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Foreign Institutional Investments (FIIs) and the Saudi Stock Market: What Drives Foreign Institutions to Invest?

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Abstract

This paper analyzes the drivers behind foreign institutional investments (FIIs) in the Saudi stock market and their impact on market stability from 2015 till 2019 using quarterly data. The results of OLS panel regression and ARCH/GARCH model support the feedback trading hypothesis and reveal a herding and momentum behavior of foreign institutions. Foreign institutions are attracted to invest in large Saudi firms with high liquidity. Interest rates, GDP growth and oil prices all have a negative and significant impact on FIIs. In contrast, inflation indicates economic growth and has a positive impact on FIIs. FIIs tend to stabilize market returns and predict future values.

Keywords: Foreign Institutional Investments (FIIs), feedback trading hypothesis, herding behavior, market stability, emerging markets

1. Introduction

In recent decades, ownership structure of companies had deviated from the concentrated ownership model into a more dispersed and global structure. Foreign institutional investments (FIIs) in leading global financial markets account for a sizable portion. On June 15, 2015, the Capital Market Authority (CMA) allowed foreign institutions to invest in the Saudi stock market as part of their initiative to move away from being an oil-based economy and liberalize the market. The initial goal of CMA is to promote market stability and improve market efficiency through long-term investments by foreign institution. For many reasons, understanding the drivers of FIIs is important in an emerging market such as the Saudi one. First, the ownership stake of foreign institutions as of 2020 accelerated to 12.23% compared to their low ownership share of 0.73% as of 2018 (www.Tadawul.com.sa). Second, FIIs are expected to stabilize the market and improve corporate governance control (Panda & Leepsa, 2018; Lin & Lu, 2019). Therefore, we intend to explain in this paper the forces behind FIIs, what attracts them to invest, and their role in market stability.

This paper contributes to the existing body of literature by analyzing the drivers of FIIs in several ways. First, the FIIs in the Saudi market are accelerating. At the end of 2020, the ownership of foreign institutions, as presented by Qualified Foreign Institution's ownership, reached 12.23% of total ownership of the market (www.Tadawul.com.sa). This increase took place regardless of the developing Saudi regularity system. Therefore, it's important to understand the drivers of FIIs in such a context, which differ from those of developing markets. Second, the main reason for opening the market to foreign investors is to liberalize it and improve its efficiency by utilizing the expertise and knowledge of foreign institutions. Hence, this paper will help regulators to assess whether their relaxation of regulations achieved the desired goals.

The aim of this paper is to explain the drivers of FIIs in the Saudi stock market. Firm-level characteristics, financial indicators, specific industries, or macroeconomic conditions might be the factors that attract foreign institutions to invest. Also, this paper aims to define the pattern of FIIs and their role in market stability.

The results of employing quarterly data, starting from mid-2015 till the end of 2019, provide support for the feedback trading hypothesis and reveal a herding and momentum behavior of foreign institutions. Foreign institutions tend to herd their own investments, investments of other foreign institutions, and market returns. Foreign institutions are attracted to invest in large-sized Saudi firms with high liquidity. Their lack of knowledge about local firms forces them to seek out large-sized, well-known firms with high liquidity. Except for inflation,

which has a positive impact on FIIs, the impact of macroeconomic variables on FIIs is significantly negative. Low inflation levels during the study period attract foreign institutions to invest because they may indicate economic growth. FIIs tend to stabilize market returns and predict future values.

The rest of the paper is organized as follows. Section 2 reviews the related literature. Section 3 discusses FIIs in the Saudi stock market. Section 4 presents the data and definitions of variables under study. Section 5 describes the methodology applied. Section 6 summarizes the results of the analysis. Section 7 concludes the study and presents its limitations and possibilities for future research.

2. Review of Literature

2.1 Theoretical Models

Previous FII findings can be explained by three prominent hypotheses. The price pressure hypothesis states that investors try to gain from price drops (rises) associated with large sales (purchases), which put pressure on stock prices (Harris & Gurel, 1986; Shleifer, 1986). The feedback trading hypothesis presumes that feedback trading deviates stock prices from their fundamentals and affects the market stability (Davidson & Dutia, 1989; Delong et al., 1990). The information revelation hypothesis, on the other hand, assumes that the superior information institutional investors possess allow them to time the market better (Lee et al., 1991).

The study of Weng and Tsai (2018) provides support to the information revelation hypothesis. The results reveal that price volatility on the Taiwan Futures Exchange can't be fully explained by mispricing variations. These findings show that price formation in the Taiwan Futures Exchange is influenced by private information held by foreign institutional investors. Similarly, the study of Vo (2017) reveals that FIIs affect positively and significantly Vietnamese stock prices informativeness. Their findings support the role of institutional investors in improving price informativeness through better information and active monitoring of the firms in which they invest. The study of Zhang et al. (2017) shows that foreign institutions, through their price informativeness and aggressive trading, can prevent controlling shareholders of Chinese companies from tunneling cash flows. Funaoka and Nishimura (2019) find that institutional investors in the Chinese market have an informational advantage over individual investors. The better information they have regarding market conditions, the quality of firms, and the ranking of underwriters, the more they invest in IPOs and the higher the returns generated from these IPOs. The research of Jiang et al. (2018) shows that foreign institutional investors reduce stock return co-movement by producing firm-specific information. This negative impact is more common among FIIs from countries with strong investor protection than among FIIs from countries with weak investor protection. Besides that, foreign institutions and domestic institutions with high ownership stakes tend to reduce stock return co-movement more effectively than institutions with low ownership stakes due to their superior ability in managing the fixed costs associated with firm-specific information production. In contradiction, the study of Agudelo et al. (2019) found that foreign institutional investors don't have informational advantage over local institutions in the Columbian stock market. Therefore, local institutions are more effective investors than foreign institutions. Similarly, the study of Ferreira et al. (2017) states that local institutional investors outperform foreign ones when investments are made in markets with low efficiency, low protection for investors and high market volatility.

In support of the price pressure hypothesis, the study of Ferreira et al. (2017) discloses that both foreign and institutional investors can significantly predict the returns of one quarter ahead. This ability results from a price pressure effect rather than an informed trading effect.

FIIs can either stabilize the market through their long-run investments or destabilize it through their hot money. The stabilizing effect occurs through widening the investor base in the market, which reduces volatility by risk-sharing (Mitton, 2006; Wang, 2007; Sharif, 2019). This is in line with the base-broadening hypothesis proposed by Merton (1987). Foreign investors can reduce transaction and information costs by providing higher information quality, better reporting standards, and more developed corporate governance regulations (Vo, 2015; Panda & Leepsa, 2018; Lin & Lu, 2019). Further, foreign investors can reduce the financial risk of local companies by substituting debt financing, which supports the leverage effect theory. The study of Sharif (2019) reveals that the valuation of Saudi listed companies improved after opening the market to FIIs. The findings support rational FIIs and their support for local companies by providing them with a low-cost source of capital. Lin and Lu (2019) show that both independent institutional ownership and domestic institutional ownership stabilize the Chinese stock market by reducing the volatility and idiosyncratic risk in stock returns. Foreign investors, on the other hand, can have a destabilizing effect due to their short-term or speculative investment strategies (Brzeszczynski & Bohl, 2006; Kim & Jo, 2019). Also, the herding behavior of foreign investors can destabilize the market. Foreign investors may follow the trading patterns of local investors. This happens due to

limited information available to the former compared to the availability of information to the later. The study of Kim and Jo (2019) reveals that the market volatility of the two largest Korean stocks is affected significantly and positively by FIIs.

Other studies back up the feedback trading hypothesis (Hiremath & Kattuman, 2017). In their research, Hiremath and Kattuman (2017) find a co-movement between FIIs and NIFTY returns, which suggests that returns of the market and previous FIIs can predict FII flows. The predicting effect of the market persists for two days, whereas the predicting effect of previous FIIs continues for five days for positive lagged flows. These findings support the extrapolation of information by foreign institutions from local markets as a result of their lack of knowledge regarding the local market in which they invest. The study of Choudhary et al. (2019) reveals that foreign institutions herd the previous returns of the Indian stock market, but this herding behavior is short-term. Furthermore, the herding behavior of foreign institutions persists when the market is booming and diminishes when it's declining, which leads to short-term volatility in the market. Similarly, the study of Fang et al. (2016) supports the herding behavior of FIIs. Foreign institutions follow their own behavior or the behavior of other foreign institutions in the Taiwan market, and their herding tends to be focused on highly traded securities and securities with high market capitalization. Besides that, FIIs herding is persistent during both bullish and bearish markets. In their research, Chattopadhyay et al. (2018) find that foreign institutions tend to follow a herding behavior in the Indian stock market, and that this herding tends to persist. In their study, Fang et al. (2017) reveal that foreign institutions herd the trades of other foreign institutions rather than herding their own trades in the Taiwan market. This herding is most common in large-cap securities and is driven by investigative herding rather than cascades. The study of Ferreira et al. (2017) shows that foreign institutions and domestic institutions, defined as local dealers, tend to follow similar types of institutions in their herding behavior, whereas those foreign institutions and domestic institutions follow each other negatively and significantly, and this negative relationship is more prevalent in the view of foreign institutions toward domestic institutions.

The investment behavior of foreign institutions in the Saudi stock market is expected to support the feedback trading hypothesis. Foreign institutions are less informed about the Saudi listed companies; therefore, they tend to herd their own investments and market returns.

2.2 Firm, Industry, and Macroeconomic Characteristics and FIIs

Several researchers define firm-specific variables and industry attributes that attract FIIs (Zou et al., 2016; Lin et al., 2018; Deb, 2018). The study of Zou et al. (2016) reveals that foreign institutions tend to invest in large Chinese firms that have better accounting performance, higher stock prices, lower systematic risk, and a longer history. The findings also reveal that qualified foreign institutions prefer to invest in "blue-chip" companies that originate in industries such as finance, transportation, and technology. The study of Korkeamäki et al. (2019) shows that the investment trend of qualified foreign institutions in the Chinese market changes before and after 2008. Before 2008, qualified foreign institutions tend to avoid investing in stocks with high volatility and penny stocks; however, they were attracted to invest in cross-listed stocks and stocks with high momentum returns. While after 2008, qualified foreign institutions lean toward following the behavior of local institutional investors. They also become more informed about the local market and its specific risk factors. In the study of Wang and Li (2018), the main driver of FIIs in emerging markets is the development of governance environment in the host country. In developed markets, what drives foreign institutions to invest is stock market openness and its development. Liu et al. (2018) reveal that foreign investors in emerging markets are attracted to invest in companies with low leverage, high profitability, and a high market-to-book ratio. Besides that, those investors prefer to invest in local companies with low international investments and a weak linkage to the global economy. The study of Deb (2018) shows that the chosen industries by foreign institutions to invest in differ from those chosen by domestic institutions. Foreign institutions tend to avoid industries and companies that require local knowledge, such as real estate, services, and textiles. The study also reveals that both foreign and domestic institutions prefer to invest in companies with high liquidity, dividend yield, age, and international visibility while they tend to avoid companies with a high leverage and P/B ratio. FIIs in this study were found to be able to time the market by favoring high beta stocks during bull markets and avoiding them during bear markets. Warganegara (2018) reveals that foreign investors in the Indonesian market are attracted to firms with high investability size, a high dividend yield, a large size and firms in the consumer goods industry sector. High investability size allows foreign investors to generate excess returns on stocks where they can exploit superior information by owning a large portion of these firms.

According to the previous literature, FIIs are more likely to be attracted to large Saudi firms with high liquidity, high profitability, and low leverage.

Many research papers outline how macroeconomic variables influence FIIs (Tripathi et al., 2015; Waqas et al., 2015). The study of Tripathi et al. (2015) shows that foreign direct investments are Granger-caused by market size, profitability of stock market, inflation, trade openness, and exchange rate. The researchers also find that trade openness and the exchange rate both have a causal relationship with foreign direct investment. In their study, Wagas et al. (2015) find that the inflation rate, foreign direct investments, GDP, real exchange rate, and interest rates all have a significant impact on foreign portfolio investments. Singh (2009) reveals that the deposit flows of migrant workers to their home country are highly sensitive to changes in exchange rates and interest rates.

