

5.6.7 Non-Debt Tax Shield

Non-debt Tax Shield has a significant negative relationship with STDR and TDR at 1% level. This negative result conforms to the prediction of Static Trade-off theory implying that the companies having high depreciation and other non-cash expenditures prefer to use less debt in their capital structure. It is consistent with Sayeed (2011) and contradictory to Hossain and Ali (2012).

5.6.8 Financial Costs

The results suggest that Financial Cost has a very strong negative influence on the capital structure decisions of the manufacturing companies in Bangladesh. The prediction of Static Trade-off theory becomes true in this case because when the interest payments become high, the companies prefer to reduce the portion of debt in their capital structure in order to reduce the bankruptcy risks.

5.6.9 Free Cash Flow to Firm

Free Cash Flow to Firm has a negative relationship with all leverage ratios although it is significant in case of STDR and TDR at 1% level. The result is consistent with the prediction of Pecking-order theory. It implies that the companies having high free cash flows finance their projects with internal financing rather than external debt financing.

5.6.10 Agency Costs

It is evident that Agency Costs have a significant negative impact on the STDR and TDR at 1% level. This result conforms to the prediction of Agency theory because the companies having more agency conflicts among the stakeholders will tend to use less debt in their capital structure. This negative result is consistent with Chowdhury (2004).

5.6.11 Dividend Payment

We have found dividend payment as a significant determinant of leverage ratio as it has a negative relationship with STDR and TDR at 10% significance level. This negative relationship is consistent with the prediction of Signaling theory. When a company gives at least 10% cash dividend, it sends a signal to the public investors that the company has a potential of favorable future earnings and hence, the investors tend to discount the company's earnings at a lower rate. Therefore, the company can raise funds from the equity markets at lower costs. The negative result is consistent with Hossain and Ali (2012).

5.6.12 Industry Classification

To determine the impacts of industry classification on capital structure choice, I have assumed the engineering industry as the base industry among the 8 industries used in this study. The results indicate that leverage ratios of the selected industries are significantly different from that of engineering industry except the food and allied industry. The positive sign of the coefficients indicates that the leverage ratio of the respective industry is greater than that of the engineering industry to the extent of the respective coefficient and vice-versa. Hence, industry classification is also a significant determinant of capital structure of the manufacturing companies in Bangladesh. This result also supports the findings of Hossain and Ali (2012).

5.7 Results of Random Effects Tobit Regression Model

Since some companies have no long term debt in their capital structure (that means, some of values of the dependent variable LTDR in Model- II are 0), I have also applied the Random-effects Tobit Regression Model in order to verify the results obtained from the PCSE regression model. The results of this model are shown in Table 13.

Table 13. Random effects tobit regression results of model- II (LTDR)

Random-effects tobit regression Number of obs. = 740
Group variable: company Number of groups = 74
Random effects u_i ~ Gaussian Obs. per group: min. = 10
Avg. = 10
Max. = 10
Wald chi2(15) = 126.12
Log likelihood = 473.35269
Prob. > chi2 = 0.0000

LTDR	Coefficient	Std. Error	z	P > |z|	95% Confidence Interval	
MO	0.1522	0.0428	3.55***	0.000	0.0682	0.2362
GR	-0.0301	0.0109	-2.76***	0.006	-0.0514	-0.0088
PR	-0.1099	0.0752	-1.46	0.144	-0.2573	0.0376
TANG	0.2712	0.0350	7.74***	0.000	0.2025	0.3399
DSC	-0.0000005	0.000002	-0.21	0.831	-0.000005	0.0000004
LQR	0.0026	0.0012	2.17**	0.030	0.0002	0.0049
NDTS	0.0113	0.0086	1.31	0.189	-0.0056	0.0282
FC	-0.7674	0.1211	-6.34***	0.000	-1.0048	-0.5301
FCFF	0.00000004	0.0000001	0.44	0.656	-0.0000002	0.0000003
ACD	-0.0196	0.0611	-0.32	0.748	-0.1393	0.1001
DIV	0.0067	0.0103	0.64	0.519	-0.0136	0.0270
d_cem	-0.1093	0.0798	-1.37	0.171	-0.2657	0.0472
d_food	-0.0253	0.0714	-0.35	0.723	-0.1652	0.1145
d_tex	-0.0478	0.0570	-0.84	0.402	-0.1594	0.0639
d_pharma	-0.0852	0.0635	-1.34	0.180	-0.2097	0.0393
_cons	0.0478	0.0496	0.96	0.335	-0.0494	0.1450

Note. Here, *, ** and *** represent 10%, 5% and 1% significance level respectively.

Here, it is evident that the results of Random-effects Tobit Regression Model are as the same as those of PCSE results of Model- II in terms of the coefficient signs and their significance level except the industry dummy variable. The overall model is also significant at 1% significance level as Prob.>chi2 is 0.0000. Hence, it can easily be concluded that the PCSE results of Model- II are satisfactory and reliable as they conform to those of Random-effects Tobit Regression Model.

6. Testing of Capital Structure Theories

Table 14. Summary of the testing of capital structure theories

Independent Variables	Expected Signs					Observed Signs*			Consistent Capital Structure theory
	Agency theory	Static Trade-off theory	Pecking -order theory	Signaling theory	Free Cash Flow theory	Model - I	Model -II	Model -III	
MO	-	-	+				+	+	Pecking-order theory
GR	-	-	+	+			-	-	Static Trade-off theory
PR		+	-	+		-			Pecking-order theory
TANG		+	-			-	+	-	Pecking-order theory & Static Trade-off theory
DSC		+	-					-	Pecking-order theory
LQR		+	-			-	+	-	Pecking-order theory & Static Trade-off theory
NDTS		-				-		-	Static Trade-off theory
FC		-				-	-	-	Static Trade-off theory
FCFF			-		+	-		-	Pecking-order theory
AC	-					-		-	Agency theory
DIV			+	-		-		-	Signaling theory

Note. Here, * represents that only significant observed signs are reported here.

One of the objectives of this study was to test the capital structure theories applicable for the manufacturing companies in Bangladesh. Based on the PCSE regression results, the summary of the testing of capital structure theories is given in Table 14.

It is evident that four independent variables *i.e.* managerial ownership, profitability, debt service coverage and free cash flow to firm follow the Pecking-order theory whereas three variables *i.e.* growth rate, non-debt tax shield and financial costs follow the Static Trade-off theory. On the contrary, two variables *i.e.* tangibility and liquidity follow both the Pecking-order theory and Static Trade-off theory. Agency costs and dividend payment follow the Agency theory and Signaling theory respectively. Hence, it can be suggested that the Pecking-order theory and the Static Trade-off theory are the two most relevant and dominant capital structure theories in Bangladesh.

7. Conclusion and Policy Recommendations

This study aims at investigating the significant determinants of capital structure of the listed manufacturing companies in Bangladesh and also testing the relevant capital structure theories. We have used a panel data set including 74 manufacturing companies listed under 8 industries in Dhaka Stock Exchange for 10 year time period (2002-2011). The selected industries are: Cement, Ceramic, Engineering, Food & Allied, Jute, Pharmaceuticals & Chemicals, Tannery and Textile industry. We have used three regression models based on three dependent variables (*i.e.* Short term debt ratio, Long term debt ratio and Total debt ratio) and each model includes twelve independent variables. We have done two unit root tests (*i.e.* Levin-Lin-Chu Test and Fisher-type ADF Test) in order to check the stationary properties of the series and found all series stationary at level. The data set had no multicollinearity problem; rather it had the problem of heteroscedasticity and positive serial autocorrelation. That's why we have applied the Panel Corrected Standard Error (PCSE) regression model as it automatically corrects the problem of heteroscedasticity and autocorrelation and provides the best estimates of the variables. As some of the companies had no long term debt (that means, some of the values of dependent variable in Model- II was 0), Random Effects Tobit Regression Model was also run to verify the results and this model supported the results obtained from the PCSE regression model.

It is evident from the results of PCSE regression models that all of the selected variables are the significant determinants of capital structure of the listed manufacturing companies in Bangladesh. Managerial ownership was found to have positive influence on the leverage ratios. On the contrary, Growth rate, Profitability, Debt service coverage ratio, Non-debt tax shield, Financial costs, Free cash flow to firm, Agency costs and Dividend payment have negative relationship with the leverage ratios. Tangibility and Liquidity ratio have positive relationship with Long term debt only but negative relationship with Short term debt and Total debt. It was also found that the capital structure of various industries of Bangladesh differs significantly from each other. The results also suggest that the Pecking-order theory and the Static Trade-off theory are the most dominant capital structure theories in Bangladesh.

This study has important policy implications for the financial managers as well as the researchers. The financial managers should consider these determinants as yardsticks before taking the leverage decisions in order to choose the most favorable capital structure for the company so that it maximizes the shareholders' value. On the contrary, the researchers can utilize the findings and methodology of this study for their further research and also incorporate some other important factors (*i.e.* managerial behavior, credit rating, potential costs of financial distress, financial flexibility, project's risk etc.) along with larger panel data set with a view to getting a better depiction of the capital structure of the Bangladeshi companies.

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Notes

Note 1. The value is standardized by dividing FCFF by 10000 following Akhtar (2005) and Sayeed (2011).

Note 2. Proxy of Agency Costs is determined following Titman and Wessels (1988) and Akhtar (2005).

Note 3. Strongly balanced panel dataset means each panel must have the same number of observations and cover the same time span.

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Do Financial Ratios Affect Index Constitution?

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Abstract

The inclusion or exclusion of a stock from an index is important with regard to be considered as a positive signal for both institutional and individual investors. The index inclusion reflects a positive situation about the quality, risks and possible future return of the stock. Financial ratios reflect the financial solidity of the enterprise. Starting from this statement, in this study we aim to research whether financial ratios have any effect on the inclusion of the stock in the Istanbul Stock Exchange (BIST 100) index. The research on which ratios and ratio groups are effective on the stock inclusion in the index has been anaylzed by using panel logit model. It has been noted that, among the models, the one with the most significant impact on inclusion in or exclusion from the index are the activity ratio variables. This result indicates that the impact of the allocation of resource financing on the probabilities of being included in/excluded from the index is too strong with positive and negative effects of debts on the operating profit. Besides, in order to illustrate the success of the estimated results obtained from the models, the probability of inclusion or exclusion of each stock in the index is determined. The empirical results, on the basis of the financial solidity of enterprises has a significant impact on the inclusion in/exclusion from the index, show that the financial ratios are effective - indirectly- on the inclusion/exclusion.

Keywords: discrete regression and qualitative choice model, financial market, financial ratio, panel data model

1. Introduction

The stock exchange markets; provide liquidity to securities, enable the securities to be processed with a single price in the market, radiate property to the base, provide assurance as they smooth the structural change in the industry by facilitating movement of capital, and act as a guide in the economy. Due to all of these facts, stock market indices are good benchmarking tools for stock investment and they are the focus of attention of investors. The announcement of the inclusion of a stock in one of the main indices of the stock exchange is considered as a positive signal by both institutional and individual investors in terms of its quality, risks and potential future return. Investors comment on the declared data and decide on their positioning. They have to make financial decisions depending on the institutional and individual relations with the enterprise and their opinion. For example, a potential investor may decide on whether buying or not the stocks of an enterprise by examining the financial tables. The legal rules of selecting the stocks which will be included in BIST 30, BIST 50 and BIST 100 indices; except the ones in exactly custody, stocks under Takasbank custody is selected starting from the first rank after the listing from the great to the small as per the end of the stock valuation period according to the market values (number of stocks∗ final quotation). The calculation of the market values is based on the daily average number of stocks under Takasbank custody during the valuation period (IMKB, 2010). Considering the studies relevant to this subject, we can observe that, usually the factors that affect stock returns which are included in or excluded from the index (trading volume, stock price etc...) are examined. In these studies the validity of the hypothesis used to explain the abnormal returns is investigated. Although the studies in the literature do not focus on the impact of the financial ratios, we believe that they have an indirect impact on stocks being included in the indices.

According to the efficient market hypothesis financial markets reflect the whole information to the price and consequently, financial ratios also have an impact on the price. Financial ratios are the indicators of the success, reliability and structural solidity of the enterprises. The financial ratios effective in the evaluation of enterprises have significant impact on the inclusion/exclusion in indices by increasing or decreasing the interest and demand

in the stock exchange. We believe that the solidity of the financial structure of an enterprise which can be determined by the financial ratios is effective on the iclusion in the BIST 100 index. To this end, in this study, the impact of the financial ratios of the enterprises traded in stock exchange on being included in/excluded from the BIST 100 index has been examined. Whereby, the examination on which ratios and ratio groups are effective on the inclusion in the stock exchange index has been realized using panel logit models. Besides, the probability of inclusion/exclusion of each stock in the index, has been determined. As far as we know, the examination of the situation of being included in the index from this point of view is a unique study in Turkey that has not been done before. Due to this feature, the study will contribute to the literature.

2. Literature

The situation of inclusion in/exclusion from the stock exchange index and the changes in the stock has been studied by many researchers for different countries. The studies can be divided in two categories such as "the ones studying the impact of inclusion/exclusion status on the stock return" and "the ones determining the probability of inclusion in/exclusion from the index by examining impacts on inclusion/exclusion". Considering the study in the first group we can see that there are four hypotheses to explain abnormal returns. These hypotheses are "the information hypothesis", "the price pressure hypothesis", "the downward-sloping demand hypothesis" and "the liquidity hypothesis" (Lynch & Mendenhall, 1997). Shleifer (1986) and Harris and Gurel (1986) are the first ones to state that stock prices react positively to its inclusion in S&P index. Whereas in some of the studies examining the data on price and trading volume of the index, some evidence of temporary price pressure is obtained (Lynch & Mendenhall, 1997; Elliott, Ness, Walker, & Warr, 2006; Mazouz & Saadouni, 2007; Chakrabarti, Huang, Jayaraman, & Lee, 2005), in some others, it is stated that inclusion in the index causes positive permanent abnormal returns (Becker-Blease & Paul, 2010; Parthasarathy, 2011; Jog & Okumura, 2003; Yun & Kim, 2010). Although Wouters (2012) observe that the inclusion in or exclusion from World ESG index cause significant positive abnormal return, Anton, Rodriguez and Alonso (2012) state that prices rise in case of the inclusion, this situation continues for the two subsequent weeks but no abnormal positive return occurs prior to inclusion, no clear conclusion can be stated in the case of exclusion from the index. Chen (2004) comes to the conclusion that there is an asymmetric reaction in cases of inclusion in/exclusion from the index. In his study, it is stated that while there is a permanent increase in the price of the stock included in the index, no permanent decline occurs in case of exclusion. In the literature, there are also studies supporting the hypothesis of downward sloping demand curve, among these are Keratithamkul (2005), Carter (2013), Chakrabarti (2001) and Hedge and McDermott (2003).

Among the works included in the second group are Andrade, Bressan, Iquiapaza and Moreira (2013), Fernandes and Mergulhao (2013), Geppert, Ivanov and Karels (2010). Andrade et al. (2013) aim to determine the factors affecting the inclusion of the enterprises in BM&FBOVESPA Corporate Sustainability Index (CSI) and whether this inclusion is related to their market value in Brazil. The results state that larger scale, highly profitable, environment friendly enterprises have got higher probability of being included in CSI index. Fernandes and Mergulhao (2013) investigated the price impact of trading as expected changes in the FTSE 100 index composition. They estimate probit model and they offer a panel-regression event study and find that anticipative trading explains about 40 % and 23 % of the cumulative abnormal returns of inclusions and exclusions. Sarma (2010) propose a multidimensional index that can be used to compare the extent of financial inclusion across different economies and computed the index for 49 countries. This index captures information on various dimensions of financial inclusion in one single number lying between 0 and 1, where 0 denotes complete financial exclusion and 1 indicates complete financial inclusion in an economy. Geppert, Ivanov and Karels (2010) analyze the probability of being excluded from the index, of the enterprises on S&P using survival analysis and neural networks methods. Additionally although Guris, Metin and Caglayan (2009) have compared the forecasting success of the logit and panel logit models they have estimated in their study where they studied the impact of the financial ratio on the profitability of the enterprises on the BIST 100 index, they have not investigated the situation of being included in/excluded from the index.

3. Methodology

Based on the fact that financial ratios are the indicators of the strength of the financial structure of the enterprise, we believe that these ratios have significant impact on the inclusion of the stock in BIST 100 index. With this aim, in this study, the impact of financial ratios of the enterprises traded in the stock exchange, on the inclusion in/exclusion from the BIST 100 index will be examined using panel logit model. A short brief on, first classic logit model estimated using Maximum Likelihood Method and then about panel logit model.

Classic Logit Model grounded logistic distribution can be formulated as;

$$y_i = \beta' x_i + e_i \quad i = 1, \dots, N \tag{1}$$

Here, the dependent variable y_i has two different values. If the success criterion that has been set for the time period t for the unit i is true, then $y_i = 1$, if it is false, then $y_i = 0$ and x_i is the k number of expalanatory variable, β is the parameter vector and e_i is the error term. Logit model is estimated via maximum likelihood method in this study. The log-likelihood function for the logit model is;

$$logL = \sum_{i=1}^{N} y_i \beta' x_i + \sum_{i=1}^{N} log(1+e^{\beta' x_i}) \tag{2}$$

In here β parameters are estimated by the maximization of this function (Greene, 2011).

Binary panel logit models can be grouped in two different categories as fixed effects and random effects. Fixed effects binomial panel logit models can be,

$$y_{it} = \alpha_i + \beta' x_{it} + e_{it}$$
$$e_{it} = IID(0, \sigma_\varepsilon^2), \quad i=1,\dots,N, \quad t=1,\dots,T \tag{3}$$

In here i subscript denotes the cross-section dimension, t denotes the time-series dimension. Binary dependent variable is,

$$y_{it} = 0 \quad otherwise \tag{4}$$

α is scalar, β is the parameter vector with the dimension $Kx1$, x_{it} is the i^{th} observation on k number of explanatory variable and e_{it} is the error term. c represents the value of the success criterion. The effect of the unit is considered fixed in the fixed effects panel logit models (α_i). The estimation of the fixed effects logit models depend on the method of conditional likelihood in line with Chamberlain (1980). It relies on the maximization of the log likelihood function,

$$logL = -\sum_{i=1}^{N} \sum_{t=1}^{T} log\left[1+exp(\beta' x_{it}+\alpha_i)\right] + \sum_{i=1}^{N} \sum_{t=1}^{T} y_{it} (\beta' x_{it}+\alpha_i) \tag{5}$$

where β and α_i are estimators (Hsiao, 2003).

An alternative approach to fixed effects is to assume that the changes are not constant and treated as random in random effects models. The effects in these models are added to the model as part of the error term. These models are stated as,

$$y_{it} = \alpha_i + \beta' x_{it} + v_{it}, \quad \alpha_i = IID(0, \sigma_\alpha^2), \quad v_{it} = IID(0, \sigma_v^2) \tag{6}$$

In here α_i and x_{it} are independent. Estimating the models as fixed or random will make changes in parameters (Verbeek, 2000).

In the random effects models, the effects that belong to the unit are independent and come from a common distribution, and assumed that they are distributed normally. The log-likelihood function for the random effects logit model, in the event of incidental parameters are independent from $\alpha_i(x_i)$ and they are a random sample from a univariate H distribution, indexed by a finite number of parameters δ, will be,

$$logL = \sum_{i=1}^{N} log \int \prod_{t=1}^{T} F\left(\beta' x_{it}+\alpha\right)^{y_{it}} \left[1-F\left(\beta' x_{it}+\alpha\right)^{1-y_{it}}\right] dH(\alpha|\delta) \tag{7}$$

In here $F(.)$ is the distribution of the error term condtional on both x_i and α_i. The maximization of the log likelihood ensures consistent estimators to β and δ (Chamberlain, 1980, 1984).