In the Saudi context, it's predictable that investment decisions of foreign institutions are driven by inflation, GDP growth, oil prices, and interest rates. Inflation is hypothesized to affect FIIs negatively (Waqas et al., 2015; Tripathi et al., 2015). High inflation is perceived as an indication of high macroeconomic risk. Also, investment's real returns are wiped with high inflation. Interest rates, GDP growth, and oil prices are presumed to affect FIIs inflows positively due to high expected returns in the host country (Tripathi, 2015; Waqas, 2015). Exchange rate is not considered as a factor that affects FIIs due to the peg of Saudi Riyal to the US dollar.

3. The Saudi Stock Market and Foreign Institutional Investments

Tadawul, the Saudi stock market, is the largest in the MENA region, with a market capitalization of around 2 trillion as of December 31, 2020. Tadawul All Share Index (TASI) is a free float index, and it's the main index in the market. There is other two indices: the NOMU Parallel Market Capped index, with a capping threshold of 20%, and the MSCI Tadawul 30 Index, with a capping threshold of 15%.

Foreign investors weren't allowed to invest in the Saudi market until 2008, when the CMA, the sole regulator of the Saudi market, permitted them to invest through SWAP agreements. On June 15, 2015, the CMA regulators opened the market for qualified foreign investors (QFIs) to directly invest. Applicants should hold at least USD 1 billion assets under management, and they are allowed to invest not higher than 49% in listed securities (www.Tadawul.com.sa). The goal of CMA is to attract qualified investors who can foster market stability, reduce volatility, improve efficiency through better disclosure, and share their knowledge with other participants in the market.

On Dec 5, 2018, the MSCI Tadawul 30 index was launched to represent the performance of the largest and most liquid 30 listed Saudi companies (www.Tadawul.com.sa). CMA officials highlighted the benefits of inclusion in global financial indices. The advantages include the development of the investment environment, raising the level of transparency, enhancing market liquidity, and integrating with advanced global markets. This inclusion had a positive impact on the Saudi stock market, as the ownership value of foreign investors increased by 128.1%, from 86.8 billion Riyals as of 2018 to 198 billion Riyals as of 2019. The number of registered QFIs rose by 309%, from 453 QFIs as of 2018 to 1,853 QFIs as of 2019 (www.CMA.org.sa).

4. Data

To define the drivers of FIIs and its impact on the Saudi stock market, data are extracted from Tadawul website (www.Tadawul.com.sa), Bloomberg terminals, and the Saudi Central Bank website (www.SAMA.gov.sa). TASI represents the Saudi stock market, an index based on free float methodology that is used to calculate market returns (Rm). The FII variable (FII) is measured as the value of net investment held by QFIs, expressed in Saudi Riyals (Thiripalraju & Acharya, 2013). The firm-specific variables considered in this paper include size, liquidity, profitability, and leverage (Lin et al., 2018; Deb, 2018). Size is measured as the logarithm of annual market capitalization. ROE is the measure of profitability, and debt-to-equity ratio is the measure of leverage. Liquidity is defined as the annual share volume divided by adjusted shares outstanding.

The macroeconomic variables comprise inflation, GDP growth, oil prices, and interest rates. The measure of inflation is based on the CLI cost of living index. GDP growth is built on quarterly rates, and oil prices are based on real figures of OPEC basket. The 52nd week % T-bill's rate is considered as the rate of interest (Waqas et al., 2015).

Twenty-two industry dummy variables are used to represent the available industries in the market. Each variable takes the value of 1 if the listed company is included in the represented industry, and the value of 0 otherwise. The inclusion of 31 Saudi companies in the MSCI is seen as an attractive factor for foreign institutions to invest. Therefore, a dummy variable is added that takes the value of 1 if the company is listed in the MSCI and 0 otherwise. The choice of period under study is considered based on data availability on the study variables. Data on FIIs, as represented by QFI figures, are available as of August 27, 2015. Therefore, data relating to all variables are collected quarterly, covering the period from August 27, 2015, till the end of 2019. Suspended

companies and companies with missing data during the study period are excluded.

5. Methodology

A data set is said to be stationary if its mean and variance are invariable over a time interval. Defining whether a data set is stationary or not is important to remove any spurious results before conducting the empirical analysis. The data understudy is an unbalanced panel data set. Unit root tests in STATA are sensitive to missing data, and most of these tests assume that the panel data set is balanced. Therefore, the Fisher-type unit root test based on the Augmented Dickey–Fuller test is used to determine the stationary of variables, as it allows for unbalanced panels.

To measure feedback trading and herding behavior of FIIs, the following panel data OLS, FE and RE models are applied:

$$FII_t = \alpha + b_1\, FII_{t-1} + b_2\, FII_{t-2} + \ldots\ldots + b_8 FII_{t-8} + e_{it} \quad (1)$$

$$FII_t = \alpha + b_1\, Rm_{t-1} + b_2\, Rm_{t-2} + \ldots\ldots + b_8 Rm_{t-8} + e_{it} \quad (2)$$

The two models are autoregressive because they include lag variables such as market return and FIIs. The lag of market returns, Rm, measures the herding behavior of foreign institutions and whether they are momentum traders, whereas the lag of FII measures the feedback trading behavior or foreign institutions.

To determine the factors that attract foreign institutions to invest, the following panel data OLS regression is applied:

$$FII_t = \alpha + b_1\, size_{it} + b_2\, liquidity_{it} + b_3\, ROE_{it} + b_4\, leverage_{it} + b_5\, GDP\ growth_{it} + b_6\, Interest_{it} + b_7\, Inflation_{it} + b_8\, Oil_{it} + b_9\, MSCI_{it} + B_{10}\, INDdummy_{it} + e_{it} \quad (3)$$

The model defines whether firm-level characteristics, industry groups, or macroeconomic variables attract FIIs. Since FIIs increased rapidly after the inclusion of some of the largest and most liquid Saudi listed firms in the MSCI index, a dummy variable is added to the model to test the impact.

A number of diagnostic tests are taken into consideration for the above model. The Lagrange Multiplier (LM) test is applied to ensure that the error terms are free of serial correlation, whereas the Jarque–Bera test is used to check normality. Heteroskedasticity problem is checked through Breusch-Pagan/Cook-Weisberg test, and the Ramsey Reset test is applied to check for model misspecification.

The Ordinary Least Squares (OLS) method is based on the assumption that the data under study are homoscedastic, which means that the variances of the error terms are constant and don't vary from one point to another. But this is not always the case because the variances of the error terms do change, and the data in this regard are considered heteroskedastic. The ARCH/GARCH model is considered by many researchers to measure data volatility in case of heteroskedasticity (Joo and Mir, 2014). The ARCH/GARCH model, which stands for generalized autoregressive conditional heteroskedasticity, deals with heteroskedasticity as a variance to be modeled rather than a problem to be resolved (Engle, 2001). To analyze the impact of FII inflows on TASI returns through applying the ARCH/GARCH model, the following econometric model is employed:

$$Rm = C_0 + C_1\, Rm\ (1\text{-}) + e_t \quad (4)$$

$$h_t = b_0 + b_1 e^2_{t-1} + b_2 h_{t-1} + b_3 FII \quad (5)$$

where Rm in the first equation represents the market return as presented by TASI, and this is the mean equation. In the second variance equation, e^2_{t-1} represents the volatility of previous period (ARCH term), whereas h_{t-1} represents the previous period forecasted variance (GARCH term), and FII represents FII inflows.

6. Results

The results of Augmented Dickey–Fuller test, in Table 1, reject the null hypothesis and prove that the variables under study are stationary. The absolute test statistics value is greater than the critical values at the 1%, 5% and 10% levels, respectively.

Table 1. ADF unit root test

			Test Critical Value		
Variable	**t-statistic**	**Probability***	**1%**	**5%**	**10%**
Rm	-56.531	0.000	-3.960	-3.410	-3.120
FII	-50.508	0.000	-3.960	-3.410	-3.120
Size	-26.459	0.000	-3.960	-3.410	-3.120
Liquidity	-67.355	0.000	-3.960	-3.410	-3.120
ROE	-54.353	0.000	-3.960	-3.410	-3.120
Leverage	-32.422	0.000	-3.960	-3.410	-3.120
Growth	-37.315	0.000	-3.960	-3.410	-3.120
Interest	-36.461	0.000	-3.960	-3.410	-3.120
Inflation	-44.040	0.000	-3.960	-3.410	-3.120
Oil	-51.564	0.000	-3.960	-3.410	-3.120

Note. Augmented Dicker-Fuller test to measure the stationary of variables understudy.

Both random-effect and fixed-effect models in equations (1) and (2) are tested to measure feedback trading, herding, and momentum behavior of foreign institutions. The maximum number of lags (eight for FII and market return variables) is considered. The fixed-effect model shows no results. Table 2 shows that the random-effect model results support the feedback trading hypothesis and FII herding behavior. The results are in accordance with the findings of Hiremath and Kattuman (2017), Fang et al. (2017), and Chattopadhyay et al. (2018). Foreign institutions tend to herd their own or other foreign institutions' investments in the previous, fourth lagged and seventh lagged periods. These periods affect current FIIs positively and significantly at the 1% level. The other lagged flows affect current FIIs negatively. Foreign institutions' lack of knowledge regarding the local market could be the reason behind their inconsistent herding behavior for their own investments in the Saudi stock market.

The positive significant impact of previous seven lagged market returns on FIIs, at the 1% level, supports the herding and momentum behavior of foreign institutions. There is a co-movement between FIIs and TASI returns. This also results from foreign institutions' lack of knowledge about the local market. To invest, foreign institutions must extrapolate information from the local market.

Table 2. Panel OLS regression

	Coef.	**Std. Err.**	**Z**	**P>z**	**[95% Conf. Interval]**	
FII						
Lag1FII.	0.4040	0.0107	37.42	0.000***	0.3829	0.4252
Lag2FII.	-0.0560	0.0037	-15.05	0.000***	-0.0633	-0.0487
Lag3FII.	-0.6423	0.0064	-99.60	0.000***	-0.6550	-0.6297
Lag4FII.	0.0308	0.0101	3.05	0.002***	0.0110	0.0506
Lag5FII.	-0.0035	0.0040	-0.88	0.378	-0.0114	0.0043
Lag6FII.	-1.3128	0.0041	-315.05	0.000***	-1.3209	-1.3046
Lag7FII.	0.2706	0.0091	29.43	0.000***	0.2526	0.2887
Lag8FII.	0	(omitted)				
_cons	0.3156	0.0043	72.32	0.000	0.3071	0.3242
FII						
Lag1Rm.	6.6739	0.1225	54.47	0.000***	6.4338	6.9141
Lag2Rm.	7.4795	0.1698	44.05	0.000***	7.1467	7.8124
Lag3Rm.	13.0053	0.2827	46.00	0.000***	12.4512	13.5594
Lag4Rm.	10.7419	0.2317	46.35	0.000***	10.2876	11.1961
Lag5Rm.	8.2210	0.1643	50.02	0.000***	7.8988	8.5432
Lag6Rm.	4.9972	0.1027	48.62	0.000***	4.7958	5.1987
Lag7Rm.	1.7358	0.0404	42.91	0.000***	1.6566	1.8151
Lag8Rm.	0	(omitted)				
_cons	0.2727	0.0030	89.17	0.000	0.2667	0.2787

Note. Random Effect model to test feedback trading, herding and momentum behavior of foreign institutions. The sign of *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

The panel data OLS regression fixed-effect model shows no results. The results of the random-effect model in Table 3 reveal that foreign institutions are interested in investing in large-sized Saudi firms with high liquidity. Both size and liquidity variables have a positive and significant impact on FIIs at the 1% level. These findings are supported by Zou et al. (2016) and Deb (2018). In an emerging context, foreign institutions prefer to invest in large, well-established firms. Their lack of knowledge about listed firms, with the developing corporate governance system, forces them to seek out large-sized, well-known firms with high liquidity.

All macroeconomic variables affect FIIs negatively and significantly, except for inflation. The positive significant impact of inflation on FIIs could be attributed to low inflation levels in the Saudi context. During the period under study, the highest level of inflation was 2.45% as of 2018. Therefore, the increase in inflation is not considered a threat to FIIs; instead, it indicates economic growth, which encourages them to invest. The negative impact of interest rates, GDP growth, and oil prices on FIIs, at the 1% level, supports the findings of Singh (2009). Foreign institutions may be short-term investors who are extremely sensitive to changes in macroeconomic factors.

The insignificant impact of profitability and leverage on FIIs supports the short-term investment behavior of foreign institutions. The long-run profitability and debt situation of the firm doesn't affect their investment decisions. They tend to look for large-sized, well-established firms with high liquidity to generate short-term gains. This is supported by the fact that MSCI and industry dummy variables have a negligible impact on FIIs.

Table 3. Panel OLS regression

	Coef.	Std. Err.	Z	P>z	[95% Conf. Interval]	
FII						
Size	0.0272	0.0154	1.76	0.079*	-0.0031	0.0575
Liquidity	0.0091	0.0047	1.93	0.054*	-0.0001	0.0184
ROE	0.0000	0.0000	0.47	0.638	-0.0000	0.0001
Leverage	0.0000	0.0001	0.62	0.538	-0.0001	0.0003
GDP growth	-0.0173	0.0035	-4.82	0.000***	-0.0243	-0.0102
Interest	-0.0965	0.0149	-6.45	0.000***	-0.1259	-0.0672
Inflation	0.0132	0.0023	5.65	0.000***	0.0086	0.0178
Oil	-0.0018	0.0004	-3.80	0.000***	-0.0028	-0.0009
_cons	0.1543	0.0197	7.83	0.000***	0.1157	0.1929

Note. Random-effect OLS regression model to determine the factors that attract foreign institutions to invest. The sign of *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

In Table 4, the *p*-value of the Breusch-Pagan test is less than 5%, indicating the presence of a heteroskedasticity problem. Similarly, the Jarque–Bera test in Table 5 reveals non-normal residuals where the *p*-value is less than 5%. In Table 6, the Ramsey Reset test looks for the occurrence of omitted variables in the model. The Lagrange Multiplier (LM) test in Table 7 shows that error terms are not free of serial correlation. The results may indicate a high volatility and trend in the data set over time.

Table 4. Breusch-Pagan Heteroskedasticity test

Chi2	22.60	Prob > chi2	0.0000***

Table 5. Jarque-Bera Normality test

Chi2	133.20	Prob > chi2	1.2e-29***

Table 6. Ramsey Reset Misspecification test

F (3, 1870)	2306.94	Prob > F	0.0000***

Table 7. Breusch-Godfrey Serial Correlation LM test

Chi2	9.151	Prob > chi2	0.0025***

Note. The sign of *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

Due to non-homoscedastic residuals, the ARCH/GARCH model is applied to measure the volatility of market returns. Table 8 shows that FIIs can significantly predict future market returns. Although foreign institutions are attracted to high-liquidity firms and sensitive to macroeconomic conditions, their investments tend to stabilize the Saudi stock market returns. Therefore, attracting foreign institutions to invest in the Saudi stock market should foster the stability of market returns and the prediction of its future values.

Table 8. ARCH\GARCH test

Rm	Coefficient	Std. err.	z	Prop.	[95% conf. interval]	
FII	0.1729	0.0271	6.37	0.000***	0.1197	0.2261
_Cons	0.1433	0.0050	28.46	0.000	0.1334	0.1531

Note. ARCH/GARCH model is applied to measure the volatility of market returns. The sign of *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

7. Conclusion

This research investigates the drivers of FIIs in the Saudi stock market and their impact on market returns. It covers quarterly data of FIIs, market returns, firm-level characteristics, and macroeconomic variables from mid-2015 till 2019. The findings support the feedback trading hypothesis as well as the herding and momentum behavior of foreign institutions. This results from the lack of knowledge of foreign institutions regarding the local market. The results are supported by the findings of Hiremath and Kattuman (2017) and Choudhary et al. (2019) that reveal a herding behavior for foreign institutions in the context of Indian market. The lack of knowledge regarding the local market also attracts foreign institutions to invest in large-sized Saudi firms with high liquidity. The results are in accordance with the findings of Fang et al. (2017) and Deb (2018). Oil prices, interest rates, and economic growth all have a negative significant impact on FIIs. Inflation, on the other hand, has a significant positive impact. The findings of Tripathi et al. (2015) provide contradicting results. Their findings reveal positive impact of interest rates and GDP on FII, whereas, Inflation has a negative impact. The finding of this paper results from the short-termed investment behavior of FIIs in the Saudi context that makes their investments sensitive to macroeconomic indicators. Attracting foreign institutions to invest is beneficial for the Saudi stock market due to their role in stabilizing and predicting market returns.

An important implication can be driven from this research for market regulators and investors in the Saudi stock market. They should pay more attention to FIIs and their impact on market returns. Understanding what drives foreign institutions to invest in the Saudi stock market is important to develop the required policies and regulations needed to attract more FIIs while also promoting market efficiency and stability. Domestic investors will also be able to make the right investment decisions that will not jeopardize the market.

This paper can be extended by defining the role of domestic institutional investors (DIIs) in attracting foreign institutions to invest. Also, understanding the role of DIIs in stabilizing or destabilizing market returns due to FII activities is important. Considering the impact of specific events, such as COVID-19, on FII decisions can improve the findings and enrich the literature.

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The Nexus between Institutional Quality & Foreign Direct Investment (FDI) in Sub-Saharan Africa

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Abstract

This study analyzes the nexus between foreign direct investment and institutional quality including political stability, rules of law, government effectiveness, voice & accountability, and regulatory quality. The major aim of this study is to examine the relationship between institutional quality and foreign direct investment. This study consists of a sample of Sub-Saharan African countries. Our study employed two-panel data techniques including Random Effect Model (REM) and Vector Autoregressive Model (VAR). The study period covers from 2015 to 2019. Empirical findings of REM indicated that both rules of law and government effectiveness have positive and statistically significant influences on foreign direct investment inflow in the SSA region. Similarly, the study utilized other explanatory variables such as the trade and labor force. The result of VAR highlighted the positive and statistically significant influence of labor force and trade on foreign direct investment inflow, therefore, the effectiveness & efficiency of region institutional quality are usually dependent on the robustness of those variables. Thus, the study recommends having higher foreign direct investment inflow in the region is necessary to make policy reforms that strengthen the quality and efficiency of governance.

Keywords: FDI, institutional quality, labor force, trade, a panel data techniques

1. Introduction

Foreign Direct Investment (FDI) plays a significant role in globalization as it is an essential promoter of output increase, technical development, and job formation. As a consequence, FDI stimulates economic progress, playing a significant role in tax income, foreign exchange, and improvement gaps in progressing and trade economies (Quazi, 2007; Smith, 1997). However, Sub-Saharan Africa (SSA) has been to some extent cut off from worldwide FDI flows, although the region witnessed a significant improvement over the last couple of decades, it is shared in international FDI remains very little. Various reasons contributed to the situation including the absence of political stability, economic reasons, fragile human capital, a weak institutional quality particularly property rights, and freedom of speech.

The share of Sub-Saharan Africa regarding the FDI inflow has been poor compared to many developing economies. For instance, the region witnessed a 218 percent rise in FDI throughout the 1980s and 1990s, Latin America recorded a growth of 560 percent, South Asia of 789 percent, East Asia of 990 percent, and the emerging nations generally reported 760 percent throughout the similar period (Asiedu, 2003). Therefore, in the last 25 years, the region could not manage to fascinate beyond 10 percent of the FDI conducted toward the emerging nations.

Nevertheless, the major factors for such a gap include the poor level of human capital, the uncertainty of economic level, deficiency of proper infrastructure and implementation of high tariff barriers, slow and inaccurate economic policy reforms, huge tax burdens, and the extensive regulation procedures regarding market characteristics certainly (Cotton & Ramachandran, 2001). Although lately, some SSA managed to initiate a new policy to attract the FDI, it has not constantly been fruitful and the influence of those strategies is debris a little when compared to other emerging nations (Asiedu, 2004).

Indeed, nations such as Mozambique, Tanzania, and Zambia managed to attract the FDI inflow after they conducted various reforms such as modest privatization strategies and significant gains in the rule of law and safeguard of private property have been accomplished (Jenkins & Thomas, 2002). Further, there is two major motive behind the attraction of FDI inflow in SSA namely: the existence of natural resource and the role of the market size (See Asiedu, 2006; Jenkins & Thomas, 2002).

However, those two factors generated several issues. Firstly, the flow of FDI based on the number of natural resources of a country demonstrates implies large superior volatility in these flows (Ndikumana & Verick, 2008). For instance, the price alterations for these commodities indicate that the interest of the foreign investor in these states will vary. Secondly, the portion of the optimistic externalities linked with the FDI assumes to be moderated when FDI is mainly concentrated on the natural resource, in terms of employment the influence of FDI is inadequate. Finally, if natural resources and market extent are mainly essential for the attraction of FDI, numerous nations in the SSA do not have either huge reserves of oil and minerals or a huge market.

Other various factors attract FDI, and many studies have postulated the act of other features on flows of FDI in SSA which include privatization policies, macroeconomic and political stability (See Asiedu, 2006; Jenkins & Thomas, 2002; Basu & Srinivasan, 2002). Moreover, the capacity of governments to implement structural reforms, the existence of robust monetary and fiscal strategies, sufficient exchange rate plans and inspiring the improvement of the private sector, promoting openness to worldwide trade, the quality of infrastructure, and various other factors have been mentioned the major drivers of FDI inflow (See Basu & Srinivasan, 2002; Bende-Nabende, 2002; Asiedu, 2006). However, very rare countries in SSA can have a competitive capacity in these areas in comparison the other developing countries.

On the other hand, current literature on the influence of institutional quality has demonstrated the various way in which institutional quality impacts FDI, whereby the following three factors have enlarged the significance of the relationship between FDI and institutional quality. In the beginning, North (1990) indicates the prominence of institutions in enhancing investment and economic progress. Next, with the robust development in FDI inflow during the last couple of years, both transitioning and emerging countries are fascinated by institutional reforms to obtain extra FDI inflow. Finally, foreign investors are displaying more curiosity about institutional quality when deciding which nation to invest in (See Bevan et al., 2004). Buchanan et al. (2012) demonstrated that fragile institutes' performance including tax burden and economic uncertainty will diminish the FDI inflow, while robust institutions encourage more FDI inflow (Ali et al., 2010).

The nexus between institutional quality and FDI has been inconclusive due to the absence of clear measurement of what extent of the quality of institutions, and this could be attributed to the multiplicity of shareholders in this framework namely: investors, ordinary citizens, and the government, and the verity of their interest. Therefore, to our knowledge, very few researchers have used the six World Governance Indicators (WGI) which consist the government effectiveness, voice & accountability, political stability, rule of law, control of corruption, and regulatory quality developed by Kaufman et al. (2010) as a quantitative measurement of the quality of the institutions. Thus, we will consider a multicollinearity issue when introducing those variables. Indeed, the major aim of this study is to examine the influence of institutional quality on the attractiveness of FDI for the sample of Sub-Saharan Africa including Kenya, Rwanda, South Africa, Senegal, Cameroon, and Ghana over the period from 2005 to 2019.