4. Empirical Findings

In this implementation the aim is to determine whether the financial ratios are effective on the probability of being included in BIST 100 index. To this end, panel logit models are estimated with 46 financial ratios for 133 enterprises which have been included in and excluded from the BIST 100 index (Note 1). Annual data between the years 2006-2013 have been used. As dependent variable with two levels it can be expressed as follows,

$$y_{it} = \begin{cases} 1, & \text{if enterprise i is included in BIST 100 index} \\ 0, & \text{if enterprise i is excluded from BIST 100 index} \end{cases} \tag{8}$$

Financial ratios are important in terms of giving information about the financial situation of the enterprise, which will help the management to avoid fiscal ambiguities and business failures. It is possible to make different groupings in ratios calculated for the financial ratios analysis. The ratios used for analysis in this study are regrouped under four titles; liquidity ratios, financial structure ratios, efficiency ratios and profitability ratios.

Liquidity ratios measure the liquid position which can easily be encashed and sufficient to meet the enterprise's

current liabilities (Aktas, 2001). Liquid assets that can readily be converted into cash, on the assumption that they form a cushion against default. Briefly, it is a measure of the payment ability of the enterprise in terms of its short-term debts (Helfert, 2001). Financial ratios are used to determine enterprise's source structure and the ability to pay long term debts (Berk, 2000). Financial ratios try to measure the efficiency, effectiveness or efficacy of an enterprise (Bull, 2008). Activity ratios, measure the effectiveness of the enterprises that uses its assets effectively and it is usually used for comparing the enterprises operating in the same sector. Profitability ratio measures the profit achieved by the company during the period of a calendar for all its operating activities, in other words whether it is satisfactory or not.

Among the 46 financial ratios used in the implementation, 6 are of liquidity, 18 of financial structure, 7 of activity and 15 are profitability ratios. The random effects and fixed effects models are estimated with different ratio combinations. Furthermore, considering the possibility of independent variables' past values having some impact on the matter, dynamic models are also estimated. Among the estimated models, the four most significant models are shown on the Table 1 (Note 2).

Table 1. The results of panel logit models

Dependent variable: BIST100	Random Effects		Fixed Effects	
Independent Variables	Model 1	Model 2	Model 3	Model 4
Constant	-2.5222***	-4.3526***		
	(0.8832)	(1.2353)		
CR(-1)		-0.1034**		
		(0.0513)		
CRCAR	-2.0492*	-3.3849**		
	(1.1121)	(1.3629)		
LTAR	8.6623***	12.2907***	4.5398***	6.1731***
	(2.2959)	(2.9162)	(1.5958)	(2.2204)
CLTLAR	-3.6621**	-5.4013**		
	(1.8258)	(2.2151)		
LTLLTSR(-1)				-1.9589*
				(1.0274)
BCTAR	-11.9831***	-16.4308***	-10.1586***	-14.5082***
	(3.4971)	(4.5182)	(3.6038)	(4.8823)
BCLR	4.2952**	7.2329***	3.5325*	7.4489***
	(1.7546)	(2.3117)	(1.9642)	(2.7272)
ETR	-0.1017*			
	(0.0587)			
NPER			-0.0734*	
			(0.0444)	
NPTAR		4.2212*		5.1512*
		(2.3705)		(2.6726)
N and # of groups	1064-133	931-133	376-47	259-37
Wald Statistics (df)	19.70 (6)***	25.50 (7)***		
LR Chi2	593.68	508.62	14.26 (4)	19.86 (5)
Log likelihood	-364.5612	-299.3908	-140.7439	-97.7083

Note. Figures under estimated coefficients in parenthesis are standard errors.

***, ** and * indicates significance at 1 %, 5 % and 10 % statistical levels respectively.

Model 1 on table 1 is random effects model, Model 2 is dynamic random effects model, Model 3 is fixed effects model, Model 4 is dynamic fixed effects model. Variables on Table 1 are respectively: Cash Ratio (CR), Current Receivables/Current Assets Ratio (CRCAR), Liabilities/Total Assets Ratio (LTAR), Current Liabilities/Total Liabilities and Equity Ratio (CLTLAR), Long Term Liabilities/Long Term Sources Ratio (LTLLTSR), Bank Credits/Total Assets Ratio (BCTAR), Bank Credits/Liabilities Ratio (BCLR), Equity Turnover Ratio (ETR), Net Profit/Equity Ratio (NPER) and Net Profit/Total Assets Ratio (NPTAR).

Cash Ratio (CR) variable in Model 2 is a ratio measuring the amount of the short term liabilities the enterprises can

pay using their liquid assets in case of an unpredictable economic difficulty such as having problems in getting the stocks off and collecting receivables. Cash ratio seems to affect the probability of being included in excluded from the index, negatively. The cash ratio is required to be at the optimum level depending on the sector, when this ratio is too high the enterprises are considered as to hold idle money. Current Receivables/Current Assets Ratio (CRCAR) appearing significant in Model 1 and Model 2. This ratio indicates which part of the current assets are derived from the futures sales. The result of the analysis show that enterprise's the high term sales have negative impact on the inclusions and exclusions to the index. The fact that this ratio is too high reflects the cash collecting difficulties of the enterprise. In all the models on Table 1 Liabilities/Total Assets Ratio (LTAR) variable has a positive impact on the inclusion in/exclusion from the index. This ratio, measures the percentage of the enterprise's assets financed by the liabilities. The business partners prefer this ratio to be rather high. Because the high ratio indicates that the liabilities are used in a larger scale compared to the equities. This allows them to get higher dividend by increasing the profitability of business with the leverage effect of financing but this situation has an optimal point (Akdogan & Tenker, 2007). In terms of financial structure the financing of the assets with the equities is considered to be reasonable therefore the enterprises that are likely to be included in BIST 100 are usually financed with liabilities. Current Liabilities / Total Liabilities and Equity Ratio (CLTLAR) variable in Model 1 and Model 2 have negative impact on the inclusion in/exclusion from the index. This ratio is the percentage of the short term liabilities used for the financing of the assets of the enterprise. The fact that this ratio is high shows that the active is mostly financed with the short term liabilities. Only Long Term Liabilities/Long Term Sources Ratio (LTLLTSR) in Model 4, as the variable's value increases the probability of being included in/excluded from the index is affected negatively. This ratio measures long-term liabilities' concern in the constant capital. Constant capital is the sum of equity and long-term resources. The increase in the LTLLTSR ratio shows that the enterprise's long term liabilities and financing is higher than the equities. This ratio should be equal to or above the total sum of short and long term equities because equities not only show the ownership rights of the business partners over the assets but they are also a guarantee for the creditors. The variable that represents Bank Credits/ Total Assets Ratio (BCTAR), present in all the models is determined to be the one with higher negative impact on the inclusion in/exclusion from the index. This ratio measures the amount of bank credit used to finance the assets of the enterprise. The negative value of this ratio increases the interest burden of the enterprises with bank loans and reduces the possibility of entering into this index. The variable that represents Bank Credits/ Liabilities Ratio (BCLR), presented in all the models indicates the amount of liabilities consisted of bank loans. This ratio has a positive impact on the inclusion in/exclusion from the index. The higher is the value of the variable Equity Turnover Ratio (ETR) only present in Model 1, the lower is the probability of the inclusion/exclusion from the index. This ratio measures the effectiveness of the usage of the assets. Normally, the high value of this ratio expresses the effective and economical usage of the enterprise's equity, but the abnormal high value of this ratio reflects the fact that the equity of the enterprise is insufficient and it widely uses the liabilities. The variable Net Profit/Equity Ratio (NPER) only present in Model 3, indicates the return on the investment that the shareholders are receiving based on the equity they have in the business. This ratio is affected by both the profit margin and the turnover of the total assets. The increase of prices or decrease of the unit cost is provided by the increase in operating profit. The adequacy of the net profit/equity ratio in enterprises changes depending on the alternative usage areas of the capital. Net Profit/ Total Assets Ratio (NPTAR) are used to determine how effective the actives are used. It has been observed that the ratio value has a positive impact on the probability of inclusion in/exclusion from index. As mentioned before, beside researching which ratios and ratio groups are effective on taking part in the BIST 100 index, to show the success of the estimation results obtained from the models fitted values of the models are used as below and the successful estimation ratios are calculated.

$$\hat{y}_{it} = \begin{cases} 1, & if \geq 0.5 \\ 0, & if < 0.5 \end{cases} \tag{9}$$

When the fitted values of the estimated models are analyzed the probability of reliable choice of stocks included in/excluded from the index in BIST 100 are; 66 % for model 1, 63.5% for model 2, 72.5% for model 3 and 54.5% for model 4. The model with the highest estimation power is the fixed effects model. The probability of inclusion in/exclusion from the BIST 100 index of the stock, will be calculated by placing its financial ratios in this estimated fixed effects model. The investors will consider this situation as a negative or positive signal concerning the future of the stock.

5. Conclusion

Investors closely follow the stocks in terms of their quality, risks, the probable returns in the future and the inclusion in/exclusion from the stock market by reviewing or changing their positions. In this study, 46 financial ratios are used as independent variables and the static and dynamic panel logit models are estimated for the 133

enterprises included or not in the stock market between the years 2006-2013, dependent variable is 1 for the enterprise is included in BIST 100 and 0 for excluded from. The best models with significant results have been declared.

Among the models, mostly the activity ratio variables have been shown to be statistically significant. This result indicates that the impact of the allocation of resource financing on the probabilities of being included in/excluded from the index is too strong with positive and negative effects of debts on the operating profit. While Cash Ratio, Current Receivables/Current Assets Ratio, Current Liabilities/Total Liabilities and Equity Ratio, Long Term Liabilities/Long Term Sources Ratio, Bank Credits/ Total Assets Ratio, Equity Turnover Ratio, Net Profit/Equity Ratio variables in models have a negative effect on the inclusion/exclusion probabilities from the index, Liabilities/Total Assets Ratio, Bank Credits/Liabilities Ratio, Net Profit/ Total Assets Ratio variables have a positive effect on the situation. This situation shows that the probability of the inclusion of the enterprises is higher than the others that; hold the money idle, believed to have cash proceeds problems, under pressure of third persons in terms of running its operations, under interest burden with too much bank credit, highly in dept with insufficient equity, have good self financing, provide comfortable working conditions to the management, facilitate the distribution of profit to the share holders as interest-free and non repayable source. This situation is usually reflects the fact that enterprises are financed with liabilities and are subject to a high interest rate.

When the estimated models are examined, the probability of determining the stock being included in/excluded from the BIST 100 index truely is 66 % for Model 1, 63.5 % for Model 2, 72.5 % for Model 3 and 54.5 % for Model 4. Among the determined models the one with the highest forecast ability is fixed effects model.

Although being included in or excluded from the index is determined by the trading volumes and the prices, as the financial ratios are the indicators of the strength of the enterprises, usually the stocks of the enterprises that have good financial ratios are likely to be more frequently traded and their price can increase. In our implementation realized with the presumption that the financial solidity of the enterprise has a significant impact on being included in the index, we have concluded that financial ratios are –even- indirectly effective on the inclusion in/exclusion from the index.

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Notes

Note 1. Financial ratios are calculated using the financial tables published in forex.

Note 2. 46 different finacial ratios can be obtained from the authors upon request.

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Test of Policy Ineffectiveness Proposition with Real Expectations for Turkey

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Abstract

The purpose of this study is to determine the validity of Policy Ineffectiveness Proposition (PIP) for the study period in which Inflation Targeting policy is kept transparent and accountability at the forefront. In the study, seasonally adjusted and seasonally unadjusted data was analyzed with Cobb-Douglas Production Function (CDPF), Lucas Aggregate Supply Function (LASF), Variance Autoregressive (VAR) and Impulse-Response Functions. Expectations series are calculated using the real expectations data obtained from the surveys conducted across the public and private sectors by the central banks.

The simultaneous effects of anticipated and unanticipated expectations of inflation and exchange rate on real output are tested using CDPF and LASF. In general, the results obtained from CDPF and LASF do not support the PIP. Looking at the results of VAR analysis, it has been determined that coefficients of anticipated expectations and some unanticipated expectations are significant. The results of Impulse-Response analysis have shown that any innovation or shock in unanticipated expectations leads to an increase in anticipated expectations of inflation. In addition, in the case of a new innovation or shock in the set of information available about the anticipated expectations, it can be said that it takes between five and eight months for the real sector to incorporate this update. The results of VAR and Impulse-Response analysis also do not support the PIP.

Keywords: policy ineffectiveness proposition, anticipated and unanticipated expectations, VAR analysis, rational expectations

1. Introduction

Expectations were first thought to be rational by Muth (1961), who defined the Rational Expectations Hypothesis more precisely as follows.

...that expectations of firms (or, more generally, the subjective probability distribution of outcomes) tend to be distributed, for the same *information set, about the prediction of the theory (or the "objective" probability distributions of outcomes)* (Muth, 1961, p. 316).

According to the rational expectations hypothesis; while forming their expectations of the future, economic agents fully use all the existing –albeit scarce - information. Since it is assumed that economic agents do not make systematic errors, expected values of prediction errors are zero and do not contain autocorrelation.

Lucas (1973) and Sargent and Wallace (1975) developed PIP based on the idea that only the unanticipated policies are effective on real variables; however anticipated policies have no effect on these variables. Barro (1977, 1978) who was first to analyse PIP empirically, tested relations of anticipated and unanticipated monetary policies with unemployment and real output for the US. The results of both of Barro's studies (1977, 1978) determined that only unanticipated monetary policies were effective on real output and unemployment. Results supporting PIP were achieved by Batchelor and Sherif (1980) with seasonally adjusted data for England, by Wogin (1980) for Canada, by Canarella & Pollard (1989) for 16 Latin American countries, by Khan (2008) with data that take seasonality into account for Pakistan, and by Komijani et al. (2012) for Iran.

Criticising the method of Barro (1977, 1978), Mishkin (1982) used nonlinear generalized least squares method in estimation of his equations. The results of Mishkin's (1982) study using seasonally adjusted data for the US, Darrat's (1985) study on Italy, Mohabbat & Al-Saji's (1991) study on Iraq, Cover's (1992) study using

seasonally adjusted data for the US, Marashdeh's (1993) study on Malaysia, Karras's (1996) study on 38 countries, Chu and Ratti's (1997) study on Japan, Begum's (1997) study on Bangladesh, and Karras and Stokes' (1999) study using seasonally adjusted data for the US do not support PIP. The results of the study carried out by Hucket (2003) using seasonally adjusted data for Economic Monetary Union supported PIP for some of the countries while not supporting others.

Uygur (1983) is prominent in the studies dealing with the Turkish Economy. His study of the validity of the PIP in the manufacturing industry was investigated with Lucas' (1973) supply function using quarterly series on the real expectations calculated through survey data and PIP was rejected. Results not supporting PIP were obtained by Yamak and Kucukkale's (1998) study using quarterly data, McGee and Stasiak's (1985) study using VAR model, Peker's (2007) study, and Cochrane's (1998) model based on VAR using seasonally adjusted monthly data. On the other hand, Abaan (1987) using quarterly data, and Tanrıover and Yamak (2012) using seasonally adjusted quarterly data obtained results supporting PIP. Bilgili (1999) accepted PIP for quarterly US data but rejects it for Turkey. In Taban's (2004), study PIP is supported when narrow money supply (M1) is used; however it does not support it when a broader money supply (M2) is used. Hasanov (2006) concluded that for the quarterly data, PIP is supported when the distinction between unanticipated expansionary and contractionary monetary policy is rejected, but it isn't supported when the distinction is recognised. Berument and Ceylan (2010) investigated the effects of anticipated and unanticipated United States Federal Funds target rate changes on the domestic interest rates of developed and developing/emerging countries for the period of 1989-2008. Results provided supporting PIP and suggested unanticipated changes have a greater effect than anticipated changes and the significant effects are greater in the developed markets than developing/emerging markets. Berument, et al. (2007) reached the similar results for the Turkish economy. Sulku (2011) tested the long run neutrality of money for the Turkish economy and monetary aggregates M1, M2, M2Y and M3 applying Fisher and Seater (1993) ARIMA framework during the period of 1987:01-2006:03. The results hold long run neutrality of money hypothesis under all alternative monetary aggregates and PIP cannot be rejected. Altunoz (2014) rejected neutrality of Money hypothesis that suggested by quantity theory of money for 1985-2013 by using unit root, cointegration and Granger causality tests and nevertheless PIP is rejected. Tuğcu (2015) Hatemi-J (2008) tested Neutrality of Money Hypothesis in Turkey for the period 1960-2012 using cointegration test and concluded that Neutrality Hypothesis does not hold for Turkey so that PIP hypothesis is rejected.

Based on the above, it is clear that consensus has not been achieved on the effectiveness of anticipated and unanticipated expectations and the validity of PIP. While the results of some studies support PIP, others do not and in this regard the topic is still debated. In addition, the PIP test is usually done by derivation of anticipated and unanticipated expectations through econometric models, although the number of the studies using real data and surveys are very limited. In this study, adopting a different approach, the anticipated expectations are defined as modified means of the questionnaires distributed by The Central Bank of the Republic of Turkey (CBRT). They are not derived using any model or equation. Both seasonally adjusted and unadjusted data are included in the analysis. Thus, the effect of seasonal adjustments on the results could be observed. In the study period, inflation targeting monetary policy that the CBRT uses to constantly inform the public, that requires high levels of independence, transparency and accountability from the CBRT, is implemented. For this reason, the expectations during this period are predicted to be more anticipated and rational. Also during this period, inflation is lower and more stable compared to previous periods.

In the first part of the study, the literature associated with the PIP takes part, the second part includes the examination of the development and change of rationality in the process of inflation targeting in Turkey. In the third part of the study data and to apply econometric methods have been introduced and the results obtained from this study are presented in tables. The results obtained from the study have been interpreted and proposals are offered in the conclusion section.

The aim of the study is to determine the impact of anticipated and unanticipated expectations on real output using monthly data from 2006:01-2012:12 in which Inflation Targeting policy is kept transparent and accountability at the forefront. The results obtained from CDPF, LASF, VAR and impulse-response analysis do not support the PIP.

2. Inflation Targeting and Rationality

The inflation-targeting monetary policy was implemented in the 2002-2014 period in Turkey, and is still being continued. One of the most important features of the inflation-targeting program is that the CBRT is independent, transparent, and accountable. A law (Note 1) issued in 2001 ensured that the CBRT was to have instrument independence; and its transparency and accountability was increased. 4th article of this law emphasizes that the

main objective of the Central Bank is to maintain price stability and it can directly determine the monetary policy and monetary policy tools it will use to achieve this objective. Central Bank is has been described as the only competent and responsible authority to determine the monetary policy instruments and implement monetary policy. However, it can support the economic growth and employment policies of the government provided that they do not conflict with price stability goal.

The CBRT - which is independent, transparent and accountable - declares the target rate of inflation to the public beforehand and which policies it will implement to meet the target. The CBRT is primarily responsible for the achievement of the target; and if the target is not met the reasons for this should be explained to the public. Credibility and sustainability of inflation-targeting policy of CBRT is adversely affected if the target is not met.

Although Bade and Parkin (1978) determined that the independence of the central bank has limited impact on inflation, the study, Bernanke et al. (1999) carried out on 7 countries shows that the increase in independence of the central bank reduces both the inflation rate and public inflation expectations. Klomp and de Haan (2010) have used the results of previously conducted 59 studies and determined that the results vary according to independence indicator, country, period, and model specification and estimation methods however the variety isn't derived from independence indicator. The results of meta-analysis carried out using the conclusion of 59 empirical studies presents that independence of central bank have a really significant negative impact on inflation.