The major contribution of our present study to the existing literature is to determine the extent that institutional quality plays in alluring the FDI inflow, particularly the emerging countries like the SSA region. Secondly, few empirical studies utilized the six dimensions of world governance indicators on the attractiveness of FDI in Africa and more specifically the SSA region. Thirdly, despite the tremendous increase of FDI inflows to emerging nations the SSA region lacked behind, and many people contributed due to the poor institutional quality. Lastly, our methodology is based on the panel data technique, to handle the issues of endogeneity. Thus, the findings of this study will not be limited to how SSA countries attract the FDI, but it will offer more specific elaboration of the particular institutional qualities that stimulate the FDI inflow in the region.

The rest of the paper will be organized as follow. Section 2 is a literature review. Section 3 provides data descriptions and empirical approaches. Section 4 analyzes empirical findings and Section 5 is the conclusion of the study.

2. Literature Review

Theoretical and empirical significance of FDI inflows has been discussed and approved for various countries. For instance, the theoretical prominence of FDI was highlighted by prior economists in the early 18th century David (1817) displayed his theory of “comparative cost advantage” (Axel, 2011), in this theory the countries

having comparatively low production costs will be more successful in attracting global capital or foreign investment. Theories on 'agency cost' (Jensen & Meckling, 1976; Berle & Means, 1932), 'modern property rights' (Coase, 1960; Demsetz, 1974), 'Transition cost' (Coase, 1937; Williamson, 1975), and 'Information asymmetry' (Arrow, 1963; Akerlof, 1978) highlight that safety, security and promoting a business environment in a nation that protects the property rights of individuals and offer incentives for investors by offering a lower transaction expenditure will be more ideal to attract the foreign investors.

However, the theory of 'Institutions' postulated by (North, 1990), indicated that FDI inflows are impacted by different factors such as microeconomic elements, formal institutional aspects, and informal norms including habits, tariffs, customs, social and cultural aspects that influence the motive of individuals to invest. Therefore, based on this theory formal institutional factors are playing a significant role to develop investors' trust in transactions and finally impact the FDI inflows.

Dunning (2004) indicated that institutional elements including virtuous governance and economic liberty, are becoming extremely attractive determinates of FDI. As the preferences of international corporations are moving from market resource seeking to efficiency-seeking. Indeed, the old traditional motives including natural resources and labor force are becoming less dominant, while less traditional agendas such as institutional quality and economic flexibility are getting great popularity (See Becchetti & Hasan, 2005; Addison & Heshmati, 2003; Noorbakhsh et al., 2001; Loree & Guisinger, 1995).

When Ali et al. (2010) compared other institutional factors that influence FDI influx, they found that property rights were a massively important contributing factor. In addition, law and order become a series of concerns for international corporations particularly when courts fail to implement agreements and when government impacts the court results for political purposes (Drabek & Payne 2002). Low and order instability results in corruption (Johnson & Dahlstrom, 2004). Not only that, but various investors believe one of the most significant factors that lower FDI inflow is corruption (Asiedu & Villamil, 2000; Campos et al., 1999; Gastanaga et al., 1998; Wei, 2000). In addition, countries that practice more corruption receive less FDI inflow, whereby a lower corruption index for the host nation is related to positive investment inflows (See Cuervo-Cazurra, 2006).

On the other hand, based on empirical findings (Minovic et al., 2021) investigated the institutional quality and FDI in Western Balkan Countries from 2002 to 2017 using panel unit root, cointegration & granger causality tests. The findings indicated that rule of law, control of corruption, and political stability cause an inflow of FDI in the Western Balkan. Khusnood et al. (2020) postulated institutional quality and FDI in Pakistan from 1996 to 2017 employing the autoregressive disturbed lag (ARDL) model. Findings proved that there is a significant impact of political instability, regulatory quality, and government effectiveness on the FDI inflows. Likewise, a study made by (Bouchoucha & Benammou, 2018) analyzed the institutional quality and FDI in a panel of African countries from 1996 to 2013 using the static and panel generalized method of moment (GMM) model. The result revealed that the attraction of FDI inflows to Africa is correlated positively with the control of corruption, government effectiveness, and quality of regulation, voice, and accountability. Pose and Cols (2017) examined the institutional quality and FDI in SSA countries from 199 to 2013 employing an econometric model. A study found that all institutional qualities except regulatory quality are an important determinant of FDI inflows in SSA.

The study made by (Ajide et al., 2014) postulated FDI and institutional quality in SSA, from 2002 to 2010 using the regression technique. The study found that corruption control, political stability, and government performance are important factors in FDI's impact on SSA's economic output. Gani (2014) investigated the FDI and institutional quality for panel countries from 1996 to 2002 utilizing the pooling technique. The result showed that all institutional qualities apart from regulatory quality are positively correlated with the FDI inflow. Similarly, the study made by (Bannaga et al., 2013) postulated the FDI and institutional quality in Arab nations from 2000 to 2009 utilizing the gravity model. The result of the study indicated that FDI impacted positively significantly all institutional qualities except rule of law and control of corruption. Mengistu and Adhikary (2011) studied FDI and institutional quality in the Asian region from 1996 to 2007 using a fixed-effect model. Empirical findings displayed that apart from regulatory quality, voice & accountability have a significant positive effect on FDI inflow in the Asian region during the study period.

However, various studies found a lack of relationship between institutional quality and FDI inflow including the study made by (Jurcic et al., 2020) postulated governances and FDI in Croatia from 1996 to 2017 employing a regression model. The result showed that six dimensions of institutional quality could not point out as important determinants of FDI inflows in Croatia. Peres et al. (2018) postulated institutional quality and FDI in panel countries from 2002 to 2012 using econometric techniques. Empirical findings showed that institutional

quality negatively impacts the FDI inflows in emerging countries. Similarly, the study made by (Bellos & Subsat, 2012) postulated FDI and institutional quality in a cross-country study from 1990 to 2003 using a gravity model. The result revealed that lack of good governance does not encourage FDI inflows. Therefore, based on the prior empirical works of literature there are inconclusive results regarding the nexus between institutional quality and FDI inflow.

The FDI inflow of the SSA region has been mentioned to play a crucial role in the economic growth and the production capacity of the region which indicates that FDI has no crowd-out influence on the local investment activities (Rjoub et al., 2017). Thus, we expect the result of this study to contribute to the current literature by providing a robust explanation of the relationship between these two variables based on the sample of the SSA region.

3. Data Descriptions and Empirical Method

This paper analyzed the nexus between institutional quality and foreign direct investment in the sample of Sub-Saharan African countries for the period 2005 to 2019. The major reason behind the sample selection is the unique characteristics of the SSA region, whereby it experienced a huge FDI inflow for the last couple of years, particularly the Chinese investments that seem unproductive (Zhang & Chen, 2014). Due to the shortage of data availability, we opted to cover from 2005 to 2019, although it is sufficient to yield robust results based on the panel data approach. As we mentioned before our study consists of two models, and the major reason we select to test two models is to confirm the robustness of our outcome. Firstly, we selected REM based on the result of the Hausman test criteria as it indicated its appropriateness instead of the fixed effect model (FEM). Secondly, the VAR model is used after transforming stationarity at the first difference, and getting the maximum lag length in the VAR model usually causes uncertainty issues (Liu et al., 2001). Therefore, we have determined to espouse this approach as it permits us to deal with not only long-run (i.e. cointegrated) constraints yet similarly short-run (i.e. covariance) limitations in the arrangement of economic linkages.

The institutional quality includes the following, political stability, government effectiveness, rule of law, voice & accountability, and regulatory quality. While, the Sub-Saharan Africa Countries are composed of the following: Kenya, Rwanda, Cameroon, Senegal, South Africa, and Ghana. The data for FDI is extracted from world development indicators (WDI), while the data of institutional quality are obtained from the world governance indicators (WGI) data set. The study also utilized other explanatory variables that related to both FDI and institutional quality namely: Trade and labor force participation rate. Indeed, the selected institutional qualities are explained in detail in the paper of Kaufmann et al. (2010). Therefore, in this study we utilize the subsequent model with balanced panel data:

$$FDI_{it} = \alpha + \beta_1 RQ_{it} + \beta_2 PS_{it} + \beta_3 RL_{it} + \beta_4 GE_{it} + \beta_5 V\&A_{it} + \beta_6 TRD_{it} + \beta_7 LFP_{it} + \varepsilon_{it} \quad (1)$$

Where the dependent variable is FDI_{it}, and the independent variables are $RQ_{i,t}$ $PS_{i,t}$ $RL_{i,t}$ $GE_{i,t}$ $V\&A_{i,t}$. While, $\beta_6 TRDi_{,t}$ and $\beta_7 LFP_{i,t}$ represent control variables respectively.α is the intercept(constant), $\beta_{1....}\beta_{7,}$ are the slope of coefficients of the model, i signifies the nation, t is the time, $\mathcal{E}_{it}$ is the noisy error term. Therefore, table 1 displays using variables and sources of data information.

Table 1. Data descriptions

Variables	Data Source	Explanation
Foreign Direct Investment (FDI)	World Governance Indictors (WDI), 2019	"the foreign direct investment is an investment in the form of a controlling ownership in a business in one nation by an entity based in another country (Shima et al., 2016)
Political Stability (PS)	World Governance Indicators (WGI), 2019	"Political stability and absence of violence/terrorism measures perceptions and likelihood of political instability including terrorism (World Bank, official, 2019)
Rule of Law(RL)	World Governance Indicators (WGI), 2019	"Reflects perceptions of the extent to which agent might have confidence in and abide by the rules of the society more specifically contract enforcement, police, court and the possibility of crime and violence (World Bank, official, 2019)
Government Effectiveness (GE)	World Governance Indicators (WGI), 2019	"Reflects perceptions of the quality of public service, civil service and degree it is independence from political pressure, the quality of policy formulation, enforcement and the credibility of the government commitment to such a policy (World Bank, official, 2019)
Regulatory Quality (RQ)	World Governance Indicators (WGI), 2019	"Reflect perceptions of the capacity of government to initiate and enforce robust policy, a regulation that allows and stimulates private sector progress (World Bank, official, 2019)
Voice & Accountability (VA)	World Governance Indicators (WGI), 2019	"Captures perception of the degree to which nations citizens can participate in choosing their state, freedom of expression and media (World Bank, official, 2019)

Labor Force Participation (LFP)	World Development Indicators (WDI), 2019	" The proportion of the population ages 15 and older that is economically active (World Bank, official, 2019)
Trade (TRD)	World Development Indicators (WDI), 2019	"An engine of development that initiates jobs lowers poverty and enlarges economic opportunity (World Bank, official, 2019)

3.1 Panel Unit Root Test

The stationarity in the data was determined employing tests including Levin, Lin, and Chu (LLC) initiated by Levin et al. (2002), the Im-Pesaran-Shin (IPS), ADF-Fisher, and PP-Fisher panel unit root tests established by Im et al. (1978). Panel unit root tests have a null hypothesis that variables contain panel unit root; nevertheless, the alternative hypothesis shows that each panel series is stationary. Thus, Baltagi (2008) described the major structure utilized by most panel unit root examining techniques in the following formats.

$$\Delta Y_{it} = \alpha_i + p_i Y_{i,t} + \sum_{j,i}^{p} \phi_{ij} \Delta Y_{it} 1 + \varepsilon_{i,t} \quad (2)$$

Where γ_{it} is a deterministic mechanism and Δ are the first differences of variables γ_{it}.He defined that when $\rho_i = 0$ means the γ procedure has a unit root for each i, while $\rho_i<0$ indicates the procedure is stationary around the deterministic part (Baltagi, 2008).

3.2 The Vector Autoregressive Model (VAR)

This study will use the same methods as Liu et al. (2001), but with different variables. The VAR model was used to investigate causation among the variables in this study. In comprehensively, the notion of causatives was initially described by Granger (1969). However, in Liu et al. (2000) the VAR involves three variables, while in our study there are seven variables. As a result, the N-dimensional vector-autoregressive model of order p (VAR (P) – process) is defined as follows:

$$Y_t = \Phi_0 + \Phi_1 . Y_{t1} + \Phi_2 . Y_{t2} + \cdots + \Phi_P . Y_t P + \varepsilon_t \quad (3)$$

Where γ_t represents N × 1 a vector of endogenous variables, Φ_0 represents N × 1 a vector of constants and Φ_j is the N × N matrix of autoregressive coefficients for j = 1, 2,… ρ; N × 1 a vector ε_t is the white noise vector process, i.e.(ε_t) serially uncorrelated random vectors with a null estimated value and covariance matrix, Von Wyss (2004). Therefore, in the VAR model, every variable is regressed on constant and ρ of its lags as well as ρ lag of every subsequent variable in the VAR model (Himilton, 1994).

Under this circumstance, N = 7, so vector γ_t comprises the subsequent explanatory variables including FDI, PS, RL, RQ, V & A, LFP, and TRD correspondingly. Therefore, it can be suggested that the variables in the VAR model are stationary processes. Nevertheless, Liu et al. (2001) indicated that if variables in the model are non-stationary, the implication that comes out from the well-known Wald test statistics is invalid Liu et al., (2001). Indeed, the stationarity of the variables was initially evaluated using a variety of panel unit root tests, including Levin, Lin, and Chu (LLC), ADF-Fisher, Im-Pesaran-Shin (IPS), and PP-Fisher the findings of which are shown in table 3.

4. Result and Discussions

4.1 Results of Static Panel Estimations

To investigate the nexus between institutional quality and attraction of FDI, we will project our model by incorporating the governance variables, which are measured by five out of six indicators by Kaufmann et al. (2010). Therefore, the outcome of the test based on the correlation matrix (Table 2) indicates the presence of robust correlation among these indicators. The introduction of overall governances concurrently into one model can result in inaccurate findings, however, to avoid multicollinearity issues we decide to perform variance inflation factor (VIF).

Table 2. Correlation analysis

Items	FDI	GE	PS	RL	RQ	TRD	V&A	LFP
FDI	1.000000							
GE	0.2231	1.000000						
PS	0.4449	0.6344	1.000000					
RL	0.4179	0.8658	0.7746	1.000000				
RQ	0.2167	0.8876	0.5721	0.8460	1.000000			
TRD	0.5080	0.2668	0.5497	0.4090	0.4005	1.000000		
V &A	0.2837	0.5514	0.4327	0.6384	0.6788	0.6711	1.000000	
LFP	0.0567	-0.2487	-0.2791	-0.3919	-0.4328	-0.2868	-0.7156	1.000000

Based on the outcome of table 2 all institutional qualities are showing a positive correlation with FDI. For instance, political stability has a robust positive correlation with FDI followed by rule of law. Thus, the next section will present variance inflation factor outcomes.

Table 3.Variance Inflation Factor (VIF)

Variables	VIF
GE	7.82
RQ	6.72
RL	5.10
VA	4.85
LFP	2.49
TRD	2.09
Mean VIF	4.84

Regarding the variance inflation factor result, it shows the absence of a multicollinearity problem since most values are below 10 percent (Ferrar & Glauber, 1967).

Table 4. Descriptive statistic results

Variables	Obs	Minimum	Maximum	Mean	Standard Deviation
FDI	90	0.0792	9.4667	2.6282	2.0592
GE	90	18.4834	71.5686	44.8197	15.4941
PS	90	8.0952	53.3333	33.7053	14.0420
RL	90	11.4832	64.4231	41.5029	17.2216
RQ	90	16.8270	71.5686	46.0768	14.4798
V&A	90	11.0577	70.4434	42.1511	20.6523
LFP	90	47.1100	85.7900	68.8676	12.1442
TRD	90	33.2398	98.1715	56.1707	12.4480

Source: Authors Estimation.

From the above statistical figures, FDI exhibits the following numbers: 0.07(minimum), 9.46(maximum), 2.62(mean), and 2.05(standard deviation). However, regarding the institutional quality political stability has the lowest figure, while government effectiveness and rule of law demonstrate the maximum figures respectively.

Table 5. The result of the Random Effect Model (REM)

Items	REM Coefficient	Std.Error	T-Stat	P-Value
Constant	-7.9860	1.7651	-4.2	(0.0000)***
Independent Variables				
LNPS	-0.0091	0.0241	-0.38	(0.7061)
LNRL	0.1142	0.0264	4.33	(0.0000)***
LNRQ	-0.0369	0.0298	-1.24	(0.2152)
LNGE	-0.0549	0.0297	-1.85	(0.0641)*
LNV&A	0.0137	0.0193	0.71	(0.4793)
Control Variables				
LNLFP	0.0802	0.0214	3.74	(0.0000)***
LNTRD	0.0756	0.0240	3.15	(0.0020)**
R^2	0.5207			
Observation	90			
Hausman Test	0.0124			
Heteroscedasticity	0.0192			
Autocorrelation	0.0004			
Lagrangian Multiplier (LM) Test	1.0000			

Note. ln (rq): log regulatory quality, ln (ps): log political stability, ln (va): log voice and accountability, ln(rl): log rule of law, ln(ge): log of government effectiveness,ln(lfp): log of labor force participation rate,ln(trd): log of trade, p-value are in parentheses: $P^{***<0.01,}$ $p^{**<0.05,}$ $p^{*<0.1}$.
Source: Authors Estimation.

Table 5 shows the influence of institutional quality on FDI for the sample of Sub-Saharan African countries. The model was regressed by utilizing the REM model, following Hausman test (1978) results which indicated the preference for random effect instead of a fixed-effect model. As a result, the Breusch and Pagan Lagrangian multiplier (LM) test validated the accuracy of Hausman tests by supporting the null hypothesis, indicating that the REM should be utilized. Furthermore, we performed Cook- Weisberg test for Heteroscedasticity, and the outcome of the study indicated that the errors are normally distributed and the model doesn't undergo the heteroscedasticity issue as we can observe from the outcome, the null hypothesis of no heteroscedasticity is abortive to be vetoed at 5% significant level because its p-value associated is higher than the standard significant level (0.0192>0.05).

However, the auto-correlation test was performed using the Brush-Godfrey Serial Correlation LM. For instance, if the probability value is less than 5%, we may rule out the null hypothesis, which states that the model has serial correlation (0.004<0.05) and no serial correlation otherwise. By adding a one-period lag to the dependent variable or altering all of the variables to the first difference, the problem can be eliminated from the model (Gujarati, 2004).

From the REM result, it's founded that rule of law has a positive and statistically significant influence on FDI inflows at a 1 percent level. For instance, this indicates that a one percent increase in rule of law will lead to 0.1142 enlargements of FDI inflows in the SSA region. This is in line with prior studies in emerging countries such as (Minovic et al., 2021; Pose & Cols, 2017). Likewise, the study found a positive and statistically significant influence of government effectiveness on FDI inflows in the SSA region at a 10 percent level. To illustrate, one percent enlargement of government effectiveness will lead to 0.0297 rises in FDI inflows. This result is according to the previous empirical studies in developing countries including the studies made by (Khusnood et al., 2020; Bouchoucha & Benammou, 2018; Pose & Cols, 2017). Therefore, the rest of the institutional quality variables display an insignificant impact on FDI inflows for the sampling countries.

On the other hand, the control variables demonstrate a significant influence on FDI inflows. For example, labor force participation rate variables indicate a positive and statistically significant effect on FDI inflows at a one percent level in the SSA region. This indicates that a one percent increase in the labor force will result in 0.0802 progress in FDI inflows. Because the major motivation of multinational companies is to attract a cheap labor force, this could be one of the main motives that they tend to move to certain countries where the working hours are cheaper. These results are in line with a recent study in the emerging market Nguyen, (2021). Similarly, the trade variables demonstrated a positive and statistically significant influence on FDI inflows at a 5 percent level. Thus, a one percent upsurge of trade will lead 0.0240 increase in FDI inflows in the SSA region. This could be attributed to the nature of multinational companies tends to increase the production capacity of their target country which will later encourage them to facilitate large international market share for their manufacturing components. This result is consistent with the prior study made by De Mello & Fukasaku (2000).

Table 6. Result of Panel Unit Root

	Level		First Differences	
Variables	Intercept	Intercept & Trend	Intercept	Intercept & Trend
Levin,Lin & Chut				
FDI	-1.6876**	-2.7444***	-3.2294***	-3.0531**
PS	-1.1064	-2.0795**	-1.7452**	0.5271**
GE	0.4831	2.4786	-2.2698**	-1.8982**
RL	-0.6774	0.8037	-2.1120**	1.6362*
RQ	-3.9760***	-2.6053**	-4.2424***	-3.1527***
V&A	0.2283	-0.2189	-1.8027**	-0.1586**
LFP	-4.2545***	2.2662	0.9419**	-0.6474***
TRD	0.2150	-3.5125***	-6.5935***	-7.3837***
Im,Pesaran & Shin We-stat				
FDI	-4.1449*	-1.7489**	-3.3264***	-1.9027**
PS	-0.4055	-1.5547*	-4.1853***	-2.1078**
GE	-0.5739	0.2151	-4.0380***	-2.7652***
RL	0.3398	2.3219	-1.7580**	-1.1475**
RQ	-1.4891*	-0.3543	-2.9515***	-2.0808**
V&A	0.3849	-0.6352	-2.1815**	-0.1222**
LFP	-1.2055	3.1688	0.742**	0.0747***
TRD	-0.9019	-1.3337*	-4.4610***	-3.6762***

ADF-Fisher Chi-Square				
FDI	21.6892**	25.4666**	33.4555***	22.2913**
PS	14.0577	20.1123*	39.6953***	23.8479**
GE	12.3616	9.7452	38.6133***	29.1871***
RL	7.4073	3.5864	19.7472*	18.3237*
RQ	20.1071*	15.4523	29.8324***	23.9863**
V&A	8.0484	13.4498	23.0287**	10.4018**
LFP	17.9260	3.1193	7.3469**	9.8698***
TRD	24.3302**	21.5852**	42.2693***	35.7162***
PP-Fisher Chi-Square				
FDI	24.5387**	34.5896***	83.2030***	76.8948***
PS	18.9423*	47.9441***	117.603***	99.9388***
GE	36.6221***	39.9067***	94.0776***	97.6937***
RL	24.4181**	6.4550	50.4994***	52.2678***
RQ	30.8733**	11.9124	67.0134***	60.8187***
V&A	7.9386	27.2937	50.5777***	30.7880***
LFP	19.8095*	0.5003	12.5672***	13.7826***
TRD	23.8322**	24.7324**	83.9200***	76.8858***

Note. ***, **,* donates statistically significant level of 1%, 5% and 10% respectively.

Before investigating the selecting variables, the stationary of these variables was examined utilizing the first generation (Table 6), it can be determined that all variables including the explanatory are not stationary at a level *I* (0), however, become stationary we transformed at the first difference, *I* (1). Therefore, the findings of both the level and first differences of panel unit root are recorded in table, 6.

Nevertheless, after confirming the stationarity of the variable at the first difference, we can perform causality modeling employing Vector Autoregression Estimation (VAR) model with the first differences of the subsequent variables ΔFDI, ΔLFP, ΔGE, ΔPS, ΔRL, ΔRQ, ΔTRD, and ΔV&A. The outcome of the causality test of the VAR model is displayed in table 7. As indicated in the study made by Liu et al. (2001), getting the maximum lag length in the VAR model (for the granger causality test) is continuous to be an unsolved issue (Liu et al., 2007). Hence, in table 7, we showed the findings of the VAR model with a lag length selection of two applied.