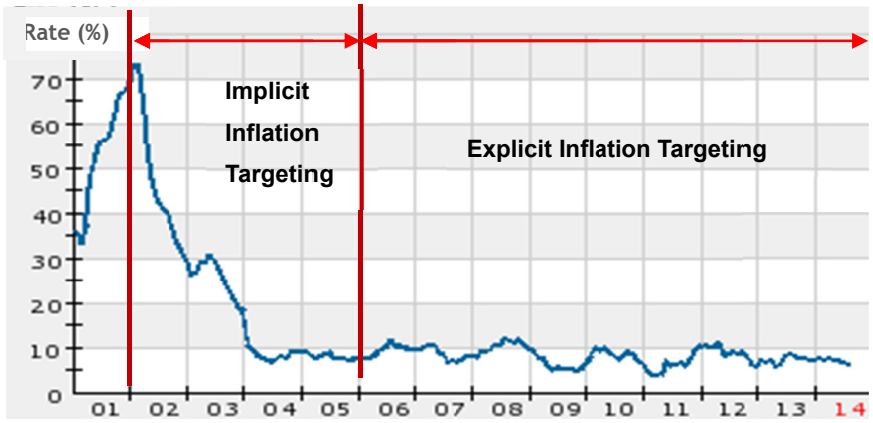

Figure 1. Inflation rate between 2001-2014

Note. http://www.tcmb.gov.tr/. Accessed: 28.08.2014.

The inflation-targeting which was implemented implicitly between 2002 and 2005, shifted to explicit from 2006 onwards in Turkey. In case of implicit inflation targeting the central bank targets the inflation implicitly and use all its opportunities to achieve this goal. As seen in Fig 1 as a result of increase in independency, transparency and accountability of the central bank, implementation of implicit inflation targeting program has been successful and inflation has decreased to 8-9% from 70-80%. The inflation rate seared in this level of inflation and it became hard to reduce inflation below these levels. Explicit inflation targeting policy was adopted enable further reduce in inflation.

In the case of the CBRT being transparent and accountable, inflation rate targets being declared beforehand, clarification on which policies will be implemented to meet the target, and - if the target is not met, -what steps will be taken, it is believed that expectations will be more rational because the CBRT informs and updates the public consistently. Moreover, after 2006 the inflation rate volatility fell and subsequently stabilized; hence became easier and more accurate to estimate the more stable inflation rate. For this reasons, expectations are expected to be more rational and support PIP in the period after 2006.

3. Econometric Analysis and Data

The effects of the real anticipated and unanticipated survey expectations series on real variables are analysed with monthly data for the period of 2006:01-2012:12 when inflation targeting was implemented in the Turkish economy. Both seasonally adjusted and unadjusted series are used in the analysis. All the variables used in the analysis were collected from the CBRT Electronic Data Delivery System. Modified mean (Note 2) values obtained from surveys conducted by the CBRT were used as anticipated series of expectations. Anticipated

monthly (p_m^a), annual (twelve months, p_y^a), and year-end (p_{ye}^a) inflation expectation of CPI (Consumer Price Index), and anticipated monthly (er_m^a) and year-end (er_{ye}^a) expectation of exchange rate of US Dollar are included in the data.

Unanticipated inflation values were obtained by subtracting anticipated rate of inflation from the inflation rate (p) calculated using CPI (2003=100) index of realisation values, and unanticipated exchange rate were obtained by subtracting anticipated exchange rate from the exchange rate (er) of US Dollar .

Accordingly, monthly ($p_m^{ua} = p_m - p_m^a$), annual (twelve months) ($p_y^{ua} = p_y - p_y^a$) and year-end ($p_{ye}^{ua} = p_{ye} - p_{ye}^a$) values of unanticipated inflation expectations, and monthly ($er_{ye}^{ua} = er_{ye} - er_{ye}^a$), year-end ($er_{ye}^{ua} = er_{ye} - er_{ye}^a$) values of unanticipated exchange rate expectation are calculated.

In the economic growth equation, growth rate of industrial production index (2010 = 100) as real output (y), growth rate of intermediate goods (Note 3) production index as the capital (k), and growth rate of labour force as labour (l) data are used. To take the effects of the Global Financial Crisis into account, the Crisis variable D_c is formed by specifying the period 2008:12-2009:03 when the effects of the crisis were the most intense as 1 and the other periods as 0.

3.1 Augmented Dickey-Fuller (ADF) Test

In this study, whether variables are stationary or not is significant in two respects. First, the variables used in the time series analysis should be stationary and should not contain unit root to prevent spurious regressions. In the event of lack of stationary of variables and spurious regression estimates, the estimations and the equation results won't be reliable. Secondly, non-stationary series show Random Walk property. Determining the future values of such series or estimating is difficult. Stationary series are predictable because they disperse around a certain mean with fixed variance. Stationary of series means series can be estimated easily by individuals with rational expectations. One of the most basic and widely used tests to investigate whether or not the variables are stationary is the ADF test.

The ADF test was developed by Dickey and Fuller (1979, 1981). For a variable Y, stationarity of which is investigated in the ADF test, *none*, *intercept* and *intercept and trend* models are as follows:

$$\Delta Y_t = \rho Y_{t-1} + \sum_{i=1}^{p} \alpha_i \Delta Y_{t-i} + e_t \quad \text{(None)} \tag{1}$$

$$\Delta Y_t = \alpha_0 + \rho Y_{t-1} + \sum_{i=1}^{p} \alpha_i \Delta Y_{t-i} + e_t \quad \text{(Intercept)} \tag{2}$$

$$\Delta Y_t = \alpha_0 + T + \rho Y_{t-1} + \sum_{i=1}^{p} \alpha_i \Delta Y_{t-i} + e_t \quad \text{(Intercept and Trend)} \tag{3}$$

An optimal lag length of the dependent variable is located on the right side of the equations as an explanatory variable in order to eliminate autocorrelation. Modified Akaike Information Criterion is used to determine the optimal lag length in the equation. If t statistics calculated for coefficient of e_t is greater than the MacKinnon (1996) table value, the null hypothesis, which expresses that the series is non-stationary, is rejected, so the series is stationary. Otherwise, the null hypothesis cannot be rejected and it is determined that the series is non-stationary.

Table 1. ADF test (seasonally unadjusted)

Variables	None	Intercept	Intercept and Trend
y	-13.32 (0) [a]	-13.32 (0)[a]	-13.25 (0) [a]
k	-5.27 (2) [a]	-5.24 (2) [a]	-5.20 (2) [a]
l	-0.74 (11)	-3.43 (0) [a]	-3.44 (0) [c]
p_m^a	-0.25 (11)	-5.32 (0) [a]	-5.30 (0) [a]
p_m^{ua}	-8.77 (0) [a]	-8.72 (0) [a]	-8.68 (0) [a]
p_y^a	-0.24 (1)	-3.78 (1) [a]	-3.70 (1) [b]
p_y^{ua}	-1.98 (0) [b]	-2.41 (0)	-2.69 (0)
p_{ye}^a	-0.41 (0)	-2.86 (0) [b]	-3.02 (0)
p_{ye}^{ua}	-2.85 (0) [a]	-2.81 (0) [c]	-2.74 (0)
er_m^a	-2.25 (1) [b]	-2.33(1)	-2.39 (1)
er_m^{ua}	-7.91 (0) [a]	-7.99 (0) [a]	-7.97 (0) [a]
er_{ye}^a	-2.10 (2) [b]	-2.12 (2)	-2.26 (2)
er_{ye}^a	-7.35 (0) [a]	-7.40 (0) [a]	-7.34 (0) [a]

Note. a, b, c respectively significant at %1, %5 and %10. The values in parentheses are the optimal lag length. Maximum lag is 11.

As shown in Table 1, all the seasonally unadjusted variables are significant I(0) at 5% namely stationary. All variables can be used in the analysis and the predictability of the series is high.

Table 2. ADF test (seasonally adjusted)

Variables	None	Intercept	Intercept and Trend
y	-3.96 (2) [a]	-4.02 (2) [a]	-4.01 (2) [b]
k	-3.08 (5) [a]	-3.17 (5) [b]	- 3.20 (5) [c]
l	-1.25 (5)	-4.53 (1) [a]	-4.56 (1) [a]
p_m^a	-0.29 (3)	-4.45 (1) [a]	-4.51 (1) [a]
p_m^{ua}	-4. 72 (2)[a]	-4.69 (2) [a]	-2.40 (7)
p_y^a	-0.00 (11)	-3.25 (1) [b]	-3.17 (1) [c]
p_y^{ua}	-1.73 (10) [c]	-2.38 (0)	-2.66 (0)
p_{ye}^a	-0.65 (1)	-2.89 (1) [b]	-3.21 (1) [c]
p_{ye}^{ua}	-2.66 (0) [a]	-2.67 (0) [c]	-2.58 (0)
er_m^a	-3.03 (6) [a]	-7.36 (0) [a]	-7.32 (0) [a]
er_m^{ua}	-2.60 (7) [a]	-2.61 (7) [c]	-4.50 (2) [a]
er_{ye}^a	-2.82 (6) [a]	-2.81 (6) [c]	-6.32 (0) [a]
er_{ye}^{ua}	-5.30 (2) [a]	-4.89 (2) [a]	-3.95 (2) [b]

Note. a, b, c respectively significant at %1, %5 and %10. The values in parentheses are the optimal lag length. Maximum lag is 11.

In Table 2, all the seasonally adjusted variables except p_y^{ua} were found to be I(0) and statistically significant at 5%, so variables are stationary. p_y^{ua} was significant at 10%. Again, all the seasonally adjusted variables can be used in the analysis and future values of series can be estimated easily by individuals with rational expectations.

3.2 Determining the Impact of Anticipated and Unanticipated Expectations on Real Output

Cobb and Douglas' (1928) Production Function and LASF can be used to determine the effects of anticipated and unanticipated expectations on the level of real output.

3.2.1 Cobb-Douglas Production Function

CDPF is one of the most well-known and commonly used production functions. CDPF can be used in investigation of the effect of anticipated and unanticipated inflation on real output. CDPF function can be written as follows.

$$Y_t = AK_t^{\beta 1} L_t^{\beta 2} \tag{4}$$

Here Y is real output, K is capital, L is labour, β_1 is the impact of capital on output, β_2 is the effect of labour on output, A is total factor productivity, and t is time notation. CDPF indicates that production amount varies depending on capital and labour variables. In order to be able to predict the function, the logarithms of both sides of the equation are taken and the equation is written as follows.

$$logY_t = logA + \beta 1\ logK_t + \beta 2\ logL_t \tag{5}$$

Time derivative or difference of both sides is taken to convert the equation to growth equation. In this case the growth equation can be written as follows.

$$\Delta logY_t = \Delta logA + \beta 1\ \Delta logK_t + \beta 2\ \Delta logL_t \tag{6}$$

In the equation, $\Delta logY$ refers to the growth rate of real output, $\Delta logK$ to growth rate of capital and $\Delta logL$ to growth rate of labour. When anticipated and unanticipated expectations are included in the equation,

$$\Delta logY_t = \Delta logA + \beta 1\ \Delta logK_t + \beta 2\ \Delta logL_t + \delta\ E(p_t|I_{t-i}) + \gamma\ [p_t - E(p_t|I_{t-i})] \tag{7}$$

Inflation expectations of t period, estimated with available data set i period before is expressed as $E(p_t|I_{t-i})$, the impact of anticipated expectations on real output as δ, the level of inflation during period t as p_t, t period inflation expectation which is unanticipated i terms before as $[p_t - E(p_t|I_{t-i})]$ and the impact of

unanticipated expectations on real output as γ. When the equation is rearranged in order to simplify it, we get;

$$y_t = \beta_0 + \beta 1\ k_t + \beta 2\ l_t + \delta\ p_t^a + \gamma\ p_t^{ua} + u_t \quad (8)$$

Here, $y_t = \Delta logY_t$, $\beta_0 = \Delta logA$, $k_t = \Delta logK_t$, $l_t = \Delta logL_t$, $p_t^a = E(p_t|I_{t-i})$, $p_t^{ua} = p_t - E(p_t|I_{t-i})$, u_t random error term.

In Tables 3 and 4, CDPF is estimated for inflation and exchange rate with seasonally adjusted and unadjusted data.

In Table 3, CDPF is estimated for inflation expectations with both seasonally adjusted data and seasonally unadjusted data. The coefficients of variable $\boldsymbol{k}$ are found to be significant in all the equations while $\boldsymbol{l}$ is significant only for seasonally unadjusted variables. $\boldsymbol{p_t^a}$ is significant in all the seasonally adjusted equations and for seasonally unadjusted monthly prediction of inflation expectation, and $\boldsymbol{p_t^{ua}}$ is statistically insignificant in all the equations.

Crisis dummy is statistically more significant in seasonally adjusted data than seasonally unadjusted one. No equation includes autocorrelation however it can be seen in the table that seasonal adjustment reduces coefficients of determination in equations and disrupts homoscedasticity and normal distribution. Whether it is estimated using seasonally adjusted or seasonally unadjusted data, in all cases any evidence supporting PIP could not be found.

Table 3. CDPF with inflation expectation

Variables	Seasonally Unadjusted			Seasonally Adjusted		
	$E(p_t\|I_{t-1})$	$E(p_t\|I_{t-12})$	$E(p_t\|I_{ye})$	$E(p_t\|I_{t-1})$	$E(p_t\|I_{t-12})$	$E(p_t\|I_{ye})$
$\boldsymbol{k}$	0.9266 [a]	0.9332 [a]	0.9342 [a]	0.3078[a]	0.3014[a]	0.3015[a]
	(25.30)	(24.75)	(24.88)	(9.01)	(9.18)	(9.14)
$\boldsymbol{l}$	-0.5035[c]	-0.5902[b]	-0.5583[b]	0.2940	0.1107	0.0714
	(-1.94)	(-2.30)	(-2.16)	(0.65)	(0.25)	(0.17)
$\boldsymbol{p_t^a}$	0.0182[b]	0.0053	0.0031	-0.0228 [b]	-0.0068[a]	-0.0044[a]
	(2.11)	(1.31)	(1.46)	(-2.52)	(-2.86)	(-3.63)
$\boldsymbol{p_t^{ua}}$	-0.0062	-0.0022	-0.0002	-0.0012	-0.0014	-0.0011
	(-1.36)	(-1.32)	(-0.09)	(-0.35)	(-1.46)	(-1.12)
$\boldsymbol{D_c}$	-0.0192	-0.0256 [c]	-0.0232 [c]	-0.0335[a]	-0.0251[a]	-0.0287[a]
	(-1.46)	(-1.93)	(-1.76)	(-4.33)	(-3.34)	(-3.87)
C	-0.0092	-0.0295	-0.0210	0.0187 [a]	0.0526 [a]	0.0387 [a]
	(-1.39)	(-1.08)	(-1.21)	(2.99)	(3.29)	(3.92)
R^2	0.90	0.90	0.90	0.62	0.65	0.65
DW	2.32	2.31	2.26	1.91	2.10	2.00
LM	2.35	2.05	1.58	0.16	1.00	0.25
	[0.13]	[0.15]	[0.21]	[0.69]	[0.32]	[0.62]
ARCH	0.67	0.16	0.13	10.23	6.57	4.70
	[0.42]	[0.69]	[0.72]	[0.00]	[0.01]	[0.03]
JB	3.25	1.58	1.53	31.10	36.19	38.19
	[0.20]	[0.46]	[0.47]	[0.00]	[0.00]	[0.00]
n	83	83	83	83	83	83

Note. a, b, c respectively significant at %1, %5 and %10. The values in parentheses are calculated t statistics. The values in square brackets are probability values. Crisis dummy D_c has been added to the equations.

Table 4. CDPF with exchange rate expectation

Variables	Seasonally Unadjusted		Seasonally Adjusted	
	$E(er_t\|I_{t-1})$	$E(er_t\|I_{ye})$	$E(er_t\|I_{t-1})$	$E(er_t\|I_{ye})$
k	0.9212 [a]	0.9186 [a]	0.3162[a]	0.3137[a]
	(25.35)	(24.62)	(9.05)	(9.11)
l	-0.6417[b]	-0.5212 [b]	0.2658	0.2930
	(-2.52)	(-1.96)	(0.57)	(0.63)
er_t^a	0.1640[b]	-0.0191	-0.0607	-0.1133[b]
	(2.26)	(-0.21)	(-1.29)	(-2.00)
er_t^{ua}	-0.0002	0.0005	0.0001	0.0001
	(-0.61)	(1.29)	(0.03)	(-0.01)
D_c	-0.0276[b]	-0.0228 [c]	-0.0283[a]	-0.0288[a]
	(-2.11)	(-1.70)	(-3.61)	(-3.76)
C	0.0029	0.0037	0.0036 [c]	0.0037 [c]
	(1.00)	(1.23)	(1.73)	(1.81)
R^2	0.90	0.90	0.60	0.61
DW	2.25	2.24	1.85	1.86
LM	1.43	1.27	0.00004	0.0016
	(0.24)	(0.26)	(0.99)	(0.97)
ARCH	1.68	0.24	5.67	4.07
	(0.20)	(0.62)	(0.02)	(0.05)
JB	1.39	1.65	33.86	28.51
	(0.50)	(0.44)	(0.00)	(0.00)
n	83	83	83	83

Note. a, b, c respectively significant at %1, %5 and %10. The values in parentheses are t statistics. The values in square brackets are probability values. Crisis dummy D_c has been added to the equations.

Cobb-Douglas Production equations have been estimated for Exchange Rate Expectation in Table 4. Similar results with Table 3 were obtained in anticipated and unanticipated Exchange Rate Expectation for one month before and the year-end. Consequently PIP is rejected.

3.2.2 Lucas Aggregate Supply Function

Lucas (1973) suggested that a change in the level of real output basically occurs only in an unanticipated change, namely in case of a surprise, and described this with the following equation.

$$y_t = \alpha + \gamma[p_t - E(p_t|I_{t-i})] + \lambda\, y_{t-1} + \varepsilon_t \quad |\lambda| < 1 \tag{9}$$

$$y_t = \alpha + \gamma\, p_t^{ua} + \lambda\, y_{t-1} + \varepsilon_t \tag{10}$$

Here y_t and y_{t-1} respectively refer to change in real production level in t and $t-1$ period, p_t to inflation level in t period, p_t^{ua} to unanticipated expectations, α, γ and λ to coefficients of equation, and ε_t to random error term. In this model, it is stated that whether unanticipated expectations are effective on real output can be investigated.

In Tables 5 and 6, LASF is estimated for inflation and exchange rate with seasonally adjusted and unadjusted data.

When the equations estimated for LASF are examined, it is seen that except for seasonally adjusted estimation for the 12 months before, in all the equations, unanticipated inflation expectations are statistically insignificant, so PIP is not supported. In general, although one lag of the dependent variable takes part on the right side of the equation as the dependent variable, the problem of autocorrelation has been seen. Although problems of heteroscedasticity and normal distribution do not occur in estimations formed with seasonally unadjusted variables, problems of heteroscedasticity and normal distribution are experienced in estimations with seasonally adjusted variables. However, the crisis dummy variable has gained significance at higher levels in seasonally unadjusted equations. Coefficients of determination of equations decreased significantly in LASF.