Furthermore, table 7 demonstrates that when lag two is applied, however, we keep swinging the dependent variable to see the alternation of other explanatory variables. For instance, when we select Δ FDI as a dependent variable only ΔLFP granger cause ΔFDI at a significant level of 10 percent in SSA this is in line with the study made by Bakari et al.,(2018). However, when we opted Δ for PS as a dependent variable the following variables ΔGE, ΔFDI, and ΔTRD granger cause ΔPS at a significant level of 10 and 5 percent respectively. In addition, when we consider Δ RQ as a dependent variable, only ΔGE granger cause ΔRQ at a significant level of 5 percent. Finally, when we select ΔTRD as a dependent variable in our model, the following variables ΔGE, ΔFDI, ΔPS, ΔRL, Δ and RQ granger cause ΔTRD at a significant level of 5 and 10 percent correspondingly, and this is consistent with the prior studies such as (Al-Marhubi, 2005; Bajo-Rubio & Montero-Munoz, 2001). Therefore, both labor force and trade play a significant role in promoting the FDI inflow in the SSA region and particularly trade plays an important role to stimulate the institutional quality of SSA nations.

Our outcome might not seem undesirable since most of the SSA countries in our sample score very low on overall dimensions of institutional qualities, and, thus, it is conceivable that the institutional quality to impact FDI inflows is required to pass through other essential macroeconomic variables such as trade and labor force. The major implication is that SSA nations have an intimidating duty of developing their institutional quality and political standards, to develop a conducive environment that motivates and stimulates the inflow of FDI in the region, which can contribute to more economic and sustainable development.

5. Conclusions

To sum up, we can emphasize this paper mainly concentrate on the nexus between institutional quality and FDI, through the portion institutional quality developed by Kaufman et al. (2010) namely: political stability, regulatory quality, voice & accountability, government effectiveness, and rule of law for the sample of SSA countries. Moreover, in this study, we utilized both REM and VAR models. Based on the Hausman test indicates that the REM is more appropriate than the FEM in our study. Empirical findings of REM show that both rules of law and government effectiveness have a positive and statistically significant impact on FDI inflows in SSA. Therefore, the SSA nations must engage the policy reforms that enhance the efficiency and effectiveness of those two institutional qualities.

Furthermore, other explanatory variables such as labor force and trade displayed a positive and statistically significant influence on FDI inflow in the region. However, regarding the VAR model, it indicates that both labor force and trade play a significant role in institutional quality attractiveness on FDI inflows in the SSA region. Therefore, it's essential for SSA nations in our study to make policy reforms that facilitate trade openness within the region and to the rest of the world, not only that, but they must engage in more robust strategies that increase the labor force participation rate to rise the institutional quality effectiveness and also to attract the FDI inflows in the region.

Nevertheless, the following points are significant for policymakers in the SSA region. First, it is crucial to enhance the quality of institutions to eliminate the risk of uncertainty related to the FDI inflow. For instance, most countries in SSA have fragile and narrow size local markets, therefore this could harm the capacity to attract large multinational corporate entities as they seek a large market base with reliable sources. Although most nations in the region have diverse regional agreements of trade and business, it is necessary to enhance the capacity of domestic markets to attract the highest possible FDI inflows.

Second, the region is required to enhance the capacity of its infrastructure to attract FDI inflows. Not only had that but also human capital and environmental investment played a vital role in attracting FDI inflows. To illustrate, improving the skills and intellectual capability, and potential labor force skills are one of the major factors for attracting FDI inflows in developing countries, (Cleeve, 2012). Thus, since most SSA countries don't have abundant natural resources and are not hugely rich, it's necessary to develop a well-structured strategy to enhance the FDI inflow in the region. Finally, to receive the attention and desire of FDI it's necessary to offer high incentives including tax deduction or exemption, and also to lower other barriers.

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The Impacts of Fiscal and Macroeconomic Factors on Vietnam Government Bond Yield

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Abstract

Government bond yield refers to the borrowing cost for government and the expected return for the individual and institutional investors. Having knowledge of government bond yield helps government operate or adjust the government bond issuance to boost the economic conditions in a country and support investors when diversifying their investment portfolio. To contribute to government bond's literature and government's policy, the determinants of government bond yield in Vietnam are examined by using GARCH-types models for time-series data. The findings show that for the 3-year and 5-year government bonds, there are positive relationships between the percentage change of Central Government Balance, Policy Rate change and government bond yields change; while the percentage change of Exchange Rate and VN Index negatively affect government bond yields change. For 10-year government bond, Policy Rate, VN Index, Inflation and VIX are the most significant determinants of the government bond yields. Their changes positively affect bond yields change while Inflation has a negative relationship with government bond yields change. Moreover, Inflation has more significant impact on the change in long-term government bond yields than that in shorter-term government bond yields.

Keywords: government bond yields, GARCH-types models, fiscal position, macroeconomic factors

1. Introduction

1.1 The Problem

For advanced economies, the government bonds are risk-free financial instruments. For emerging countries such as Vietnam, the government bonds, however, are exposed to a greater degree of risk. Moreover, the world had been witnessing the default of some emerging markets including Greece, Sri Lanka, and so on, which decreased the nation's credit worthiness and challenged the issuance of their government bond. Understanding risks exposed to the government bond is necessary for policy makers since they decrease the government's borrowing cost which is indicated by the government bond yields. It is also essential for investors to forecasting long-term interest rate and pricing corporate securities and other financial instruments. Besides, to the best of our knowledge, only few researchers in Vietnam investigated this problem and developed additional factors affecting the government bond yields and examined them in depth.

1.2 The Rationale for the Research

Government bond market plays a significant role in bond market. In addition to the effective capital mobilization channel for the state budget, government bond market is also a standard financial market because it provides benchmark yield curve and overall credit curve.

In Vietnam, the bond market had been operating since the mid-1990s and expanding from only 2.82 percent GDP in 2001 to 47.8 percent in 2020. There are five types of bonds traded including government bond issued by State Treasury, government-guaranteed bond issued by State-owned policy banks, Municipal bond issued by local government, corporate bond issued by incorporated entities, and green bond. And the government bond market accounted for the biggest proportion at 28.28 percent GDP in size, followed by the corporate bond, and government-guaranteed bond, which indicates that government bond issuance plays a vital role in developing the bond market in Vietnam. Developing a government securities market is meaningful for macroeconomic and

microeconomic conditions. An effective government securities market provides a channel for government budget deficits funding instead of borrowing from the central bank, which can reduce the amount of fund borrowed directly from the central, and, thereby, declining the possibility of the damage of government budget deficits and the likelihood of rising foreign currency-dominated debt. Moreover, its development can smooth the transmission and implementation of monetary policy. Through government securities market, authorities can adjust consumption and investment expenditures to deal with the shocks. Therefore, the government's exposure to interest rate, currency, and other financial risk decreases and the government's borrowing costs decline. For microeconomic aspect, the development of government securities market ensures the financial stability and the improvement of financial intermediaries in market. That is why the government concerns about the factors influencing the government bond yields which indicate the government's cost of borrowing.

The development of government securities market also affects the investor confidence. Therefore, the government bond yield which refers to the expected return the investor gains on a bond for investors. In addition, for corporates, government bond yield is a benchmark for them to determine the price of corporate bonds and other financial securities. Besides, bond yield also refers to the magnitude of risk that the investor must face when investing in bond. Higher bond yield is a sign of greater risk. Hence, this proved that government bond yield is also an important indicator which is focused on by financial institutions, individual investors, and corporates.

The purpose of our study is to examine the determinants of Vietnam government bond yields. We divide them into three types of factors including fiscal position, macroeconomic factors, and global factors. Specifically, our study investigates the effects of specific variables such as government budget deficit, inflation, exchange rate, domestic policy rate, stock market return, S&P500 stock market volatility index (VIX) on Vietnam government bond yields.

1.3 Literature Review

1.3.1 Bond Yield

Bond yield refers to the expected return that investor generates on fixed-income securities over a specific period. Moreover, bond yield also interprets the risk that investor must face when investing in bond. Investors frequently require higher bond yield as a compensation for higher risk they face.

1.3.2 The Determinants of Government Bond Yield

To the best of our knowledge, most of the papers examine two types of factors that affect government bond yield including fiscal variables and macroeconomic variables. Hence, we decided to divide the literature review part into three parts as follows.

1) Fiscal Factors

Fiscal factors, known as fiscal policy variables, refer to the use of government spending and tax policies influencing economic conditions, especially macroeconomic conditions such as inflation, GDP growth, employment and so on. There are several research papers studying the impact of fiscal variables on government bond yields. To our knowledge, most papers used government debt-to-GDP and primary balance over GDP as the proxies for fiscal policy. Including, government debt-to-GDP and primary balance measure the performance of long-term and short-term fiscal policy, respectively.

- Government Debt

Government debt-to-GDP ratio (Public debt ratio) is the indicator for a nation's capacity of paying back its debt. In terms of developed countries, (Gruber & Kamin, 2012) examined the effect of fiscal variables on Government bond yield in the OECD and G-7 countries during the period from 1988 to 2007 by using panel approach, stating that higher net debt ratio increases the Government bond yield in the long run and fiscal variables affect more greatly G-7 nations' government bond yield than that of OECD countries. This interprets that the government bond yields in the more advanced economies are more market driven. Similarly, for 22 developed countries, (Poghosyan, 2014), examined the short-run and long-run determinants of advanced economies' government bond yields, and found that government debt-to-GDP ratio has the significantly positive effect on government bond yields in both short run and long run. These results are also in line with those of (Malešević Perović, 2015). For developing and emerging market, the paper also interprets that financial development rises the magnitude of the level of the increase in government bond yields in CEE region and the crisis increase the effect of government debt ratio on government bond yield in the same countries. By using fixed effect panel method on the data of 26 emerging countries, (Jaramillo & Weber, 2013) showed that government debt is the factor driving the increase in nominal government bond yields and plays a significant role in determining the government bond yield during

the time of high global risk aversion.

Besides, by applying the ARCH models including GARCH, TGARCH, and EGARCH with the sample in Vietnam during the period from 2006 to 2019, Trinh et al. (2020) indicated that public debt ratio has a significantly negative impact on Vietnam government bond yield volatility because the country had benefited from several factors including gradual fiscal consolidation, strict limits on government guarantees, and financial repression that kept interest rates low over the previous decade. As a result, the public debt had been managed well and had not yet exceeded the debt ceiling of the governments.

- Government Deficit

To measure government deficit or surplus, some variables including overall, primary, or structural balance are used in the literature. For developed countries, according to Gruber and Kamin (2012), with the panel approach, the increase in the primary and structural balance boosts government bond yields in G-7 countries in the long run. However, Jaramillo and Weber (2013) showed that the negative effect of primary balance is insignificant in 22 developed nations. By employing FLGS approaches with data from 20 European countries from 1992 to 2015, Jalles (2019) also showed that the budget balance has a significantly negative impact on government bond yields. In terms of emerging market, Malešević Perović (2015) examined that the coefficient of primary balance is negative and significant, meaning that an increase in primary deficit over GDP leads to a decrease in government bond yield in the CEE nations and there is no non-linearity in the relation between government bond yield and primary balance. For emerging countries, the significantly negative coefficient of overall balance is found in (Jaramillo & Weber, 2013). Furthermore, Chionis et al. (2014) mentioned that it is a factor that investors concentrate on during the crisis while they do not focus on the variable before the crisis. Moreover, by employing panel regression method with the scope of 20 emerging market, Gadanecz et al. (2018) indicated that there is a significantly negative relationship between fiscal deficit and local currency sovereign bond yield.

2) Macroeconomic Factors

- Economic Conditions

Economic condition is reflected by GDP growth, Inflation rate, or Consumer Price Index (CPI). For developed nations, by using OLS regression in the context of Croatia, Mihelja Žaja et al. (2018) found that higher GDP growth leads to the decline in the borrowing cost of government, which is proxied by government bond yield while harmonized Consumer Price Index affects negatively and significantly government bond yield during the crisis period and the recovery period. In addition, Jalles (2019) indicated that current GDP growth has a significantly negative impact on government bond yield while the impact of current Inflation rate is not significant. The paper's results also reveal that creditors concentrate more on forecasted Inflation rate when pricing the government bond yield. In the scope of 19 nations in Europe Monetary Union, Pappas and Kostakis (2020) used fixed effect panel regression to investigate the negative (positive) impact of GDP growth (Inflation rate) on long-term government bond yield. Specifically, in Spain, Hsing (2015) found that GDP growth (Inflation rate, respectively) impacts significantly and negatively (positively, respectively) the government bond yields. For emerging markets, Malešević Perović (2015) revealed that the significantly negative relationship between GDP growth and government bond yield was explained by the fact that the growth of GDP increases tax revenue, which leads to the decrease in government's bond issuance, declining the government bond yield in the CEE countries. Moreover, Zhou (2021) showed that Inflation rate has a significantly positive effect on government bond yield in the short run while it has opposite side in the long run. Moreover, Jaramillo and Weber (2013) indicated that GDP growth and Inflation rate are the factors that negatively affect the government bond yield at the time of low global risk aversion. By considering all government bonds on Indonesia Stock Exchange and employing random effect panel regression, Kurniasih and Restika (2015) found that Inflation has a significantly positive effect on government bond yield, because an increase in Inflation rate leads to the decrease in government bond price, thereby, rising the government bond yield.

- Exchange Rate

To measure exchange rate, most papers studying the relationship between macroeconomic factors and government bond yields used nominal exchange rate or real effective exchange rate. For developed economies, Afonso and Nunes (2015), employing panel approach and SUR estimation, examined that the forecasts' corrections of real effective exchange rate have a significantly negative impact on government bond yield, and it varies across 15 nations. Specifically, Hsing (2015) used EGARCH model and stated that the nominal exchange rate has a significantly negative impact on government bond yield in Spain. Regarding to Croatia, Mihelja Žaja et al. (2018) investigates that the exchange rate HRK/EUR affects significantly and positively on government bond yields in the period of economic recovery while it significantly and negatively impacts government bond

yields in the previous period. However, Jalles (2019) showed the results that the real effective exchange rate is not a significant factor in most of their regression models and it negatively affects the dependent variable, government bond yields. In terms of emerging market, Kurniasih and Restika (2015) stated that the Rupiah/USD exchange rate negatively affects Indonesia's yields of government bonds. Additionally, Gadanecz et al. (2018) studied the importance of exchange rate risk in determining local currency sovereign bond yield in depth. This paper used the depreciation of expected exchange rate and implied volatility of exchange rate as independent variables. An increase in the volatility of exchange rate leads to an increase in sovereign bond yields and unfavorable fiscal policies can easily affect the responsiveness of sovereign bond yields to the depreciation of expected change rate. Regarding to South Africa, Zhou (2021) examined the significantly negative impact of nominal effective exchange rate on government bond yields in both short term and long term, which means that the appreciation in domestic currency lowers the government bond yields because the demand for government bond increases.

- Short-term Interest Rate

Short-term monetary policy is proxied by short-term interest rate. In empirical evidence in advanced economies, Poghosyan (2014) considered short-term rate as a significantly positive factor affecting government bond yield in 22 developed nations. Furthermore, Hsing (2015) used the treasury bill rate as a proxy for short-term rate. The paper found that short-term rate has a significantly positive influence on government bond yields, which is in line with (Poghosyan, 2014; Jalles, 2019). For emerging countries, Kurniasih and Restika (2015) indicated that the impact of short-term interest rate is positive since a rise in interest rate can lead to a decline in bond price, which also increases the yield of government bonds in Indonesia. Regarding to India, Akram and Das (2019) considered nominal yields of India's 3-month treasury bill as an indicator for short-term rate and examined that it plays a key role in determining government bond yield in India in both short run and long run. The paper illustrated the significantly positive impact on Indian government bond yields, being consistent with (Akram & Das, 2019; Zhou, 2021).

- Stock Market Index

To measure the equity market's performance, stock market index or stock traded to GDP can be used. To our knowledge, most of the papers used stock market index. After reading the paper conducting in developed countries, we realized that few of them examine the relationship between stock market return and government bond yield. In terms of developing countries, Muharam (2013) indicated that there is a significantly negative relationship between stock market return and government bond yield in Indonesia, which is explained that the demand of stock purchase increases due to the growth of economics, which is the reason for a decrease in government bond yield. However, there exists an insignificantly impact of stock market return on government bond yield, which is found in (Jaramillo & Weber, 2013; Malešević Perović, 2015).

3) Global Condition

Based on International risk is indicated by S&P500 stock market volatility index (VIX), calculated based on the price of S&P500 index options with near-term expiration date. VIX is frequently seen as a measurement of market sentiment. Afonso et al. (2014), Jalles (2019), Pinho and Barradas (2021) used VIX as an independent variable while it is seen as a threshold variable in (Jaramillo & Weber, 2013) to examine whether the effects of fiscal condition depend on the VIX level representing global risk aversion by using panel threshold method. Jalles (2019) stated that the more VIX increases, the more sovereign bond yield increases. In contrast, Santosa and Sihombing (2015) examined that the factor that least dominantly contribute to the slope and curve of Indonesia government bond is VIX.

To sum up, most of the existing articles studied the determinants of government bond yields and sovereign bond yields in advanced economies and emerging markets excluding Asia regions. There are only a limited number of papers examining the factors affecting government bond yields in ASEAN, especially in Vietnam although government bond accounts for the greatest proportion in Vietnam bond market. For these reasons, this research is carried out to fill the gap.

2. Methodology

2.1 Data and Variables

Our study focuses on developing additional factors that affect the government bond yield to help policymakers and investors get more knowledge on the determinants of government bond yield in Vietnam. Based on the previous research papers, we plan to examine the relationship between independent variables including government budget deficit, inflation, exchange rate, domestic policy rate, stock market return, S&P500 stock

market volatility index (VIX) and the long-term government bond yields including 3-year, 5-year, and 10-year government bond yields in Vietnam, dependent variables. We use data from August 2007 to August 2020 according to the availability of data in Vietnam and the capacity of accessing data. Especially, for fiscal position, at the beginning of the study, government deficit and government debt ratio were chosen to represent fiscal positions (default risk of government bond). However, Government Statistics Office of Viet Nam (GSO) and other authorized international database only estimate fiscal data on a yearly basis apart from the Government Deficit. We decided then to choose Monthly Central Government Deficits of Vietnam based on USD, which is forecasted by Thomson and remove Debt ratio because of its unavailability. In terms of other independent variables, we collected monthly data from Investing.com, Thomson Reuters, GSO.

Table 1. The description of selected variables

Factors	Labels	Variables	Sources	Expected sign
Dependent variables				
3-year Government bond yields	D3GOV_Y	The first difference of Monthly 3-year Government Bond Yield	Investing.com	
5-year Government bond yields	D5GOV_Y	The first difference of Monthly 5-year Government Bond Yield	Investing.com	
10-year Government bond yields	D10GOV_Y	The first difference of Monthly 10-year Government Bond Yield	Investing.com	
Independent variables				
Government Deficit	DCG_DEF	The percentage change of Monthly Central Government Budget Deficit based on USD	Thomson Reuters	(+)
CPI	INF	The percentage change of Monthly Consumer Price Index	GSO	(+)
Exchange rate	DEXC	The percentage change of Monthly USD/VND Exchange Rate	Thomson Reuters	(+)
Base rate	DPIR	The first difference of Monthly policy rate	Thomson Reuters	(+)
Stock market return	DVN_Index	The percentage change of Monthly VN index	Investing.com	(-)
VIX	DVIX	The percentage change of S&P500 stock market volatility index	Thomson Reuters	(-)

2.2 Estimated Models

Based on the property of financial time series data concluding volatility clustering, leptokurtosis, leverage effect, the GARCH family approaches are applied to estimate our model, using STATA software. Before running any model, we use diagnostics test for unit root to make sure that the variables are stationary. To test the presence of unit root, we use the Augmented Dickey-Fuller Test (ADF). To test for ARCH effect, we use Lagrange Multiplier (LM) test for autocorrelation in conditional variance of the error term.

2.2.1 GARCH Model

Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model was proposed by Bollerslev and Taylor. The difference between ARCH and the GARCH model is that the conditional variance of the error term (σ_t^2) depends on the value of the square of previous error term under ARCH model, while the latter is affected by the value of conditional variance of the previous error term and the previous squared error term in the GARCH model. The general form of GARCH(p,q) is formulated as follows:

$$\sigma_t^2 = \alpha_0 + \alpha_i \sum_{i=1}^{p} u_{t-i}^2 + \beta_j \sum_{j=1}^{q} \sigma_{t-j}^2 \quad (1)$$

The biggest drawback that ARCH model has been facing is that the lags of the squared residual can be exceptionally large to model all the nature of volatility, which leads to the non-parsimonious model. To fix this problem, the GARCH model was proposed. Including only three parameters, GARCH (1,1) is sufficient to contain an infinite number of the lags of squared error terms that have an influence on the current conditional variance.

In this paper, our proposed model is the following:

$$DGOV_{Y_t} = a_0 + a_1 DCG_{DEF_t} + a_2 Inf_t + a_3 DEXC_t + a_4 DPIR_t + a_5 DVN\_INDEX_t + a_6 DVIX_t + u_t \quad (2)$$

where $u_t \sim (0, \sigma_t^2)$

$$\sigma_t^2 = \alpha_0 + \alpha_1 u_{t-1}^2 + \beta_1 \sigma_{t-1}^2 \quad (3)$$

This model includes:

$DGOV\_Y_t$: The first difference of the 3-year, 5-year, and 10-year government bond yield (we run separate models for three types of government bond yields)

σ_t^2: The conditional variance of government bond yields at time t

u_t : The error term in equation (2)

DCG_DEF: The first difference of Central Government Deficit.

Inf: The percentage change of Consumer Price Index.

DEXC: The percentage change of exchange rate based on USD.

DPIR: The first difference of Policy Rate.

DVN_INDEX: The percentage change of VN Index.

DVIX: The percentage change of VIX.

2.2.2 E-GARCH Model

The exponential GARCH model, proposed by Nelson is one of the extensions of the GARCH model. EGARCH is the dynamic model that solves non-negativity constraint and leverage effect problems in the innovation process. EGARCH model can address those problems that GARCH model is facing. Specifically, EGARCH model contains the log of conditional variance, which is always positive with any negative or positive parameters so that we do not need to impose non-negative constraints on the parameters. Additionally, EGARCH model takes leverage effect into account while GARCH model only allows symmetric response to positive and negative shocks. The general form of EGARCH (p,q) is:

$$\ln(\sigma_t^2) = \alpha_0 + \sum_{i=1}^{q} \alpha_i \left| \frac{u_{t-i}}{\sqrt{\sigma_{t-i}^2}} \right| + \sum_{i=1}^{q} \gamma_i \frac{u_{t-i}}{\sqrt{\sigma_{t-i}^2}} + \sum_{j=1}^{p} \beta_j \ln(\sigma_{t-j}^2) \quad (4)$$

Where α_0 = constant, α_i = ARCH effects, γ_i = asymmetric effects, and β_j = GARCH effects.