Table 5. LASF with inflation expectation

Variables	Seasonally Unadjusted			Seasonally Adjusted		
	$E(p_t\|I_{t-1})$	$E(p_t\|I_{t-12})$	$E(p_t\|I_{ye})$	$E(p_t\|I_{t-1})$	$E(p_t\|I_{t-12})$	$E(p_t\|I_{ye})$
y_{t-1}	-0.4151 [a]	-0.4191 [a]	-0.4187 [a]	-0.0705	-0.1342	-0.0623
	(-4.00)	(-4.03)	(-4.03)	(-0.63)	(-1.21)	(-0.55)
p_t^{ua}	0.0075	-0.0027	0.0032	-0.0010	-0.0033 [b]	-0.0006
	(0.63)	(-0.60)	(0.69)	(-0.21)	(-2.44)	(-0.41)
D_c	-0.0717 [c]	-0.0750 [b]	-0.0700 [c]	-0.0437 [a]	-0.0475 [a]	-0.0440 [a]
	(-1.91)	(-2.01)	(-1.86)	(-3.70)	(-4.15)	(-3.72)
C	0.0105	0.0150	0.0090	0.0057 [b]	0.0112 [l]	0.0060 [b]
	(1.30)	(1.39)	(1.07)	(2.30)	(3.41)	(2.33)
R^2	0.19	0.19	0.19	0.16	0.22	0.16
DW	2.09	2.08	2.09	1.70	1.67	1.70
LM	3.54	3.33	3.31	15.26	11.09	15.47
	(0.06)	(0.07)	(0.07)	(0.00)	(0.00)	(0.00)
ARCH	0.46	0.64	0.42	3.70	2.84	3.83
	(0.50)	(0.43)	(0.52)	(0.06)	(0.10)	(0.05)
JB	1.15	1.64	1.16	506	514	471
	(0.56)	(0.44)	(0.56)	(0.00)	(0.00)	(0.00)
n	82	82	82	82	82	82

Note. a, b, c respectively significant at %1, %5 and %10. The values in parentheses are t statistics. The values in square brackets are probability values. Crisis dummy D_c has been added to the equations.

Table 6. LASF with exchange rate expectation

Variables	Seasonally Unadjusted		Seasonally Adjusted	
	$E(er_t\|I_{t-1})$	$E(er_t\|I_{ye})$	$E(er_t\|I_{t-1})$	$E(er_t\|I_{ye})$
y_{t-1}	-0.4133 [a]	-0.4162 [a]	-0.0724	-0.0808
	(-3.93)	(-3.96)	(-0.65)	(-0.69)
er_t^{ua}	-0.0002	-0.0001	-0.0001	0.0005
	(-0.15)	(-0.04)	(-0.11)	(0.27)
D_c	-0.0740 [c]	-0.0740 [c]	-0.0436 [a]	-0.0441 [a]
	(-1.98)	(-1.97)	(-3.69)	(-3.68)
C	0.0106	0.0107	0.0057 [b]	0.0058 [b]
	(1.29)	(1.30)	(2.30)	(2.31)
R^2	0.18	0.18	0.16	0.16
DW	2.09	2.08	1.69	1.70
LM	3.53	3.22	16.29	15.94
	(0.06)	(0.08)	(0.00)	(0.00)
ARCH	0.56	0.57	3.64	3.49
	(0.46)	(0.46)	(0.06)	(0.07)
JB	1.44	1.46	494	488
	(0.49)	(0.48)	(0.00)	(0.00)
n	82	82	82	82

Note. a, b, c respectively significant at %1, %5 and %10. The values in parentheses are t statistics. The values in square brackets are probability values. Crisis dummy D_c has been added to the equations.

Almost the same results were obtained in the equations, estimated for exchange rate. In general, efficient results could not be achieved with LASF.

3.2.3 VAR and Impulse Response

Lucas (1986) has stated that economic agents are dependent to economic output of the adaptive learning process until they collect enough information about the economy. Orphanides and Williams (2005) said that they can model the expectations of economic agents in the form of a VAR system. Whether lagged values of policy variables are significant is investigated in the studies of McGee and Stasiak (1985), Marashdeh (1993), Yamak

and Kücükkale (1998), Peker (2007), Khan (2008), Komijani et al. (2012). In this study, the significance of the lagged effects of anticipated and unanticipated expectations is investigated by the VAR analysis. In addition, the effects of shocks in expectation variables on the real variables of investigated using impulse response analysis are investigated.

Sims (1980) was the first to develop the VAR analysis. According to Sims (1980), grouping the variables as endogenous and exogenous is not required. Therefore all of the variables in the VAR analysis are accepted as endogenous. For example; a VAR model with $y_t, p_t^a, \ p_t^{ua}$ variables can be displayed as follows.

$$\begin{bmatrix} y_t \\ p_t^a \\ p_t^{ua} \end{bmatrix}_{kx1} = \begin{bmatrix} A_{10} \\ A_{20} \\ A_{30} \end{bmatrix}_{kx1} + \begin{bmatrix} A_{11}(L) & A_{12}(L) & A_{13}(L) \\ A_{21}(L) & A_{22}(L) & A_{23}(L) \\ A_{31}(L) & A_{32}(L) & A_{33}(L) \end{bmatrix}_{kxk} \begin{bmatrix} y_t \\ p_t^a \\ p_t^{ua} \end{bmatrix}_{kx1} + \begin{bmatrix} e_{1t} \\ e_{2t} \\ e_{3t} \end{bmatrix}_{kx1} \quad (11)$$

Here, A_{ij} is the independent variable coefficient, k is the number of variables in the VAR system, so that here k is 3, L is lag operator, t is time notation $(t = 1, \ldots\ldots, T)$, and e_{it} is random error terms of equations. In VAR analysis both the variables used in the analysis and VAR system should be stationary. Stationarity of the variables was investigated by the ADF test. All the variables are stationary and can be used in VAR systems. Stationarity of all VAR systems was examined with inverse roots of AR characteristic polynomial and all systems were found to be stationary. The length of the lag in the VAR system is calculated using Final Prediction Error (FPE) information criterion.

The dependent variable in the first equation is y_t. For example, collectively, significance of lagged coefficients of p_t^a variable can be tested with $H_{01}: A_{12}(L) = 0$. Collective significance of lagged coefficients of p_t^{ua} variable on the other hand can be tested with $H_{02}: A_{13}(L) = 0$. χ^2 or F-tests can be used for testing these hypotheses. χ^2 was used in this study. If H_{01} is rejected, it is concluded that anticipated expectations are effective on real variables; if H_{01} is not rejected then they are not effective. If H_{02} is rejected it is accepted that unanticipated expectations are effective on real variables; if H_{02} is not rejected they are not effective. If anticipated expectations are effective on real variables or unanticipated expectations are not effective on real variables, then the PIP hypothesis would have been rejected.

Table 7. VAR without dummy crisis

Variables	Seasonally Unadjusted		Seasonally Adjusted	
	$H_{01}: A_{12}(L) = \mathbf{0}$	$H_{02}: A_{13}(L) = \mathbf{0}$	$H_{01}: A_{12}(L) = \mathbf{0}$	$H_{02}: A_{13}(L) = \mathbf{0}$
$E(p_t \mid I_{t-1})$	20.49 (3) [a]	4.27 (3)	2.35 (1)	0.07 (1)
$E(p_t \mid I_{t-12})$	8.33 (2) [b]	0.90 (2)	12.36 (2) [a]	0.15 (2)
$E(p_t \mid I_{ye})$	7.99 (1) [a]	0.03 (1)	11.11 (1) [a]	1.20 (1)
$E(er_t \mid I_{t-1})$	2.84 (1) [c]	3.81 (1) [b]	8.35 (1) [a]	0.03 (1)
$E(er_t \mid I_{ye})$	4.90 (1) [b]	1.40 (1)	12.79 (1) [a]	0.06 (1)

Note. Coefficients are χ^2 statistic value calculated for hypotheses. a, b, c respectively significant at %1, %5 and %10. The values in parentheses are optimal lag length of VAR system. Maximum lag is 6.

The rows in Table 7 and Table 8, respectively, refer to a month before the time period t for inflation, twelve months before and the end of the year expectations, and a month before the time period t for exchange rate and the end of the year expectations. VAR equations including anticipated and unanticipated expectations were estimated for each of these expectation periods. Columns on the other hand include χ^2 values calculated for H_{01} and H_{02} hypotheses. Table 7 shows the results of the VAR equation which does not include the Crisis dummy, while the results in Table 8 show the VAR equation including the Crisis dummy. As seen in Table 7, whether seasonally adjusted or not, in general coefficients of anticipated expectations are collectively found to be significant. Coefficients of both anticipated and unanticipated expectations for monthly exchange rate expectations were found to be statistically significant. The results do not support the PIP.

Table 8. VAR with dummy crisis

Variables	Seasonally Unadjusted		Seasonally Adjusted	
	$H_{01}: A_{12}(L) = 0$	$H_{02}: A_{13}(L) = 0$	$H_{01}: A_{12}(L) = 0$	$H_{02}: A_{13}(L) = 0$
$E(p_t \mid I_{t-1})$	26.24 (5) [a]	13.51 (5) [b]	5.18 (1) [b]	2.25 (1)
$E(p_t \mid I_{t-12})$	4.54 (2)	1.67 (2)	17.07 (3) [a]	3.88 (3)
$E(p_t \mid I_{ye})$	6.59 (1) [a]	0.001 (1)	11.17 (1) [a]	3.09 (1) [c]
$E(er_t \mid I_{t-1})$	1.37 (1)	4.31 (1) [b]	-- (0)	-- (0)
$E(er_t \mid I_{ye})$	2.85 (1) [c]	1.10 (1)	9.48 (1) [a]	0.11 (1)

Note. Coefficients are χ^2 statistic value calculated for hypotheses. a, b, c respectively significant at%1, %5 and %10. The values in parentheses are optimal lag length of VAR system. Maximum lag is 6.

In the case of the addition of the Crisis dummy to equations, almost the same results were obtained. Conversely, when seasonal adjustment is applied for the monthly exchange rate expectation, optimal lag length of the variables became zero and as a result VAR could not be estimated. In results including seasonally unadjusted monthly exchange rate expectations, coefficients for anticipated expectations compatible with the ineffectiveness of the policy are found to be insignificant, and for unanticipated expectations they are significant; however first-degree autocorrelation is found in equations. In overall evaluation of Table 8, PIP is rejected.

Impulse-response analysis shows how the other variables respond to innovation or shock in the variables in the VAR system. The VAR system can be written in a different way as follows;

$$X_t = A_0 + A_1 X_{t-1} + A_2 X_{t-2} + \ldots\ldots + A_m X_{t-m} + e_t \quad (12)$$

Here, X_t represents a vector of $kx1$ $(3x1)$ size formed of y_t, p_t^a, p_t^{ua} variables, A_0 is constant term vector in $kx1$ size, A_i is coefficients matrix in size of kxk $(for\ every\ i = 1, \ldots m)$, m is optimal lag, and e_t is random error terms in size of $kx1$.

VAR system can be written as $MA(\infty)$ as follows,

$$X_t = \mu + \sum_{s=0}^{\infty} \Phi_s e_{t-s} = \mu + \Phi_0 e_t + \Phi_1 e_{t-1} + \Phi_2 e_{t-2} + \Phi_3 e_{t-3} \quad (13)$$

and impulse-response function can be written as follows;

$$\Phi_n = \frac{\partial X_{i,t+n}}{\partial e_{j,t}} \quad (14)$$

The equation expresses response of variable i in period t+n to one-time innovation or shock on variable j in period t. The following figures show the responses of variable i to Cholesky one standard deviation innovation or shock on variable j with ± 2 standard error. Statistically significant impulse-responses are given in Figure 2 and Figure 3.

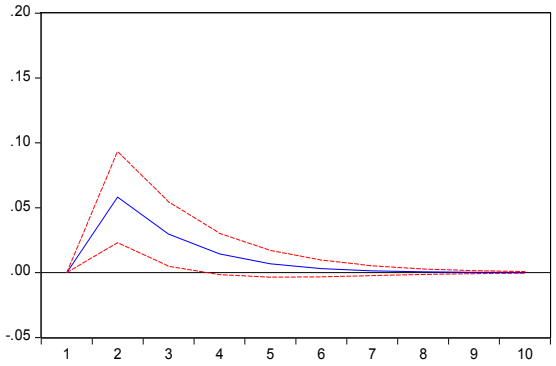

Figure 2a. Response of p_t^a to p_t^{ua} on $E(p_t \mid I_{t-1})$

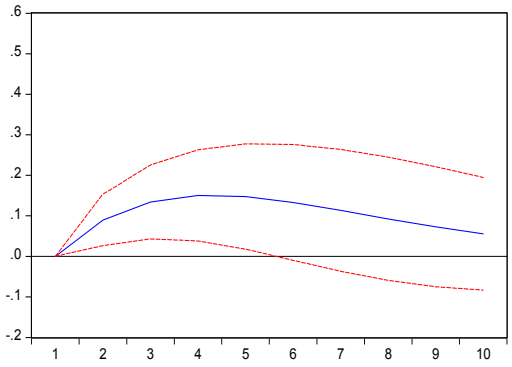

Figure 2b. Response of p_t^a to p_t^{ua} on $E(p_t|I_{t-12})$

Figure 2 shows that in both one month and twelve months before, any innovation or shock that occurs in unanticipated expectations results in an increase of anticipated expectations of inflation. This reaction represents the process of adaptation of expectations to the shock for the last three periods in monthly expectations, for the five periods in annual expectations and then blurs. When it is considered that unanticipated and anticipated expectations are complementary to each other in the event of new information entry to available information set, it is normally expected that anticipated inflation updates itself.

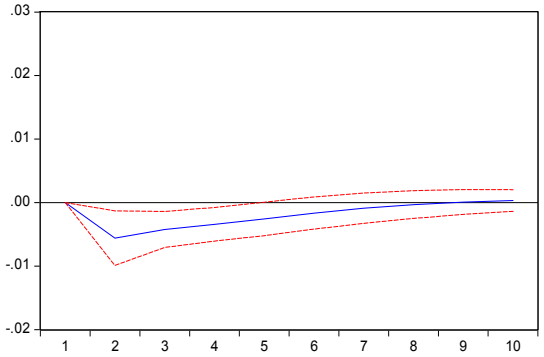

Figure 3a. Response of y_t to p_t^a on $E(p_t|I_{t-12})$

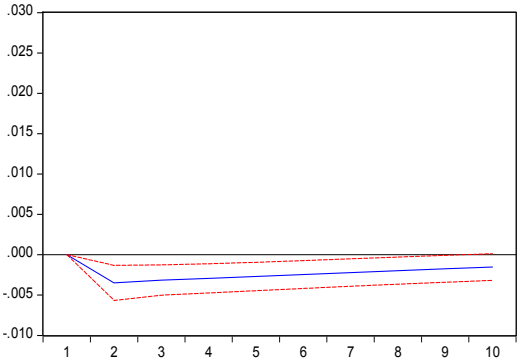

Figure 3b. Response of y_t to p_t^a on $E(p_t|I_{ye})$

Real output response to an innovation or shock occur sin anticipated expectations with decline. This situation can be interpreted as where, in the event of a sudden increase in inflation expectations, real production tends to decline. The impact of this shock on real output lasts for five months in twelve-month inflation expectations and seven months in year-end inflation expectation. In the event of information flow to the existing information set about anticipated expectations, namely a sudden update in expectations of economic agent, the adaptation of the real sector to this update can be said to take about five to eight months.

4. Conclusion

According to the PIP suggested by Lucas (1973) and Sargent and Wallace (1975), only unanticipated changes in expectations will affect real economic variables. In this study, the PIP hypothesis has been investigated for the study period in which inflation targeting policy which retained transparency and accountability in terms of monetary policy at the forefront is implemented using both seasonally adjusted and seasonally unadjusted data with CDPF, LASF, VAR and Impulse-Response analysis.

A survey of expectations conducted by the CBRT has been taken as the anticipated expectation series. Anticipated expectations are modified mean of one month before, twelve months before and year-end survey expectations of inflation rate of CPI and one month before, and year-end estimations of the exchange rate. Unanticipated expectations are the difference in anticipated expectations from the realization values. Stationarity of the variables used in the study is examined with the ADF unit root test. All the seasonally unadjusted and adjusted variables are stationary at I(0) level. All variables can be used in the analysis and can be estimated easily by individuals with rational expectations.

The simultaneous effect of anticipated and unanticipated expectations of inflation and exchange rate on real output was tested with CDPF. In general, the results obtained from CDPF do not support the PIP. The results of LASF which tests the simultaneous effect of unanticipated expectations of inflation and exchange rate on real output equations do not support the PIP either. Also, the overall evaluation shows that seasonal adjustment decreases coefficients of determination of the estimated equations, and normal distribution and homoscedasticity is adversely affected.

The results of VAR analysis taking lagged variables of anticipated and unanticipated expectations of inflation and exchange rate on real output into account confirm that coefficients of anticipated expectations and some unanticipated expectations are statistically significant and acceptable. The results of impulse-response analysis have demonstrated that any innovation or shock that occurred in unanticipated expectations led to an increase in anticipated expectations of inflation. In addition, in the event of innovation or shock in the existing information set about anticipated expectations of economic agents, namely a sudden information input to the existing information set, it can be said that it takes between five and eight months for the real sector to adapt to this update. The results of VAR and Impulse-Response analysis also do not support the PIP. These results are compatible with the studies of Yamak and Kucukkale (1998), Peker (2007), Altunoz (2014), ve Tuğcu (2015).

Overall evaluation of the study suggests that the results obtained on the basis of anticipated and unanticipated expectation series calculated using surveys conducted by the Central Bank with seasonally adjusted and unadjusted data under the inflation targeting policy implemented during the study period do not support the PIP.

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Notes

Note 1. Law No 4651 issued on 25.04.2001.

Note 2. The results of analyses using arithmetic mean support and are consistent with the results of this study.

Note 3. In estimates using capital goods as lower coefficients of determination than intermediate goods, more autocorrelation and heteroscedasticity problems were encountered and significance of all the independent variables were adversely affected. Intermediate goods are therefore preferred.

Appendix A

CBRT explains The Modified Mean, Outlier, Extreme Outlier as follows.

"***The Modified Mean:*** *It is a statistic computed as a result of data analysis and elimination of observations judged to be atypical to develop an appropriate indicator of central tendency of a distribution. The modified mean is determined among statistics such as the arithmetic mean, the median, the mode, the mean computed by excluding outliers and extreme outliers as well as the trimmed mean by analyzing outliers and extreme outliers. If skewness and kurtosis values are close to those of a normal distribution, the arithmetic mean is regarded as the modified mean. If atypical values are identified in the distribution, the modified mean is computed by taking the arithmetic average after excluding outliers and extreme outliers. If skewness is relatively high, the median, if kurtosis is relatively high, meaning that the expectations are concentrated around a specific value, the mode is regarded as the modified mean*" (CBRT, 2013, p. 2-3).

"***Outlier:*** *Values smaller than Q1-1.5*(Q3-Q1) and greater than Q3+1.5*(Q3-Q1); where Q1:Lower Quartile and Q3: Upper Quartile, computed by Tukey's Hinges method are defined as outliers*" (CBRT, 2013, p. 3).

"***Extreme Outlier:*** *Values smaller than Q1-3*(Q3-Q1) and greater than Q3+3*(Q3-Q1); where Q1:Lower Quartile and Q3: Upper Quartile, computed by Tukey's Hinges method are defined as extreme outliers*" (CBRT, 2013, p. 3).

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Impact of Educational Public Policy on Schooling in Morocco: A Temporal and Transverse Analysis

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Abstract

Morocco has made major advances in the education in primary and secondary levels, mainly because of targeted public policies that had placed the generalization of Education at head of their concerns since independence. However, despite the efforts made, many studies reveal the persistence of important problems, related in particular to the increase of regional disparities and importance of inequalities in access to school between boys and girls. However, the Moroccan education system still has a low student performance, with high dropout and repetition rate and moderate level of secondary schooling. This can be partially explained by several factors including household income, the characteristics of the labor market, rural and urban distribution, parental education, etc. Public policy could also be the cause of the problems plaguing the country's education system. This study aims to test the validity of the effects of three public policy instruments (basic infrastructure, management, and direct aid) on the enrolment rate for pre-school, primary, secondary and college levels.

To conduct this study, we retained 27 variables which concern three categories: product, result and impacts. A principal component analysis (PCA) had been carried out from 2002 to 2012, in order to identify the most statistically correlated variables with enrollment rates. Then, a regression models with panel data were used to test the relevant effects of public policy on enrolment rate by level. The results indicate the presence of statistically significant effects of the basic infrastructure on increasing enrolment rate, especially the number of classrooms and the staff.

Keywords: educative policy, econometric panels

1. Introduction

Morocco has made significant progress in increasing access to education and implemented a great number of strategies, which had contributed to improve schooling rates in primary, collegial and secondary levels. In this regard, it is important to underscore the evolution of education policies, which started the first years after independence by the adoption of unification, moroccanisation, generalization and arabisation principles. It developed thereafter by the implementation in 1973 of training teachers programs and by a global reform aimed to facilitate access to education for disadvantaged groups at the beginning of the 1980s. In 1994, a new phase based on opening of the school to its environment, the involvement of new participant and the rationalization of resources began. The creation of regional academies and the implementation of the National Charter marked the culmination of this phase. As results, the net enrolment rates have improved appreciably at the national level and in urban areas.

In return, the disparities between females and males and between urban and rural areas have increased, affecting the student's performance. This can be partially explained by several factors including household income, the characteristics of the labor market, rural and urban distribution, parental education, etc. Public policy could also be the cause of the problems plaguing the country's education system.

This study aims to examine the effects of educational public policy on the schooling rates and to present the trends of education indicators in Morocco. In particular, it articulated to evaluate if the construction of schools and the strengthening educational staff were appropriate feeding choices around education public policies. This will make it possible to draw lessons about the suitable policies required to improve the quality and efficiency of

education and training.

The remainder of the present paper is structured as follows: the second point provides a brief review of literature. The educational context in Morocco is presented in the third point, which is followed in the fourth by a presentation of data and methodology. The fifth point gives insights on the results of the econometric treatments. The last concludes.

2. Review of Literature

The determinants of education were at the central concerns of many economists and sociologists, focused on developing a theoretical framework and empirical production function of education. The pioneering study was carried out by Coleman (1966) because of its role in reviving the debate about the determinants of scholastic skills. Rather, the study highlighted the importance of ethnicity and race of students in assessing educational outcomes as well as the effect of family conditions during all years of schooling. Colman's findings have been criticized particularly because of the estimation methods which not akin with a theoretical production function.

Emmanuel Jimenez (1985) used flexible cost functions to evaluate the possible complementarities between different levels of education. The study revealed an important degree of substitution between inputs of education. The effects of class size on economies of scale and marginal costs of higher education have been experienced by Nelson and Hevert (1992). A Translog function multi-product cost was estimated from data relating to a single university. The authors showed that the effects of omission control of the size of the classrooms resulted in biased estimates of economies of scale and marginal costs.

Other studies were interested in modeling and assessing the results of the standardized tests of school output, like one of the principal criteria of the educational production. Others used quantitative measurements, like the schooling rates, the completion of the years of schooling rate, the school dropout rate of or the number of years of schooling.

The estimate of the educational production function was confronted with the question of the choice of education indicator. Wilson (2001) indicated that about two thirds of the studies examined for this purpose, choose indicators of quality of teaching (performance of the students to the tests), whereas the other third was devoted to the study of the quantity of schooling (a number of years of schooling).

Bertola and Cecchi (2003) considered the individual and social outputs of education. They briefly presented the methods according how the financial resources of schools affect the quantity, the quality and the heterogeneity of the educational offer. In the prolongation, the roles of the public expenditure in determining the educational production function. For Jenkins, Levacic and Vignoles (2008), the lack of the incentives for the pupils and the teachers can constitute a basic problem, which tends to reduce the effect of the public utility in the determination of the productive function of education.

3. Educational Context in Morocco

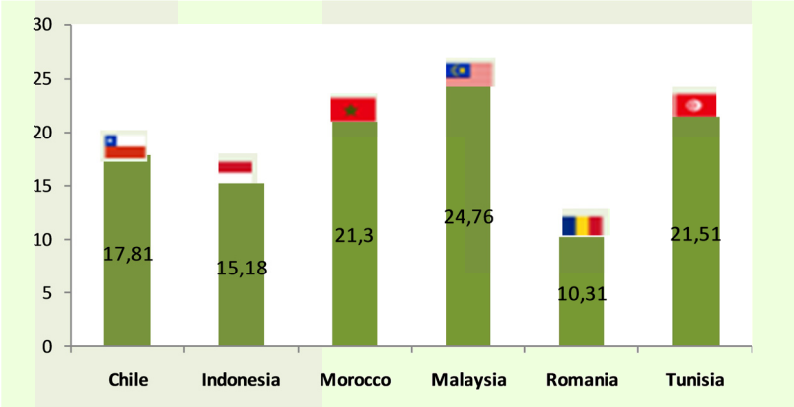

Figure 1. Public expenditure on education, % of government spending, 2011-2012

Source: Ministry of Education, World Bank.

Morocco has invested heavily in education in recent years. This commitment of the Moroccan government has materialized, first, through public policies implemented to improve the education system. This led in place of

Emergency Plan launched in 2009 to enable the implementation of the objectives of the National Charter of Education and Training (NECS). Second, the financing of the education system has also grown, with an increase of the share of the budget devoted to public spending on education. The most recent data show that Morocco has surpassed all comparator countries with a share of around 24.8% (Figure 1).

As results of these efforts, the primary education rates increased appreciably and its generalization is close. From 59% in 1980, it rose to 97% in 2012, with a very small difference between places of residence. The improvement was particularly observed for the rural girl's enrolment rate which has more than quadrupled between 1990 and 2011, rising from 22% to 96% of children of age group (Figure 2). It should also be noted that the repetition and dropout rates were very low in the primary education, not exceeding 8% and 3% in 2012. The completion rate is high at almost 86%.

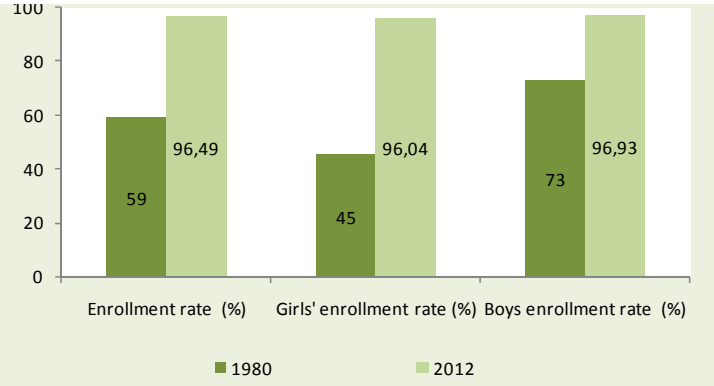

Figure 2. Enrolement rate at the primary

Source: Ministry of Education, World Bank.

By contrast, the secondary school enrolment rates remain modest and heterogeneous. Thus, at the college level, the net enrolment rate of children aged between 12 and 14 years, does not exceed 53.9% , with significant differences between regions and gender (girls enrolment rate is 23.6%in rural areas against 78.7% for urban). Similar results were obtained in the qualifying secondary, where the rate does not exceed 28% in 2010/2011 for children aged between 15 and 17 years. In addition, a very large disparity between medium of residence is registered (5.4% in rural areas, 5.6% for boys and 5.1% for girls). The lack of school infrastructure, roads and transport in some areas makes access very difficult to school. Moreover, the quality of secondary education (college and qualifying cycles) remains low in Morocco, taking account of a completion rate in both cycles of 65% and 37.5%, respectively (Table 1).

Table 1. Indicators of education, 2008-2012

		2008-2009	2009-2010	2010-2011	2011-2012
Primary education	*Repetition average rate*	12,3	12	9,3	8,2
	Drop-out average rate	4,6	3,3	3,1	3,2
	Completion rate	76	83	86,5	86,2
Collegial	*Repetition average rate*	15,2	16,1	16,3	16
	Drop-out average rate	13,1	12,9	10,8	10,4
	Completion rate	52	57	64,6	65,3
Qualifying	*Repetition average rate*	19,2	18,8	18,1	17,1
	Drop-out average rate	14,1	11,9	9,2	11
	Completion rate	26	30	36,2	37,5

Source: Ministry of Education.

In view of the results, it's no surprise that the average years of schooling in Morocco are not high. It should be recalled that the length of schooling was below 6 months (0.4 years) in 1960. Over the following fifty years, the average number of years of schooling for population aged of 15 and over has increased gradually to reach 5

years in 2010. This gain is less than that recorded in the comparator countries and the rest of the Arab countries.

Overall, the efforts of successive governments had contributed in an improvement of education, especially in the primary level, but many gaps remain important. In fact, the literacy level is relatively low compared to referent countries, show average rate of over than 90%, with the exception of Tunisia, where the level is around 79%. In addition, statistics show the persistence of inequalities between men and women in literacy. Significant disparities are also detected between areas: illiteracy affects 39% of the total population aged of 10 years and over, 50% of rural population and 65% of rural women.

4. Methodology and Data

The study pertains to a sample of the sixteen regions of the kingdom, covering a period from 2002 to 2012. 27 variables classified into three levels: outputs, outcomes and results have been identified and have undergone specific treatments. Data were collected from the Ministry of Education.

The choice of the specification models is framed by the content of the logical framework and theoretical evaluation commonly accepted and internalized the arguments of the educational production function. Annex 1 presents the theoretical specifications of education indicators with an indication of expected signs.

Explanatory variables included in the final statistical model were selected by an iterative procedure; which involves conducting successively the following steps:

• Step 1: identify, among the explanatory variables, those having a theoretical link with results variables;

• Step 2: conducting a principal components analysis (PCA) so to retain the independent variables, being more empirically correlated with results, varying among those short listed in step 1. The calculation of correlations is, in addition, leads to some potentially relevant variables products in conjunction with some result indicators;

• Step 3: specify model panel data regressions, which identifies the explanatory variables and check the existence of regional differences (fixed or random effects models). We used for this purpose, Hausman test.

• Step 4: modify non-relevant specifications and retain parsimonious model that presents a satisfactory degree of explanation that a recursive method for each variable. This exercise was conducted through a review of the parameters, their signs and analyzing statistics like the Student and the Fischer tests, R2 (Within ...).

Econometric specifications adopted allow highlighting the relationship between the dependent variables and the explanatory variables. The specification that is applied takes the following functional form: $Y = F(W)$ With Y: results variables vector for education and W: explanatory variables vector.

Using panel models and data of the sixteen regions, we examined the relationship between the determinants of result indicators for education. This review captures the effects of regional differences in the development of education expressing the priority objectives of public policy. These include the:

- Preschool enrolment rate;
- Primary enrolment rate;
- Collegial enrolment rate;
- Qualifying secondary enrolment rate.

5. Presentation of Results

This is to combine a simple descriptive analysis based on the calculation of the average rates of education indicators between two periods with the results from econometric panel data treatment, in particular when regional differences exist. It proves that the inclusion of "the effect of the regions' sheds light on the behavior of education between each region.

5.1 Preschool Enrolment Rate

Preliminary analysis of data related to the phase between the periods 2002-2008 and 2009-2012, marked by the implementation of the Emergency Plan for Education, shows a slight improvement in preschool average enrolment rate. The latter increased from 53.3% to 62.3% at the national level. Regionally, the most remarkable finding concerned the regions of Oued Ed-Dahab-Lagouira, Laayoune-Boujdour-Sakia the Hamra, Guelmim Smara, Great Casablanca and Meknes-Tafilalet, with a fall of around 10 points.

Thus, we propose to test whether a public policy aimed at improving basic educational infrastructure in the preschool had encouraged households to enroll their children in preschool. It is, in this case, to assess how extent of the number of classrooms and education personnel staff has been in contributing to improving education and whether these variables are causing an increase in the preschool rate of in the regions.

The model results confirm the significant effect of the number of classrooms in improving the preschool enrolment rate, with a sign closely aligned with the expected. The higher the number of preschool classrooms, the greater is the gross preschool enrolment rate. Specifically, an increase in preschool classrooms by one unit leads to an improvement by 0.005 points in the preschool average enrolment rate.

Table 2. Specification of the preschool enrolment rate

Estimator	Expected sign	MCG
A number of pre-school rooms by 1000 inhabitants	+	13.240 (3.01)
A number of pre-school teachers per 1000 inhabitant	+	1.881 (2.35)
Fixed effects		
02- Laayoune-Bojdour-Sakia Hamra		-22.940
03- Guelmim-Smara		-0.811
04- Souss-Massa-Draa		-51.288
05- El Gharb-Chrarda-Bni Hssaine		-59.495
06- Chouia-Ourdigha		-48.486
07- Marrakech-Tensift-El Haouz		-41.228
08- Eastern Area		-57.412
09- Grand Casablanca		-6.804
10- Rabat-Sale-Zemmour-Zaer		-28.142
11- Doukkala-Abda		-69.404
12- Tadla-Azilal		-59.430
13- Meknes-Tafilalet		-8.909
14- Fes-Boulemane		-40.261
15- Taza-Al Hoceima-Taounate		-50.952
16- Tanger-Tetouan		-31.455
Constant		79.931
R-squared (Between)		0.232
R-squared (Within)		0.171
Rho (Fraction of the variance due has *u_i)*		0.882
P-been worth test of Haussman		0.450
Fisher		78.76
Nombre observations (areas)		176

Note. * Significativity with 5%.

5.2 Net Primary Enrolment Rates (6-11 Years)

Analysis of the data leading up to and after the emergency plan period reveals a continuation bullish movement of the net primary enrolment, growing from 92.0% to 94.8%, at national level. Regionally, this slight increase was marked the whole of Morocco's regions, with the exception of Souss-Massa-Draa and Taza-Al Hoceima-Taounate regions.

Identifying the factors behind this improvement of the primary enrolment rate by reference to public policy requires specific models. Thus, we are interested to assess whether the development of the educational infrastructure in rural and urban areas, increase of teachers and supervisors in both medium and development of school canteens could promote higher enrolment of children in primary school.

It arises that most relevant variables, which explain the primary enrolment rate, are in the order as follows: the number of primary schools and the staff ratio in urban areas, the support rate, the school canteens and the number of rural primary schools in rural medium. In addition, their signs compared to the net primary enrolment rate are in conformity with what is expected in theory. Specifically, an increase by one unit of the number of primary schools in the urban areas leads to a raise by 0.06 points of the net primary enrolment rate. In addition, it should be noted that an expansion by one point of the supervision rate in the urban areas generates a gain by 0.197 point of the net primary enrolment rate, while a one point increase of the rate framing the rural environment results in a relatively important effect (0.213 points). Finally, a rise by one unit of the school canteens in rural areas creates a strengthening by only 0.001 points of the net primary enrolment rate.

Having identified the determinants of the primary enrolment rate, we can explain the results recorded in all

regions of Morocco except for the Souss-Massa-Draa and the Taza-Al Hoceima-Taounate, where the parameter of the constant is important. The parameters are more remarkable in the southern regions of Morocco: Region 2 and Region 3 with the value of parameters around of 5971 and 2765 respectively.

Table 3. Specification of the primary enrolment rate (6-11 years)

Estimator	Expected sign	MCG
Number of primary schools in urban environment for 1000 inhabitants	+	35.556 (23.835)
Rate of urban framing	+	0.153 (0.071)
Rate of rural framing	+	0.264 (0.085)
Fixed effects		
02- Laayoune-Bojdour-Sakia Hamra		6.700
03- Guelmim-Smara		3.324
04- Souss-Massa-Draa		-19.166
05- El Gharb-Chrarda-Bni Hssaine		-6.034
06- Chouia-Ourdigha		1.462
07- Marrakech-Tensift-El Haouz		-5.562
08- Eastern Area		-7.178
09- Grand Casablanca		4.878
10- Rabat-Sale-Zemmour-Zaer		-2.842
11- Doukkala-Abda		-9.668
12- Tadla-Azilal		-4.672
13- Meknes-Tafilalet		0.163
14- Fes-Boulemane		-2.587
15- Taza-Al Hoceima-Taounate		-13.943
16- Tanger-Tetouan		-6.104
Constant		79.160
R-squared (Between)		0.084
R-squared (Within)		0.155
Rho (Fraction of the variance due has *u_i)*		0.836
P-been worth test of Haussman		0.000
Fisher		4.81
observations number (areas)		176

Note. * Significativity with 5%.

5.3 Net Collegial Enrolment Rate (12-14 Years)

Comparing the period before the implementation of the emergency plan with one that followed also confirms a clear strengthening of the net average college enrolment rate, which had increased at the national level from 36.7% to 49.3%. At regional level, the increase is noticeable in the regions of Laayoune-Boujdour-Sakia, Great Casablanca and the Rabat-Salé-Zemmour-Zaer. Conversely, relatively low rates were recorded in other regions of Morocco.

By adopting the same procedure for assessing the role of public policy in improving college completion, we evaluated the effects of educational infrastructure and providing incentives such as grants, scholarships and school canteens ...) on the net collegial enrolment rate.

The results of econometric models allows for the identification of the most relevant explanatory variables classified as follows: number of urban settlements, number of internal, number of the school canteens in rural areas. These relevant variables also show signs aligned to the expected results. Indeed, an increasing of the number of establishment by one unit (establishment) contributes to a gain by 0.057 points of the net collegial enrolment rate, while a rise of the number of the internal by one unit boosts the net collegial rate enrolment by 0,002 points. Moreover, the strengthening of the number of beneficiaries of school canteens in rural areas by one unit, leads to an expansion by 0.156 points. Note, however, that the only non-relevant variable in this model was the number of fellows, which has been rejected by the appropriate tests.

As for the primary, the Hausman test results served to retain the fixed effect model, which is expected given that Morocco behaviour of school children by region is not the same. It is introducing improvement of R2 coefficient

(Within) from 0.35 to 0.94. Public policy factors identified above explain the good results in the regions of Laayoune-Boujdour-Sakia, Great Casablanca and the Rabat-Salé-Zemmour-Zear.

Table 4. Specification of the collegial enrolment rate (12-14 years)

Estimator	Expected sign	MCG
Urban Établissements for 1000 inhabitants	+	257.620 (33.308)
Number of school recipients of canteens (rural) for 1000 inhabitants	+	5.497 (0.669)
Number of stock-brokers for 1000 inhabitants	+	2.671 (0.956)
Fixed effects		
02- Laayoune-Bojdour-Sakia Hamra		8.938
03- Guelmim-Smara		-17.211
04- Souss-Massa-Draa		-31.619
05- El Gharb-Chrarda-Bni Hssaine		-15.728
06- Chouia-Ourdigha		-17.627
07- Marrakech-Tensift-El Haouz		-22.162
08- Eastern Area		-14.353
09- Grand Casablanca		15.479
10- Rabat-Sale-Zemmour-Zaer		1.130
11- Doukkala-Abda		-21.947
12- Tadla-Azilal		-13.605
13- Meknes-Tafilalet		-19.750
14- Fes-Boulemane		-14.355
15- Taza-Al Hoceima-Taounate		-33.359
16- Tanger-Tetouan		-19.524
Constant		45.418
R-squared (Between)		0.000
R-squared (Within)		0.540
Rho (Fraction of the variance due has *u_i)*		0.959
P-been wort test of Haussman		0.000
Fisher		61.67
Nombre observations (areas)		176

Note. * Significativity with 5%.

5.4 Net Qualifying Secondary Enrolment Rate

The analysis of the evolution of the qualifying secondary schooling by region and by period, especially before and after the implementation of the Emergency Plan in 2009 attest to a slight improvement in its average rate, especially if we compare its evolution to the performance recorded in the previous levels. Thus, at national level, the rate increased from 16.3% to 25.8%. At regional level, some improvements are visible in the regions of Oued Ed-Dahab-Lagouira, Laayoune-Boujdour-Sakia the Hamra and the Great Casablanca. For the other regions, this rate does not exceed 36%.

As a reminder, the comparison of the average net enrolment rate in qualifying secondary per period and region, aimed to identify trends varying results explain by reference to econometric models and to identify factors driving these trends.

The analysis of the model results show that the suggested variables such as the number of facilities has a sign consistent with what is expected, while the variables “rate of urban and rural management are not relevant although their signs were closely aligned with what is expected,. Overall, an increase in the number of establishments by one unit generates an increase of 0.269 point of the net enrolment rate in qualifying secondary. This could be explained by the significant deficit in the constructions of specialized institutions at secondary level.

Furthermore, it should be emphasized that the effect of the number of institutions affects positively the net enrolment rate at the secondary qualifying differently from one region to another (cf. fixed effects expressed by constant related to the regions). These determinants explain the good results recorded in regions 2, Laayoune-Boujdour-Sakia the Hamra with a value of the constant around 7784, Region 9, the great Casablanca

with 22,141. By contrast, the least favorable results are recorded in region 4, the Souss Massa Daraa with a value of the constant around 47,832.

Table 5. Specification of the rate Net of schooling to the qualifying secondary (15-17ans)

Estimator	Expected sign	MCG
Number of establishments for 1000 inhabitants	+	498.394 (45.206)
Rate of urban framing for 1000 inhabitants	+	0.067 (0.083)
Fixed effects		
02- Laayoune-Bojdour-Sakia Hamra		-3.926
03- Guelmim-Smara		-14.846
04- Souss-Massa-Draa		-15.624
05- El Gharb-Chrarda-Bni Hssaine		-9.931
06- Chouia-Ourdigha		-8.412
07- Marrakech-Tensift-El Haouz		-8.858
08- Eastern Area		-6.935
09- Grand Casablanca		12.576
10- Rabat-Sale-Zemmour-Zaer		1.754
11- Doukkala-Abda		-7.711
12- Tadla-Azilal		-8.616
13- Meknes-Tafilalet		-5.247
14- Fes-Boulemane		-5.379
15- Taza-Al Hoceima-Taounate		-13.429
16- Tanger-Tetouan		-8.673
Constant		14.890
R-squared (Between)		0.408
R-squared (Within)		0.531
Rho (Fraction of the variance due has *u_i)*		0.858
P-been worth test of Haussman		0.000
Fisher		89.65
A number of observations (areas)		176

Note. * Significativity with 5%.

6. Conclusion

Morocco has invested heavily in education in recent years. This commitment by the Moroccan government has materialized through the development sector funding programs, as also evidenced by the increase in the share of the budget allocated to public expenditure in education at all levels. In addition, we noted also the effect of the implementation of public policies supporting these funding, including the launch of an Emergency Plan, in 2009, in order to enable the achievement of the objectives of the National Charter of Education and training (NECS).

From our analysis, it emerges that public policies, focused on increasing the personnel, the number of school canteens and boarding schools, have significant positive effects on primary school enrolment, mainly because of shortfalls in the matter, considered more important the construction of schools. At secondary level, where the deficit in basic infrastructure is important, the effect of increasing the number of constructed facilities is crucial.

To conclude, this analysis highlighted the positive effect of educational public policy. However, public efforts should be maintained to generalize education especially in rural areas and improving its performance through an acceleration of the sector basic infrastructure development programs. It is also useful to greater synergy and coordination between public and private operators in order to assess policies and adequate education strategies that could promote a significant improvement of the Moroccan education system and its performance on a medium-term horizon.

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The Relationship between Capital and Bank Risk: Evidence from Tunisia

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Abstract

The capital and risk are two important variables in banking. Indeed , capital can protect banks against shocks and excessive risks. But according to other researchers , there is a positive relationship between capital and risk.

In the context of this article, we looked at 18 banks in Tunisia over the period (2000-2010), we found that there is a negative relationship between the capital and bank risk by applying a static panel method.

Keywords: bank, capital, risk, panel

1. Introduction

The capital is important in banking. It can finance their investments and reduce the probability of bankruptcy. But the relationship between capital and bank risk is ambiguous. On the one hand , some researchers suggest that the capital increases the risk , others feel that capital reduces the risk.

Also this relationship depends on the regulations (capital requirement) and type of risk. The first studies that have examined the influence of capital requirements on bank solvency souch Kahane (1977), Kareben et Wallace (1978) Sharpe (1977) have shown that banks have incentives to increase risk taking.

Moreover, Kohen and Santomero (1980), Kim and Santomero (1988) showed that capital regulation may increase the risk taking of the bank.Indeed, Santos (1999) proved that an increase in capital requirement negatively encourages risk taking of the bank (reduced risk of bank insolvency). On the other hand, Kendall (1992) showed that higher capital requirement can cause a riskier behavior of the bank at times, but this does not imply a trends towards riskier banking system.

More recently, Abba et al. (2013), Fatnassi et al. (2014), Gosh (2014) found a significant relationship between capital and bank risk. As a result, the relationship between capital and bank risk is interesting to study. In the context of this article, we will discuss this relationship for 18 banks in Tunisia over the period (2000-2010), we will adopt a methodology composed of 3 sections. The first is devoted to the literature review, the second is related to the empirical study, finally, we will make a conclusion.

2. Literature Review

There are several studies that have explored the relationship between capital and bank risk. Aggrawal and Jacques (2001) found a positive and significant relationship between the change in level of capital and the risk of US banks respectively over the period of (1984-1987) and (1993-1997).

This relationship has been released by Rim (2001) in the case of swiss banks.

A positive relationship between the level of bank capital and risk assumes that banks have high levels of risk will try to increase their capital in order to avoid being penalized but also that banks with high capital level will engage in similar activities (Note 1).

But VANROY (2003), Godlewski (2004) found that changes in capital and risk are negatively related. Their results do not confirm those of Santomero (2003) according to which banks choose a riskier portfolio to offset the indirect loss by lower leverage.

In addition, Barth et al. (2004) showed that while more stringent capital requirements associated with some non performing loans, the relationship between regulatory capital and banking crises is not strong (this result is found

after the control of other regulatory policies and supervisions) (Note 2).

Also Marshall and Prescott (2000) found that the need for capital reduces the probability of default and the risk of the portfolio. Roy (2003) has studied the impact of capital regulation on risk taking by commercial banks in 7 European countries, he found that the change in capital and credit risk are negatively associated change over the period (1998-2003). In addition, Leaven and Levine (2009) analyzed a sample of banks from 48 countries during the period (1996-2001) and they found that capital needs and more stringent restrictions on the bank's activities are associated with a higher risk to banks with shareholders powerful enough.

But the opposite is true in the case of very widespread bank when the domination of shareholders is very high. On the other hand, Partick, Reinhard, Ruxie (2009) studied the effect of regulatory capital on the behavior of risk taking by commercial banks. They observed that different regulations depending on capital market structures of banking sector.

In the level of concentration of market (Note 3), capital regulation is effective in changing the risk taking of the bank because the value of concession[4] is low and banks have incentives to practice risky strategies to increase their franchise values.

When the value of the concession (Note 4) is strong, the effect of capital regulatory on the bank risk is ambiguous because banks lack these incentives. Indeed, the literature shows that capital adequacy rules have an impact on bank behaviour in two ways. First, the introduction of capital adequacy rules will strengthen the bank's capital and improve the protection of banks to negative shocks. Also, the level of capital adequacy set standards high capital requirement for lending to the private sector for loan for the public sector. Heid (2007) studied the problem of capital, bank loan cycles and their effects on the macro- economy in general. He found that the minimum capital requirements on banks increases the regulation of Basel 2 plays a critical role in reducing the volatility of capital requirements.

In the Tunisian context, Bouri and Ben Hmida (2006) using simultaneous equations, they showed that the relationship between changes in capital and risk is dynamic and multidimensional that reflects a change in bank behaviour studied not only to adapt the regulation but also to better identify risks that threaten bank intermediation.

On the other hand, Terhi and Alistair (2010) studied a sample of US banks between (1986-2008). They examined this relationship between capital and risk adjustments in the bank's portfolios. They found that this relationship is positive.

Whyove et al. (2010) analyzed a sample of 99 banks over the period (2004-2007). They found that a higher capital level is associated with more risk and profitability. Betty and Gron (2001) examined a sample of banks in USA between (1986-1995). They showed that capital regulation has a significant effect to decrease the level of capital in some banks but not in others. Besides, Fatnassi, Hasnaoui, Ftiti (2014) studied 13 banks in the GCC countries over the period (2003-2011). They found that highly capitalized banks are more risky. Looking at the Asian data, Agusman et al. (2008) studied 46 banks and found a negative relationship between (equity / total assets) and the risk but this relationship is not significant.

By examining a large data of 2276 Asian banks in 42 countries, Lee and Hsieh (2013) concluded that there is a positive relationship between capital and risk. Haq and Heaney (2012) studied a panel of 117 banks in 15 European countries over the period (1996-2011). They found a U relationship between capital and banking risk.

They showed that bank risk initially decreases with increasing bank capital, to the level that the capital increase, the bank risk increases. Moreover, Athansoglou (2011) examined the simultaneous relationship between bank capital and risk. He used unbalanced panel of SEE banks from (2001-2009). A key result for the whole sample of bank is the relationship between regulatory capital and risk which is positive. However, a positive two –way relationship between regulatory capital and risk has found only in less than adequately capitalized banks, which also increased substantially their risk in 2009. Employing data on over 100 GCC banks for (1996-2011), Gosh (2014) tested the relationship between risk and capital. The risk is measured by the Zscore, while capital is computed as the ratio of equity to assets, the findings indicate that banks generally increase capital in response to an increase in risk and not vice versa.

Abba et al. (2013) studied a sample of 22 banks in Nigeria from (2007-2011). They found that there is as significant negative relationship between risk and capital adequacy ratio of banks, which means when risk level rises, capital adequacy ratio falls in the Nigerian banking industry.

Ayaydin and Kkarakaya (2014) studied 23 Turkish commercial banks over the period (2003-2011). They find evidence that the effect of increasing bank capital on risk is significantly positive and negative supporting the

regulatory hypotheses and moral hazard hypotheses respectively.

Gual (2011) reviewed the theoretical and empirical arguments behind the increase in capital requirement proposed by the Basel 3 regulation. It is shown that the new regulation are unlikely diminish risk taking in the banking industry and that the increased capital requirement most likely will lead to increased costs of funding for the industry with adverse consequences for the real economy.

Hishamuddin et al. (2014) studied banks in Malaysia from December 2006 to October 2013. They found that high capital growth and capital buffers provides an extra cushion for Malaysian banks to pursue relatively risky financing activities.

Dao and Ankinbrand (2014) studied the banks in Vietnam. They found that the risk is positively related with capital.

Therefore, there is an increased literature about bank capital and bank risk, but there is no consensus on their relationship.

3. Empirical Study

We will use a sample of 18 banks belonging to the professional association of banks in Tunis over the period (2000-2010), the financial data are collected from the professional association of banks in Tunis and the bank's annual reports. Macroeconomic indicators are collected from the national institute of statistics and the central bank of Tunisia.

Table 1. Sample of banks

Index of bank	Name of bank
AB	AMEN BAN
ABC	ARAB BANKING CORPORATION
ATB	ARAB TUNISIAN BANKING
Attijari bank	Atiijari Bank of Tunisia
BH	Bank of Housing
BT	Bank of Tunisia
BTE	Tunisia and Emirate Bank
BIAT	Arab International bank of Tunisia
BNA	National agriculture bank
BTS	Tunisian solidarity bank
BTL	Tunisian lybian bank
CB	CITI BANK
STB	Tunisian banking company
SB	STUSID BANK
TQB	Tunisian Qatari bank
UBCI	Banking Union of trade and industry
UIB	International banking Union
BTK	Tuniso Kwaiti Bank

We will use the static panel because we have individual banks based on the number of years (2000.....2010). Also to control the heterogeneity of individuals (Pirott, 2011).

3.1 Specification of Model

The model studied is :

$$Risk_{i,t} = a0+b1.Size_{i,t}+b2.CAP_{i,t}+b3.TLA_{i,t}+b4.ROA_{i,t}+b5.ROE_{i,t}+b6.CEA_{i,t}+b7.Tdeposit_{i,t}+ b8.CPC_{i,t}+b9.ALA_{i,t}+b10.CFC_{i,t}+b11.TPIB_{i,t}+b12.TINF_{i,t}+E_{i,t}$$

i = bank;

t = time;

a0, b1, b2, b3, b4, b5, b6, b7, b8, b9, b10, b11, b12: parameters to be estimated

$$Risk=(\frac{\sigma(ROA)}{E(ROA)+CAP})2$$

Risk = insolvency risk of bank(Teresa & Dolores, 2008).

σ(ROA) = standard deviation of return on assets;

E(ROA) = expectation of return on assets;

CAP = equity / total assets;

Size = logarithm of total assets;

The size shows the ability of the bank to win and take risks. The big banks can make diversification of operations which reduces bank risk.

CAP = equity / total assets;

CAP show the capitalization of bank. Generally more capital can meet the shock and excessive risks.

TLA = total loans / total assets;

TLA shows the percentage of loans in relation to total assets TLA shows the bank's market power in the provision of credit. More TLA increases, the risk increases.

ROA = net profits / total assets;

The net results shows the profit made by the bank after the market operations, operations with customers also shows bank profitability. More ROA increases, the bank may face the risk of hazard.

ROE = net income / equity;

ROE shows the profitability of equity. It is important to point of view of shareholders.

CEA = operating expenses / total assets;

CEA shows the share of operating expenses relative to total assets. More CEA increases, bank risk increases, prompting banks to reduce operating expenses for effective bank management

T deposit = total deposits / total assets;

T deposit shows the share of deposits relative to total assets. Usually the deposits are used to finance credit operations.

CPC = equity / total loans;

CPC shows the share of capital in credits operations. CPC should be low to reduce the credit risk.

CFC = financial expenses / total loans;

CFC shows the share of financial charges on total credits.

ALA = liquid assets / total assets;

ALA shows the share of liquid assets to total assets.

TPIB = growth rate of GDP.

TINF = rate of inflation.

3.3 Econometrics Tests

3.3.1 Multi-Colinearity Test

Mutli-colineartiy appears when 2 or more explanatory variables are correlated and positive similar information. In this situation, the coefficient estimates may change erratically in response to small change in the model or data.

The consequence of high multi-colinearity are (increase of the standard error of β, reduce reliability), the results are often confusing and misleading. Collinearity detection is done by calculating the correlation between the variables.

Table 2. Correlation between variables

	Risk	Size	CAP	TLA	ROA
Risk	1.000				
Size	0.1327	1.000			
CAP	-0.1493	-0.4423	1.000		
TLA	-0.0569	0.2600	0.0171	1.000	
ROA	0.0549	-0.1208	0.3815	-0.1608	1.000
ROE	0.0395	0.2760	-0.1122	-0.0964	0.1532
CEA	0.3268	0.0955	-0.1581	-0.1448	-0.1253
T deposit	0.3120	0.4116	-0.5023	-0.2069	-0.1496
CPC	-0.0879	-0.5282	0.7829	-0.0771	0.5535
ALA	-0.0910	-0.1167	0.0634	-0.1049	0.0213
CFC	0.1226	-0.0058	-0.1023	-0.1215	-0.0888
TPIB	0.0849	0.0646	-0.0656	0.0994	0.1984
TINF	0.0778	0.1809	-0.1582	0.0518	-0.0028

Table 3. Suite of correlation between variables

	ROE	CEA	Tdeposit	CPC	ALA	CFC	TPIB	TINF
ROE	1.000							
CEA	0.1025	1.000						
Tdeposit	0.1550	0.5322	1.000					
CPC	-0.1053	-0.2513	-0.5516	1.000				
ALA	-0.0347	-0.0853	-0.1281	0.0524	1.000			
CFC	0.0435	0.4619	0.3067	-0.1314	-0.0485	1.000		
TPIB	-0.0640	-0.0019	0.0177	0.0443	-0.0850	0.0804	1.000	
TINF	0.0470	-0.1563	0.1587	-0.1294	-0.1397	0.014	-0.1375	1.000

There is a problem in CPC (relation 78% with CAP). We eliminate CPC.

Table 4. Test of VIF

Variable	VIF	1/VIF
CPC	4.82	0.207
Size	3.01	0.332
Tdeposit	2.95	0.338
CAP	2.85	0.350
CEA	1.87	0.534
ROA	1.85	0.541
TLA	1.38	0.724
CFC	1.33	0.751
TINF	1.27	0.786
TPIB	1.21	0.827
ROE	1.19	0.840
ALA	1.13	0.882

Therefore the model will be estimated is:

$$Risk_{i,t} = a0+b1.Size_{i,t}+b2.CAP_{i,t}+b3.TLA_{i,t}+b4.ROA_{i,t}+b5.ROE_{i,t}+b6.CEA_{i,t}+b7.Tdeposit_{i,t}+ b8.ALA_{i,t}+b9.CLC_{i,t}+b10.TPIB_{i,t}+b11.TINF_{i,t}+E_{i,t}$$

i = bank;

t = time.

3.3.2 Test of Hausman

It determines if the individual effects are fixed or random. It determines if the beta coefficients of two fixed and

random or estimates are not statistically different. Under the null hypothesis of independence between the errors and the explanatory variables, both estimators are unbiased, so the estimated coefficients become little different. The fixed effect model assumes that the influence of explanatory variables on the dependent variable is the same for all individuals, regardless of the period.

The random effect model assumes that the relationship between the dependent variable and the explanatory variables no longer fixed but random, individual effect is not a fixed parameter, but a random variable (Bourbonnais, 2009).

3.3.3 Test of Heteroscedasticity

There is an heteroscedasticity of residuals if they do not all have the same variance. To detect heteroscedasticity, we apply 2 tests (test Breush Pagan, the wald test), the general idea of these test is to verify whether the residues square can be explained by the explanatory variables of the model.

The Breush Pagan test allows us to detect intraindividual heteroskedasticity which assumes different variance between the errors terms in the same individual.

Pvalue is greater than 1%, there is no problem of heteroskedasticity.

3.4 Analysis of Descriptive Statistics

Table 5. Descriptive statistics

	Observations	Mean	Standard deviation	Minimum	Maximum
Risk	198	0.009173	0.0206	0	0.1659
Size	198	13.67853	1.315	10.19	15.72
CAP	198	0.19866	0.200	0	0.97
TLA	198	0.6711	0.196	0.071	0.957
ROA	198	0.0127	0.017	0	0.1291
ROE	198	0.0769	0.088	0	0.9572
CEA	198	0.027	0.010	0.0024	0.055
T deposit	198	0.648	0.278	0.0066	0.97
ALA	198	0.047	0.055	0.0045	0.44
CFC	198	0.035	0.027	0.0023	0.3179
TPIB	198	0.039	0.011	0.02	0.0611
TINF	198	0.042	0.013	0.03	0.078

-The average of risk is 0.91%. The standard deviation is 2.06%. There is a significant difference between banks at risk of insolvency. The average of size is 13.67. The standard deviation is 1.31. There is a significant difference between at level of size.

-The average of CAP is 0.198. The standard deviation is 0.2005. It has not significant difference between banks at the level of CAP. The average of TLA is 67%. The credits represent on average 67% of total assets. As a result, the banks give importance to credits operations. The standard deviation is high. So, there is a significant difference between banks to credit level.

-The average of ROA is 1.27%. Net income is on average 1.27% of total assets. The standard deviation is low. So, there is not a significant difference between banks in level of return on assets. The average of ROE is 7.69%. The net income is on average 7.69% of equity. The standard deviation is low. So, there isn't a significant difference between banks in level of return of equity.

-The average of CEA is 2.7%. The operating expenses represent 2.7% of total assets. The standard deviation is low. There isn't a significant difference between banks in level of CEA.

-The average of Tdeposit is 64.8%. Total deposit represent 64.8% of total assets. The standard deviation is high. There is a significant difference between banks in level of Tdeposit. The average of ALA is 4.7%. Total liquid assets represent 4.7% of total assets. The standard deviation is high. There is a significant difference between banks in level of ALA.

-The average of CFC is 3.5%. The financial expenses represent 3.5% of total credits. The standard deviation is low. There isn't a significant difference between banks in level of CFC.The average of TPIB is 3.9%. The standard deviation is low. There isn't a significant difference in TPIB between (2000-2010) in Tunisia.

-The average ofTINF is 4.22%. The standard deviation is low. There isn't a significant difference in TINF between (2000-2010) in Tunisia.

3.5 Estimation and Interpretation of Model

Table 6. Estimation results

Risk	Coefficient	Standard error	Z	Z<P	95% Confiance intervalle
Size	-0.0010926	0.0017	-0.63	0.526	-0.0044 0.00
CAP	-0.012401	0.0110	-1.13	0.260	-0.033 0.009
TLA	0.0002402	0.0078	0.03	0.976	-0.0150 0.01
ROA	0.0462319	0.104	0.44	0.658	-0.158 0.25
ROE	-0.0133178	0.016	-0.83	0.409	-0.044 0.01
CEA	0.6729943	0.175	3.83	0.000	0.32 1.01
Tdepsoit	0.0096315	0.008	1.19	0.233	-0.0062 0.02
ALA	0.0001482	0.025	0.01	0.995	-0.048 0.04
CFC	-0.0492457	0.054	-0.90	0.367	-0.1562 0.05
TPIB	0.1199457	0.125	-0.41	0.339	-0.0117 0.001
TINF	0.1685402	0.1069	0.96	0.115	-0.125 0.3
Constant	-0.013	0.026	-0.59	0.555	-0.059 0.032

Therefore, the model estimated is:

$$Risk_{i,t} = -0.013-0.0010926.Size_{i,t}-0.012401.CAP_{i,t}+0.0002402.TLA_{i,t}+0.0462319.ROA_{i,t}$$
$$-0.0133178.ROE_{i,t}+0.6729.CEA_{i,t}+0.0096.Tdeposit_{i,t}+0.0001482.ALA_{i,t}-0.049.CFC_{i,t}$$
$$+0.1199.TPIB_{i,t}+0.168.TINF_{i,t}+E_{i,t}$$

Z = t of student.

-There is a negative relationship between risk and size (if the size increases by 1%, the risk decreases by 0.0010926%). The increase in size causes diversification operations that reduce the risk of bank. It the same result found by Hakimi et al. (2012), Zribi and Boujelbène (2011), Salked (2011) but contrary to the result found by Teresa and Dolores (2008).

-There is a negative relationship between risk and capital (if capital increases by 1%, the risk decreases by 0.0124%). The increase in equity has a negative effect on bank risk. The equity augmentation improves the bank ability to cope with financial shocks. (Berger, 1995). But this relationship is not statistically significant. It is the same result by Zribi and Boujelbène (2011) Salked (2011) but this is contrary to result found by Hakimi et al. (2012).

-There is a positive relationship between risk and TLA (TLA increases by 1%, The risk increases by 0.00024%). Increases in total loans has a positive effect on bank risk. The credit growth can increase the number of borrowers default which increasing bank risk.

This is the same result found by Salked (2011).

-There is a positive relationship between risk and ROA (if ROA increase by 1%, the risk increases by 0.046%). Increase in return of assets ha a positive effect on bank risk. The increase in net income can encourage banks to make risky operations diversification or growth which increases the bank risk.

-There is a negative relationship between risk and ROE (if ROE increases by 1%, the risk decreases by 0.0133%). The increase of return on equity has a negative effect on bank risk. This is contrary to result found by Teresa and Dolores (2008).

-There is a positive relationship between risk and T deposit (if Tdeposit increase by 1%, Risk increase by 0.0096%). The increase of T deposit has a positive effect on bank risk. This is similar a result found by Salked. M (2011).

There is a positive relationship between risk and ALA (if ALA increase by 1%, Risk increases by 0.0001482%). The increase of liquid assets has a positive effect on bank risk. The increase in liquid assets reduces profitable investment opportunities by banks which increases their risk.

There is a negative relationship between risk and CFC (if CFC increase by 1%, risk decreases by 0.049%). The

increase of financial expenses has a negative effect on bank risk.

-There is a positive relationship between risk and TPIB (if TPIB increase by 1%, risk increase by 0.11%). The increase of growth of PIB has a positive effect on bank risk. This is contrary to result found by Salked. M (2011). There is a positive relationship between risk and TINF (if TINF increase by 1%, risque increase by 0.168%). The increase of inflation has a positive effect on bank risk.

The increase in inflation can lead to higher costs for banks which reduces the risk of bank insolvency. This is consistent with result found by Hakim et al. (2012), Salked (2011).

4. Conclusion

The capital and risk are two important variables in the banking literature. As a result, their relationship is interesting fro managers, shareholders, researchers. In the context of this article, we used a sample of 18 banks over the period (2000-2010), we found a negative relationship between capital and bank risk, when the capital increases, the bank risk decreases. This is similar to several studies, showing risk aversion for banks in Tunisia and incentives to increase their capital.

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Notes

Note 1. The results of the works of Shrieves et Dahl (1992), Jacques and Nigro (1997), Aggrawal and Jacques (1997), Editz et al (1998) which are based on simultaneous equation models showed that regulatory capital constraints exert significant influence over the financial decisions of banks and confirmed the effectiveness of capital regulation in the sense that it has led to higher capital ratio.

Note 2. Jacques and Nigro (1997) showed that the introduction of capital standards based in risk lead to a significant increase in capital ratios and reduction of bank portfolio risk which already meet regulatory requirements.

Note 3. The market with many banks.

Note 4. The value of future cash-flows discounted at the bank.

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Financial Performance Determinants of Paper and Paper Products Firms Listed in Borsa Istanbul

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Abstract

The aim of this study is to reveal the major determinants which have impact on financial performance of paper and paper products firms listed in Borsa Istanbul. We examined the impact of the firm specific, industry specific and macroeconomic factors on Return on Assets (ROA) and Return on Equity (ROE) in paper and paper products firms listed in Borsa Istanbul during the period from 2011/01 to 2014/09 by using panel regression. The results show that except for Sales to Asset Ratio, firm specific and industry specific factors have statistically significant and material impact on both financial performance indicators. As macroeconomic factor, the impact of foreign trade deficit on the performance indicators is relatively weak. Through macroeconomic variables, commercial loan interest rate has no statistical significance for both ROA and ROE. The empirical result suggests that the impact of the variables on ROE is stronger compared to ROA.

Keywords: paper, paper products industry, ratio analysis, panel data

1. Introduction

Paper-making was first invented in China in 105 BC and after a while the know-how was carried to Africa and Europe respectively. Today, per-capita paper/cardboard consumption is one of the developmental indicators of a country. The world's average per-capita consumption for paper and cardboard is 48.5kg. While this average is over 200kg in Finland, Belgium, Denmark, the Netherlands and Germany; for Greece it is 62kg and for Turkey it is 32kg (Özarslan et al., 2011). According to these figures, the paper and cardboard consumption per capita in Turkey is lower than the world's average. However, the population growth rate of Turkey is higher than that of other European countries, and thus increasing per capita consumption of Turkey creates a high potential for the paper industry and makes it attractive for foreign capital and high-technology transfer (Zaimoğlu, 2012).

Firms' performance must be measured by using comparable, objective and reliable information for their survival and sustainability. The accuracy of managerial decisions in firms is assessed by performance analysis and according to results of analysis, necessary corrective actions are taken and thus sustainability is ensured. Business decision-making and policy formulation mostly depend on productive, financial and economic indicators (Ray, 2011). Disclosure of financial statements on a periodic and systematic basis and accessibility of financial data makes financial information crucial in performance measurement. Meanwhile financial ratios are useful in predicting firm failure and that failed firms are less profitable, more liquidity constrained and higher in debt leverage (Ho et al., 2013). In this context, amongst financial analysis techniques, the financial ratio analysis is frequently used to determine the financial situation of firms. As uniform financial statements are disclosed by firms, the financial data extracted from these statements will also be uniform and this will provide comparability between firms.

This study is one of very few studies which investigate the relationship between the financial ratios generated from financial statements of the publicly traded paper and paper product companies. Although there are various studies on measurement of financial performance by using financial information, there are a limited number of studies examining the financial aspect of the paper industry in particular. The empirical findings verify a statistically significant relationship between independent variables (firm specific, industry specific and macroeconomic factors) and profitability ratios.

In the next section a macroeconomic view of the global and domestic paper industry is interpreted. The literature examining the impact of financial ratios on profitability is summarized in Section 3. In section 4, detailed information about the data and methods is given. The empirical results are presented in Section 5, followed by a concluding section.

2. Major Financial Indicators of the Domestic and Global Paper Industry

Despite the fact that the history of the paper industry in Turkey is quite old, the development of the industry began in 1934 with the establishment of the Turkish Pulp and Paper Company (SEKA) as a public sector investment. The industry was closed to foreign competition till Turkey's entry into the Customs Union in 1996 (Şengül, 2010). In 2006, Turkey with more than 50 factories produced 2.4 million tons of paper against 3.9 million tons of paper consumption. As of 2010 year end, among 219 countries exporting paper and cardboard, Turkey was ranked 27th. As being the 15th largest importer out of 229 countries, Turkey's share of global paper and cardboard imports was 1.6% (Zaimoğlu, 2012). When geographical concentration of the paper and cardboard production industry in Turkey is analyzed, it is observed that about 50% of paper and board production capacity is in the Marmara Region.

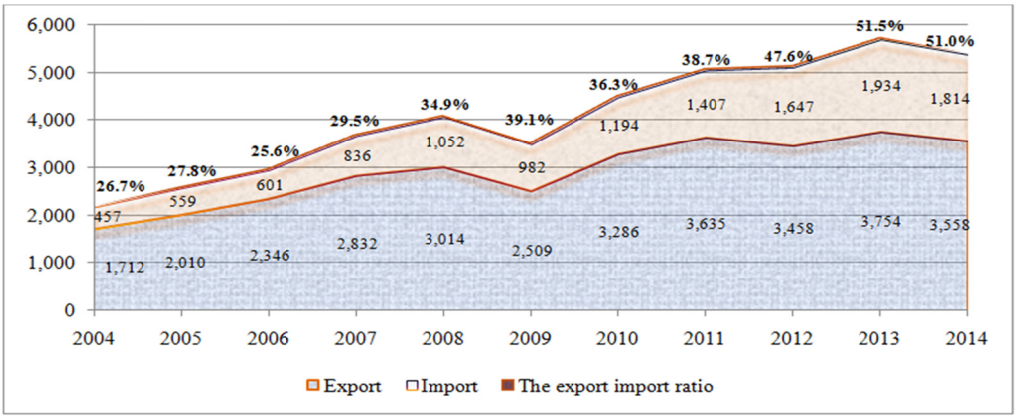
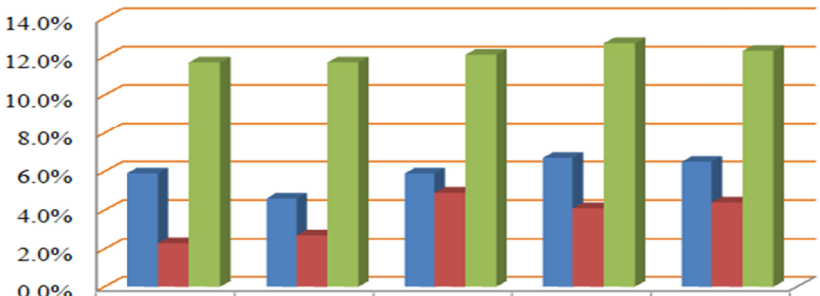


Figure 1. Foreign trade statistics of paper industry in Turkey (www.tuik.gov.tr)

In Turkey consumption of paper and paper products has been growing steadily. Between 1998 and 2008, Turkey's per capita paper and board consumption grew by an average of 6.9%. In 2009, foreign trade volume declined with the influence of the 2008 Global Financial Crisis but as imports decreased more than exports, the export import ratio remained high compared to 2008. In recent years, the interest of foreign capital in the industry has increased and acquisitions have taken place especially in publicly traded companies such as Mondi Tire Kutsan, and Olmuksan International Paper. Rising foreign capital inflow has helped the producing power of the industry and contributed to the increase of exports positively. Thus the export import ratio of the industry has increased steadily over time and reached 51% as of 2014 year-end.



	2008	2009	2010	2011	2012
Return on Sales	5.9%	4.6%	5.9%	6.7%	6.5%
Return on Capital	2.3%	2.7%	4.9%	4.1%	4.4%
EBITDA margin	11.7%	11.7%	12.1%	12.7%	12.3%

Figure 2. Financial ratios of top 100 forest, paper and packing (FFP) companies

In paper products, the top importing countries are the developed countries such as United States, Germany, France, the UK and Italy. When we examine the Global Paper Industry for the period from 2008 to 2012, considering sales and operating profits, the top 100 Forest, Paper and Packing (FFP) companies were determined whose sales revenue accounted for more than 50% of global sales revenue (Pricewaterhouse Coopers LLP, 2013).

The consolidated return on sales, return on capital ratios and EBITDA margin regarding these companies are displayed in Figure 1. By the impact of the Global Financial Crisis which broke out in late 2008, 2009 Global Sales Revenue of the industry declined sharply. In line with the downswing of sales revenue in 2009, return on sales ratio also decreased. The sales revenue of the top 100 FFP countries was $358 billion by the end of 2008 and the sales revenue of these companies decreased by 15% and became 311 $billion by the end of 2009. With the recovery of economies, in 2011 the sales revenue was able to reach $354billion.

Table 1. Sales revenue and net Income of top 100 FFP companies

	Sales (Billion $)			Net Income (Billion $)		
Region/Country	2011	2012	Change	2011	2012	Change
United States	98.5	106	7.6%	4.2	5.8	1.60
Europe	114.7	105.8	-7.8%	4.3	1.1	(3.20)
Japan	57.4	60	4.5%	0.8	0.5	(0.30)
Emerging Asia	33	33.1	0.3%	1	1.1	0.10
Canada	26.3	26.1	-0.8%	-0.3	0.9	1.20
Latin America	24	23.3	-2.9%	0.8	0.9	0.10
TOTAL	353.9	354.3	1.0%	10.8	10.3	(0.50)

Source: Pricewaterhouse Coopers LLP, 2013.

Top 100 FFP total sales of $354 billion remained almost the same in 2012 compared to 2011. Sales of European countries were reduced by 8% due to volatility in the FX market; however US sales rose by 8% as the US real estate market began to recover. Sales of Japanese companies increased by 4.5% in 2012 after the booming period in the Far East starting from the tsunami in March 2011. Emerging Asia consists of South Africa and Australia. In South Africa, the devaluation of the rand by 12% against the US dollar reduced sales. The slowdown in the Chinese economy affected the other Asian companies negatively so the growth rate of these in 2012 is consistent with that of 2011. The emerging market share within the top 100 FFP companies is about 10% for 2011 and 2012. Sales of Canadian companies dropped slightly (-0.8%) in 2012. Latin America posted a decrease in sales of 3.0% in 2012. Consequently, the performance of the industry reflected in a large measure the difficulties of doing business in the relatively volatile economic environment.

3. Literature Review

When the recent literature on determination of factors affecting profitability in corporate companies is examined, it is observed that the factors influencing profitability are mainly classified into three groups: firm specific, industry specific and macroeconomic.

Liargovas and Skandalis (2008) examined the impact of key determinants of firms' performance during the period of 1997-2008 by using panel least squares regression method. In the research study, return on sales or profit margin, return on assets and return on equity were used as dependent variables in order to evaluate firm performance of Greek industrial firms. The empirical results showed that leverage, export activity, location, size and effective management significantly affected firm performance in Greece.

By employing panel data of 238 listed companies in the Jakarta Stock Exchange (JSX) in the period 1994-2004 as the sample, Prasetyantoko and Parmono (2008) investigated firm-specific and macroeconomic factors which have impact on corporate performance considering the pre-crisis and post-crisis periods. In the study, return on assets (ROA) and market capitalization growth were selected as dependent variables. Leverage, liquidity and solvability ratios as firm specific factors were found statistically significant on ROA and market capitalization growth. However, according to empirical results, it was verified that macroeconomic factors such as inflation and interest rates were more important variables inducing firm performance, rather than firm-specific factors.

Korkmaz et al. (2008) analyzed the financial performance and ROA of fifteen cement firms quoted on Borsa Istanbul (formerly ISE) during the period 2003-2007. By implementing panel data analysis, the study revealed

that economic development had a positive impact on the financial performance of cement firms. At the same time, financial ratios selected as independent variables were found statistically significant on ROA except for working capital turnover ratio and interest bearing ratio.

In his study, Sarbapriya Ray (2011) analyzed the financial performance of Indian paper and paper product companies considering seven key financial dimensions, namely, financial profitability, capital structure, operational efficiency, fixed asset age, current asset efficiency and liquidity position during the period 2000/01 to 2008/09. According to the findings, resources like current assets of the firms of the industry were being utilized efficiently, but lower rate of dividend payment must be increased by the companies in order to satisfy the investors without affecting the future expansion and modernization programmes of the sector.

Muritala (2012) examined the optimum level of capital structure through which a firm can increase its financial performance in Nigeria using annual data of ten firms between 2006 and 2010. By performing the Panel Least Squares Method, he found that asset turnover, size, firm's age and firm's asset tangibility were positively related to firm's performance (ROA). The study also provided evidence of a negative and significant relationship between asset tangibility and ROA as a measure of performance in the model.

By using financial ratio analysis, Chun-Yu Ho et al. (2013) examined North American pulp and paper company bankruptcies that occurred between 1990 and 2009. They showed that failed firms were less profitable, more liquidity constrained and higher in debt leverage. According to empirical evidence, it was found that during the month a bankruptcy occurred, shareholders suffered substantial losses (37%).

4. Data and Methodology

4.1 Sample and Sample Selection

In this paper it is aimed to reveal the firm-specific, industry-specific and macroeconomic factors which have impact on financial performance of paper and paper product companies listed in Borsa Istanbul. In the study, financial ratios generated from financial statements of the companies are recognized as firm-specific factors.

The financial statements of the companies subject to our research are extracted from the website of Borsa Istanbul. Actually, there are seven paper and paper products industry companies listed in Borsa Istanbul but one of them is excluded in the analysis due to lack of data as it is a newly established company. The list of the companies and their corresponding stock codes are displayed in Table 2. The study covers the period from 2011/01 to 2014/09.

Table 2. List of paper and paper product industry companies listed in Borsa Istanbul

Stock Code	Company Name	Availability
ALKA	Alkim Kağıt Sanayi Ve Tic. A.Ş.	Yes
KAPLM	Kaplamin Ambalaj San. Ve Tic. A.Ş.	Yes
KARTN	Kartonsan Karton San. Ve Tic. A.Ş.	Yes
TIRE	Mondi Tire Kutsan Kağıt Ve Ambalaj San. A.Ş.	Yes
OLMIP	Olmuksan Int. Paper Ambalaj San. Ve Tic. A.Ş.	Yes
PRZMA	Prizma Pres Matbaacılık Yayıncılık San. Ve Tic. A.Ş.*	No
VKING	Viking Kağıt Ve Selüloz A.Ş.	Yes

Note. *Excluded due to lack of data.

4.2 Explanatory and Dependent Variables

In evaluating the financial performance, the ROE would not provide a good comparison because the small and the negative equity levels of some companies would generate distorted indicators of profitability (Vieira, 2010). ROA is a more appropriate indicator of company's profitability reflecting how effectively and efficiently its assets are used. Obviously the higher the net income for a given amount of assets, the better the return. ROA is the product of two factors:

$$Net\ Income\ Margin = Net\ Income / Sales$$

$$Assets\ Turnover = Sales / Total\ Assets$$

$$ROA = Net\ Income\ Margin \times Assets\ Turnover$$

Net Income Margin as a factor of ROA may be low, but the company may be able to generate more sales per

dollar of assets than comparable companies. Conversely poor turnover may be partially offset by high net profitability (Jones, 2010). So the relation between ROA and these two factors is not always positive.

ROE looks at the return to equity investors using the accounting net income as measure of this return (Damodaran, 2011). ROE is the product of two factors:

$$Net\ Income\ Margin = Net\ Income / Sales$$

$$Equity\ Turnover = Sales / Equity$$

$$ROE = Net\ Income\ Margin \times Equity\ Turnover$$

Liquidity ratios help us to measure the firms' capacity to repay short-term debts, with the liquidation of short term assets. In financial statements, liquid items are usually less profitable then fixed items; in other words the fund invested in current assets generates less returns than fixed assets. However a low liquidity level in a company may lead to increasing financial costs and result in the incapacity to pay its obligations (Maness & Zietlow, 2004). So it is a crucial matter for finance professionals to maintain the balance between adequate liquidity and profitability. The literature on liquidity and profitability trade off is fairly expansive and the vast majority of studies suggest a negative relationship between liquidity and profitability (Smith & Begemann, 1997; Teruel & Solano, 2007), while in some of the studies, findings show a positive association (Chhapra & Naqvi, 2010).

The capital structure is defined as the mix of debt and equity that the firm uses in its operation (Shubita & Alsawalhah, 2012). The allocation of debt and equity is a fundamental task of financial managers as the debt burden may cause excessive interest expenses for companies. In this context, capital to asset ratio is a substantial measure of capital structure. There are various studies examining the relation between capital to asset ratio and ROA. Capital structure was initially examined by Modigliani and Miller (1958) and according to their assumption, capital structure has an impact on the firms' total value since the economic activities are exempt from tax, agency costs and asymmetric information. Recently, Ferati and Ejupi (2012) examined the relation between capital structure and profitability in Macedonia. According to empirical evidence, ratios concerning profitability have a positive correlation with short-term debt and equity, and a negative correlation with long-term debt. Singh (2013) examined how far the capital structure affects the profitability of the manufacturing firms in India. By classifying firms into three categories, low, medium and high, based on business revenue, he found that high debt financing would minimize the net profit of these firms and thus lower the ROA and ROCE (Return on Capital Employed).

The market share and profitability correlation has long been investigated by various studies. The previous studies on average revealed a significant positive correlation between these variables (Szymanski et al., 1993). But recent empirical results suggest that the relation between these two depends on competitive and strategic context and the fabricated or erroneous impacts that form a great part of the criteria used for measuring this relation (Ritz, 2008).

Foreign trade deficit or surplus is related to agents such as foreign currency fluctuations, foreign capital inflow, competitive structure of the industry, etc. Depending on reduction in manufacturing costs of companies, profitability of companies will be boosted.

In theory, a downswing in interest rates encourages consumers and firms to take out loans to finance greater spending and investment. So the relation between interest rates and profitability is considered to be negative.

Table 3. Definition of variables

Category	Variable	Definition	Type of Variable	Period
Performance Indicator	ROA	Return on Assets	Dependent	2011/01-2014/09
Performance Indicator	ROE	Return on Equity	Dependent	2011/01-2014/09
Turnover	SA	Sales/Assets	Firm-specific	2011/01-2014/09
Profitability	NPM	Net Income/Sales	Firm-specific	2011/01-2014/09
Capital Structure	CAR	Capital to Asset Ratio	Firm-Specific	2011/01-2014/09
Liquidity	ATR	Acid Test Ratio	Firm-Specific	2011/01-2014/09
Market Share	MS	Firm Sales/Total Sales	Industry-Specific	2011/01-2014/09
Foreign Trade Deficit	FTD	Export-Import Diff.	Macroeconomic	2011/01-2014/09
Interest Rates	IR	Commercial Loan Interest Rates	Macroeconomic	2011/01-2014/09

Table 3 shows the firm-specific, industry specific and macroeconomic variables which may have impact on ROA and ROE determined as performance indicators.

4.3 Methodology

In obtaining empirical evidence, panel data analysis is implemented by using E-views version 7 package. In panel data, individuals (persons, firms, cities, ...) are observed at several points in time (days, years, before and after treatment, ...). This handout focuses on panels with relatively few time periods (t) and many individuals (N). This handout introduces the two basic models for the analysis of panel data, the fixed effects model and the random effects model, and presents consistent estimators for these two models (Schmidheiny, 2014).

According to the variables given in Table 3, the following equations are estimated:

Model 1:

$$ROA_{it} = \alpha_{it} + \beta_1 SA_{it} + \beta_2 NPM_{it} + \beta_3 CAR_{it} + \beta_4 ATR_{it} + \beta_5 MS_{it} + \beta_6 FTD_{it} + \beta_7 IR_{it} + \varepsilon_{it} \quad (1)$$

Model 2:

$$ROE_{it} = \alpha_{it} + \beta_1 SA_{it} + \beta_2 NPM_{it} + \beta_3 CAR_{it} + \beta_4 ATR_{it} + \beta_5 MS_{it} + \beta_6 FTD_{it} + \beta_7 IR_{it} + \varepsilon_{it} \quad (2)$$

where i is a subscript for each firm and t for each year. ROAit and ROEit represent firm performance indicators.

The estimated panel least squares models displayed in (1) and (2) equations have an insufficient number of cross sections (number of firms) to run the random effects model; in other words as the number of cross-sections in both of the equations is 6 which is less than the number of regressors, the fixed effect model is appropriate for the estimation. In the fixed effect model estimation, all regression coefficients are restricted to be the same across all cross sections.

Inference on estimation of equations primarily needs verification of the stationarity of the individual time series otherwise spurious regression equations can be generated if regressed for non-stationary series (Engle & Granger, 1987). In order to ensure stationarity of the variables in the sample, we perform a set of common and individual panel unit root tests. The main difference to time series testing of unit roots is that we must take asymptotic behavior of the cross-sectional dimension and the time-series dimension into consideration. In the study, the following panel tests based on common and individual unit root tests are performed, because there is no significant difference between the tests.

-Levin, Lin, and Chu (2002).

-Im, Pesaran and Shin (2003).

-Fisher, Augmented Dickey Fuller (Maddala & Wu, 1999).

Levin, Lin and Chu (2002) revealed that the panel unit root testing notably increases power in finite samples when compared with the single-equation Augumented Dickey Fuller Test (ADF) test and proposed a panel approach that limits β_i by holding it the same across cross-sections as follows:

$$\Delta X_{it} = \alpha_i + \beta X_{i,t-1} + \gamma_i t + \sum_{j=1}^{k} \theta_{ij} \Delta X_{i,t-j} + \varepsilon_{it} \quad (3)$$

where i = 1, 2, … N represents cross-sections. Levin-Lin-Chu have tested H_0 hypothesis of $\beta_1 = \beta_2 = \ldots = \beta = 0$ against the H1 of $\beta_1 = \beta_2 = \ldots = \beta < 0$, with the test based on the t-statistic $t_\beta = \hat{\beta} / se(\hat{\beta})$ where $\hat{\beta}$ is the OLS estimate of β in Equation (3), and $se(\hat{\beta})$ is its standard error.

Im et al. (2003) have developed a panel-based unit root test that unrestricts β to vary across cross-terms under the alternative hypothesis. The Im, Pesaran and Shin test is based on the mean of individual ADF test statistics.

$$\bar{t} = (1/N) \sum_{i=1}^{N} t_{\beta_i} \quad (4)$$

Based on Fisher's (1932) empirical results, Maddala and Wu (1999) derived tests by combining the p-values from individual unit root tests and thus developed a new panel based approach. If we define π_i as the p-value from any individual unit root test for cross-section, then under the null of unit root for all cross-sections, we have the asymptotic result that:

$$-2 \sum_{i=1}^{N} \log(\pi_i) \rightarrow X_{2N}^2 \quad (5)$$

In addition, it demonstrates that:

$$Z = \frac{1}{\sqrt{N}} \sum_{i=1}^{N} \Phi^{-1}(\pi_i) \rightarrow N(0,1) \quad (6)$$

where Φ^{-1} is the inverse of the standard normal cumulative distribution function. It reports both asymptotic x^2 and standard normal statistics using ADF and Phillips-Perron individual unit root tests.

In order to determine the autocorrelation Woolridge test is performed. In Woolridge test the residuals from a linear model first differences are used. Let Δ be the first-difference operator, The model that is estimated by the method is:

$$\Delta Y_{it} = \Delta X_{it} \beta_1 + \Delta e_{it} \quad (7)$$

5. Empirical Results and Discussions

In the research sample, the impact of Sales/Assets, Net Income/Sales, (log) Capital/Asset Ratio, Firm Sales/Industry Sales, (log) Export-Import Diff., Commercial Loan Interest Rates on ROA and ROE is examined for six companies operating in the paper and paper products industry. In order to ensure normality the natural logarithm of Capital/Asset Ratio and Export-Import Diff. is taken. The descriptive statistics regarding the variables in the research sample is displayed in Table 4.

Table 4. Descriptive statistics

	ROA	**ROE**	**ATR**	**SA**	**FTD**	**IR**	**NPM**	**MS**	**CAR**
Mean	0.00	(0.14)	1.49	0.31	13.09	12.17	0.00	0.17	(0.77)
Median	0.01	0.01	0.97	0.33	13.07	12.14	0.02	0.15	(0.58)
Maximum	0.05	0.06	5.52	0.43	13.48	14.82	0.22	0.31	(0.11)
Minimum	(0.09)	(10.10)	0.20	0.12	12.84	8.54	(0.40)	0.05	(4.78)
Std. Dev.	0.03	1.07	1.22	0.08	0.14	2.02	0.12	0.09	0.73
Skewness	(1.26)	(9.10)	1.71	(0.42)	0.98	(0.26)	(1.41)	0.32	(0.24)
Kurtosis	5.51	85.09	5.43	2.01	4.86	1.84	6.04	1.51	11.68
Jarque-Bera	47.41	26,513.09	65.91	6.29	27.67	6.01	64.67	9.89	372.2
Probability	0.00	0.00	0.00	0.04	0.00	0.05	0.00	0.01	0.00
Sum	0.29	(12.53)	134.29	27.55	1178.141	1095.65	0.04	15.00	(69.20)
Sum Sq. Dev.	0.06	102.01	132.89	0.57	1.76	363.20	1.19	0.75	48.44
Observations	90	90	90	90	90	90	90	90	90

In Table 4, when Jarque-Bera Test Statistics are examined, all series are normally distributed after the proper transformation of the series CAR and FTD. As all p-values are less than 5 percent, the null hypothesis (the distribution is normal) is accepted and alternative hypothesis (the distribution is not normal) is rejected. Correlation among series is displayed in Table 5.

Table 5. Correlation matrix

	ROA	ROE	ATR	SA	FTD	IR	NPM	MS	CAR
ROA	1.0000								
ROE	0.4581	1.0000							
ATR	0.6642	0.1347	1.0000						
SA	0.2477	0.1606	(0.1377)	1.0000					
FTD	0.0353	0.0358	(0.1397)	0.0243	1.0000				
IR	(0.0042)	(0.2185)	0.0045	0.0002	(0.1329)	1.0000			
NPM	0.9712	0.4515	0.6698	0.2304	0.0441	(0.0897)	1.0000		
MS	0.3883	0.1549	0.1363	0.3293	(0.0000)	(0.0000)	0.3626	1.0000	
CAR	0.7958	0.6492	0.5858	0.3772	(0.0767)	0.0078	0.7866	0.4223	1.0000

The correlation between performance indicators ROA, ROE and the independent variables is positive except for IR, in other words commercial loan interest rates are negatively correlated with return on equity and return on asset of the companies in the research sample. Decrease in interest rates does have a positive impact on investment through lower borrowing costs and thus the profitability of the companies rises. For the aforementioned series, Common

(Levin- Lin-Chu) and Individual (Im- Pesaran-Shin, ADF - Fisher Chi-square) Unit Root Tests are performed, in order to ensure stationarity. The results of panel unit root tests are illustrated in Table 6.

Table 6. Results of panel unit root test

Variables	Levin, Lin & Chu	Im, Pesaran and Shin	ADF - Fisher Chi-square
ROA	(3.159)	(2.568)	26.253
	0.001	*0.005*	*0.003*
ROE	(1.952)	(2.548)	26.040
	0.025	*0.005*	*0.004*
CAR	(0.624)	(1.658)	21.622
	0.266	*0.040*	*0.040*
FTD	(13.704)	(9.110)	82.126
	0.000	*0.000*	*0.000*
MS	(2.479)	(3.786)	36.992
	0.040	*0.000*	*0.000*
SA*	(2.508)	(3.783)	36.529
	0.006	*0.000*	*0.000*
NPM	(3.384)	(3.365)	35.556
	0.000	*0.000*	*0.000*
IR*	(4.425)	(6.223)	37.046
	0.000	*0.000*	*0.000*
ATR*	(2.703)	(3.926)	38.349
	0.000	*0.000*	*0.000*

In the table, p-values are shown in italic and t-statistics in normal characters. * after taking the first difference series becomes stationary.

After determining normality and stationary, in order to detect multicollinearity, variance impact factors (VIF) of variables are calculated. VIF values are shown in Table 7.

Table 7. Variance impact factors of variables

Variables	R_i^2	**VIF**
CAR	0.709	3.436
FTD	0.091	1.101
MS	0.227	1.293
SA	0.361	1.565
NPM	0.711	3.460
IR	0.039	1.041
ATR	0.604	2.525

Since all VIF values are less than 5%, it is concluded that there is no multicollinearity between the variables. After providing all assumptions, the cross section fixed effect model is performed. The coefficients estimations and the t-statistics are given in Table 8.

Table 8. Panel data fixed effects regression results

Explanatory Variables	Cross Section Fixed Effects	
	ROE	ROA
SA (Sales/Assets)	0.0149	0.0072
	0.9764	*0.6021*
IR (Commercial Loan Interest Rates)	(0.0006)	(0.0001)
	(0.9760)	*(0.7184)*
FTD (Foreign Trade Deficit)	(0.1019)	(0.0051)
	(1.9348) **	*(1.9804)* **

CAR (Capital to Asset Ratio)	0.2924		0.0027	
	2.7609	**	*2.2239*	**
ATR (Acid Test Ratio)	(0.0081)		(0.0018)	
	(2.3475)	**	*(2.3227)*	**
MS (Market Share)	(0.2356)		0.0075	
	(1.4436)	**	*(1.4798)*	**
NPM(Net Profit Margin)	0.2314		0.1962	
	19.3452	***	*26.663*	***
Constant	0.2811		0.0053	
	1.6728	*	*1.893*	*
Unweighted Stat.				
R-squared	0.9611		0.9700	
Durbin-Watson stat	1.5267		1.5506	
Number Of Obs.	60		60	

Note. In the Table, the italic characters stand for t-statistics and normal characters for coefficients.

* Indicates significance at the 10% level. ** Indicates significance at the 5% level. *** Indicates significance at the 1% level.

In the sample, as we have cross-sections less than the number of coefficients, random effect model is not appropriate for the estimation. In other words, random effect model requires equal number of cross sections and regressors. At the same time, the data is unbalanced which refers to different number of observations for each cross-section unit so to estimate the model by using two-way fixed effects specifications is not possible. For this reason, the panel regression is estimated with a cross sections fixed effects model.

Finally, in order to test heteroscedasticity, Long-Run (LR) Variance test and in order to test autocorrelation Wooldrige test is performed. The results are given in Table 9.

Table 9. Long-run variance test and woolridge test

Test	**Test Statistics**	**p-values**
LR (ROA)	22.34	0.03
LR(ROE)	27.59	0.04
Woolridge (ROA)	1.34	0.01
Woolridge (ROE)	2.22	0.02

Both tests have p-value less than 0.05. Therefore, it is concluded that there is no heterodasticity and autocorrelation in the model.

According to regression results using cross-section fixed effects specification, most of the explanatory variables have statistically significant impact on the dependent variables, ROE and ROA. Only SA and IR have no statistical significance in both cases. As firm specific factor, SA which indicates the firm's efficiency in utilizing its assets to generate sales does not have association with ROA and ROE. Similarly there is disconnection between the change in commercial loan interest rates and the profitability ratios during the period.

In the model, through firm specific factors, ATR measured as the ratio of current assets (without inventories) to short term debts has statistically significant and weak negative impact on the profitability ratios in the period for the paper and paper product firms. Capital to asset ratio has statistically significant and material positive impact on ROE (0.2924); however the impact of Capital to Asset Ratio on ROA(0.0027) is quite weak. Net Profit Margin has also significant and material positive impact on ROE (0.2314) and ROA (0.1962). The results show that through firm specific factors, CAR and NPM have significant and the strongest impact on ROA and ROE

As industry specific variable, the market share which is related to volume of sales significantly and negatively influences both ROE(-0.2356) and ROA(-0.0075), however the negative impact of Market Share on ROA is too weak. Negative relation between volume of sales and the profitability ratios indicates that as the volume of sales increases, with respect to competitive structure of the industry, decrease in net profit margin affects profitability of the firms negatively.

In the sample, from macroeconomic factors, the relation between Foreign Trade Deficit and the dependent variables ROE(-0.1019) and ROA(-0.0051) is significant and negative for the paper and paper products industry

firms listed in Borsa Istanbul. However the negative impact of FTR on ROE is stronger compared to ROA. According to these outcomes, as the foreign deficit decreases, correspondingly profitability increases.

6. Conclusions

Analyzing the firm-specific, industry-specific and macroeconomic variables which have impact on the profitability (used as dependent variables) ratios of paper and paper product companies listed in Borsa Istanbul, it is concluded that the empirical outcomes are consistent with the expected results. In the sample, firm specific and industry specific variables turn out to be more efficacious on ROA and ROE compared to macroeconomic variables. Among all the variables, capital to asset ratio and net profit margin have significant and strongest positive impact on the performance indicators. Through firm specific variables, Acid Test Ratio which is a measure of liquidity risk has significant but weak negative impact on ROA and ROE while sales to asset ratio has no statistical significance for both ROA and ROE. The outcome concerning sales to asset ratio shows that in the period, for the paper and paper products firms, efficiency in utilizing their assets to generate sales cannot be considered as significant on the profitability. Likewise, commercial loan interest rate has no statistical significance for the performance indicators.

The results of regression analysis show that for the sample, ROE is a more appropriate performance indicator rather than ROA due to sound association with the independent variables.

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