In this paper, our specific EGARCH (1,1) model is as follows:

$$\ln(\sigma_t^2) = \alpha_0 + \alpha_1 \left| \frac{u_{t-1}}{\sqrt{\sigma_{t-1}^2}} \right| + \gamma_1 \frac{u_{t-1}}{\sqrt{\sigma_{t-1}^2}} + \beta_1 \ln(\sigma_{t-1}^2) \quad (5)$$

3. Results

3.1 Descriptive Statistics

Table 2. Summary statistics for original data

Variable	N	Mean	SD	Min	Max
GOV_Y_3	161	7.08	3.72	0.48	19.50
GOV_Y_5	161	7.44	3.51	1.18	17.00
GOV_Y_10	161	7.97	3.04	2.42	17.10
CG_DEF (billion USD)	155	-0.4405	0.2804	-1.005	0.0499
CPI	161	100.55	0.82	98.46	103.91
PIR	161	7.81	2.73	4.00	15.00
EXC	161	30355.65	2419.34	24459.00	33273.90
VN_INDEX	161	639.93	222.51	245.74	1174.46
VIX	161	20.37	9.08	9.51	59.89

From Table 2, the total number of observations is 161 except for Central Government Deficit based on USD, CG_DEFUSD (155 observations). Most of our data are collected from August 2007 to August 2020 apart from CG_DEFUSD (from August 2007 to April 2020). The table illustrates that the mean of three government bonds yields increase with their duration of maturity, from 7.08% to approximately 7.97%. More specifically, the

longer the government bond's maturities, the higher the government bonds return, which is consistent with the theory. In contrast, the standard deviations of government bonds yields decrease along with the increase in the maturity durations with 3.72% for 3-year government bond, 3.51% for 5-year government bond, and 3.04% for 10-year government bond. This contrasts with the theory that the long-term bonds with lower coupons have the longer durations. These bonds are more volatile in a changing rate environment because they are more susceptible to changes in market interest rates. Bonds having shorter maturity dates or larger coupons, on the other hand, will have shorter duration.

To make sure that our models run effectively, we must check multicollinearity and the stationarity for our data through pairwise correlation, variance inflation factor (VIF), and the Augmented Dickey-Fuller test. After testing ADF for our original data, all of them are not stationary. Therefore, we use the first difference and percentage change for all variables because they are stationary based on ADF test.

After running the models, we also test for correlation among independent variables via pairwise correlation and variance inflation factor (VIF).

Table 3. Pairwise correlation

Var.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1)	1.000								
(2)	0.845	1.000							
(3)	0.744	0.820	1.000						
(4)	0.067	0.004	0.003	1.000					
(5)	-0.151	-0.053	-0.107	-0.093	1.000				
(6)	0.824	0.762	0.720	-0.006	-0.110	1.000			
(7)	0.030	0.136	0.197	-0.033	0.111	0.231	1.000		
(8)	-0.130	-0.148	-0.050	-0.194	-0.036	-0.053	0.061	1.000	
(9)	0.078	0.043	0.066	0.046	-0.157	0.054	-0.139	-0.310	1.000

(1) D3GOV_Y; (2) D5GOV_Y; (3) D10GOV_Y; (4) DCG_DEF; (5) INF; (6) DPIR; (7) DEXC; (8) DVN_INDEX; (9) DVIX

From Table 3, correlation coefficients among independent variables are not high, which is in line with the result of VIF. Based on the table below, VIF of six explanatory variables is around 1, meaning that there is no multicollinearity problem among independent variables.

Table 4. Variance inflation factor

	VIF	1/VIF
DVN INDEX	1.172	.853
DVIX	1.17	.855
DEXC	1.101	.908
DPIR	1.087	.92
INF	1.078	.928
DCG BAL	1.052	.95
Mean VIF	1.11	.

3.2 Estimated Results

After checking for the multicollinearity, stationarity and running basic regression models, we implemented LM test for conditional heteroscedasticity to test for ARCH effect. Based on tables A1, A2, A3 from appendix A, the p-values equal 0.000 from lags 1-12 for 3-year government bond's model and around 0.001-0.005 for six lags 6-12 for 5-year government bond's model. LM test for 10-year government bond yields' regression model has a result that the p-value equals around 0.001 for twelve lags. This interprets that there exist ARCH effects and we decided to run GARCH (1,1) and EGARCH (1,1) models for 3-year, 5-year, and 10-year government bond yield apart. The GARCH (1,1) and EGARCH (1,1) can replace the ARCH (p) model because they are equivalent to ARCH model with infinite number of lags.

Table 5. GARCH and EGARCH results

	(1) D3GOV_Y	(2) D5GOV_Y	(3) D10GOV_Y	(4) D3GOV_Y	(5) D5GOV_Y	(6) D10GOV_Y
	GARCH			EGARCH		
DCG_DEF	.166*	.141**	-.033	.112**	-.008	-.032
	(.085)	(.06)	(.034)	(.052)	(.051)	(.07)
INF	-14.718**	-.782	-18.493***	-10.813	-6.224	-21.202***
	(7.216)	(5.189)	(2.161)	(6.854)	(4.497)	(1.922)
DPIR	1.08***	.482***	.507***	.942***	.557***	.56***
	(.036)	(.044)	(.031)	(.064)	(.043)	(.05)
DEXC	-8.354***	-3.622*	-1.874	-7.075***	-4.193**	.357
	(2.583)	(1.97)	(1.168)	(2.353)	(1.97)	(1.37)
DVN_INDEX	-2.563***	-1.919***	.932***	-2.666***	-2.222***	1.311***
	(.436)	(.301)	(.168)	(.39)	(.328)	(.282)
DVIX	-.125	-.096	.228***	-.088	-.061	.217***
	(.175)	(.153)	(.063)	(.144)	(.122)	(.062)
_cons	.012	-.037	-.039***	-.032	-.031	-.024
	(.039)	(.032)	(.014)	(.037)	(.032)	(.021)
ARCH:L.arch	.12**	.17*	2.549***			
	(.049)	(.097)	(.518)			
ARCH:L.garch	.867***	.758***	.084*			
	(.041)	(.138)	(.047)			
ARCH:L.earch				-.277***	-.112	-.143
				(.092)	(.092)	(.129)
ARCH:L.earch_a				.29***	.333***	1.638***
				(.085)	(.129)	(.176)
ARCH:L.egarch				.972***	.938***	.883***
				(.027)	(.057)	(.039)
ARCH:_cons	.005	.013	.011*	-.021	-.099	-.115
	(.004)	(.01)	(.006)	(.031)	(.104)	(.089)
Observations	154	154	154	154	154	154

Standard errors are in parentheses

**** p<.01, ** p<.05, * p<.1*

3.2.1 3-Year Government Bond Yields

From Table 5, for the 3-year government bond yield's model with GARCH approach, the previous error terms of the volatility of government bond yields change have a significant impact on the current volatility of the yields because the coefficient α1 is statistically significant at the 5% level. Additionally, the coefficient β1 is statistically significant at the 1% level, meaning that the current volatility of 3-year government bond yields is significantly and positively affected by the previous volatility of the yields. Most of the independent variables have a significant coefficient except for the VIX. Specifically, the coefficient of DCG_DEF is 0.166 and statistically significant at the 10% level, interpreting that the changes in Central Government Deficit in Vietnam significantly and positively influence the change in 3-year government bond yields, which is the same as our expectation. In other words, the more Central Government Deficit in Vietnam increases, the more 3-year government bond yield rises. And the policy rate has a significantly positive effect on the government bond yields change. This is interpreted from the positive coefficient at the 1% level of significance. However, the coefficient of Inflation is negative (-14.718) at the 5% level of significance, meaning that Inflation has the strong and negative impact on the first difference of government bond yield. The coefficients of DEXC and DVN_INDEX are negative with -8.354 and -2.563, respectively at the 1% significance level. This means that the change in exchange rate and VN Index have the significantly negative relationship with the government bond yields.

In EGARCH model, the coefficient of exponential GARCH term is positive and significant at the 1% level, interpreting that the log of previous variance of the government bond yields change has a significantly positive impact on the log of current variance of the government bond yields change. In addition, the asymmetric coefficient is significant and positive, meaning that the positive shocks have larger effects on the volatility of the

government bond yields than the negative shocks. Most of the explanatory variables have the significant coefficients apart from two independent variables including Inflation and DVIX. The relationship between the change in Central Government Deficit and the government bond yields change is significantly positive. For the policy rate, it also has the significantly positive correlation with the government bond yields. Specifically, the coefficient of DPIR is 0.942 at the 1% level of significance. However, the coefficient of Exchange Rate and VN Index is negative and significant. In other words, the change in Exchange Rate, VN Index significantly and negatively affects the government bond yields change. The more Exchange Rate and VN Index increases, the more the government bond yields change decline. In contrast, the change in Inflation and VIX does not affect the government bond yields change. To compare with the results of GARCH model, all the coefficients are in the same sign as the corresponding ones in GARCH model. There is only one coefficient of Inflation, turned to be insignificant in EGARCH model.

3.2.2 5-Year Government Bond Yields

From the GARCH results in Table 5, the previous error terms of the volatility of government bond yields have a significant impact on the current volatility of the yields because the coefficient α1 is statistically significant at the 10% level. And the previous volatility of the government bond yields has a strong effect on the current volatility of the government bond yields with the positive coefficient at the 1% level of significance. Most of the coefficients are significant apart from Inflation, DVIX. The coefficients of DCG_DEF and DPIR are positive and significant, which means that the increase in the change in CG_DEF and PIR lead to the increase in the government bond yields change. However, the coefficients of DEXC and DVN_INDEX are -3.622 and -1.919 at the 10% and 1% level of significance, respectively. It interprets that the increase in Exchange Rate and VN Index change leads to the decrease the 5-year government bond yields change as we expected.

For EGARCH model, the coefficient β1 is significant and positive, interpreting that the log of previous volatility of the government bond yields significantly and positively affects the log of current volatility of the government bond yields. The asymmetric coefficient is positive and significant, which means that the good shocks have a larger effect on the volatility of government bond yields than bad shocks. The coefficient (α1+β1) is less than 1, meaning that the shock effects declining in the short term in the model. The table reports that three independent variables have the significant coefficients. Including, the coefficient of DPIR is positive (0.557) while DEXC and DVN_INDEX have the negative coefficient with -4.193 and -2.222, respectively. In other words, the change in DPIR and the government bond yields change move in the same direction. On the contrary, the increase in DEXC and DVN_INDEX change leads to the decrease in the change of government bond yields. Besides, the change in Central Government Deficit, Inflation, and VIX do not affect the change in 5-year government bond yields. By using EGARCH (1,1) model, the coefficient of DCG_DEF turned to be insignificant.

3.2.3 10-Year Government Bond Yields

From Table 5, after employing GARCH model for 10-year government bond, the result shows that the coefficient α1 is significantly positive, meaning that the previous error term has a significant impact on the current error term. Additionally, the previous variance of the government bond yields significantly affects the current variance of the yields. Most of the independent variables significantly influence the first difference of 10-year government bond yields except for Central Government Deficit, Exchange Rate. The coefficient of INF, DPIR, DVN_INDEX, and DVIX are significant. Accordingly, if the change in INF increases, there is a decline in the government bond yields change. However, the higher the change in Policy Rate, VN Index and VIX, the higher the change of the government bond yields. Besides, Exchange Rate and Central Government Deficit are not the fundamental factors determining the 10-year government bond yields because their coefficients are not significant.

When applying the EGARCH(1,1) model, the results express the coefficient of egarch_a and egarch are significant at the level of 1%. This interprets that the good news has a larger effect on the 10-year government bond yields volatility than the bad news. Besides, the coefficient of Inflation, DPIR, DVN_INDEX, and DVIX are significant at the 1% level while the coefficient of DCG_DEF and DEXC are insignificant. The EGARCH model yields a smaller INF coefficient that that of the GARCH model. In other words, the negative impact of INF on Government Bond Yield change is greater when measured by the EGARCH model than when measured by the GARCH model. Besides, the coefficients of DPIR and DVN_INDEX are positive and significant. Those coefficients in EGARCH model are larger than ones in GARCH. This means that the positive effects of DPIR and DVN_INDEX on the change in government bond yields in the EGARCH model becomes larger than that of the GARCH model. However, the significantly positive coefficient of DVIX is smaller than that in GARCH model, which interprets that the positive impact of DVIX on government bond yields change in the EGARCH

model turn to be smaller than that when applying the GARCH model.

4. Discussion

When mentioning the relationship between the change in central government deficit and the government bond yield change, by employing the GARCH model, there are two types of government bonds with 3-year and 5-year duration of maturity for which yields change are significantly and positively affected by Central Government Deficit while the impact of it on 10-year government bond yields change is not significant. However, regarding to EGARCH model, only the coefficient of DCG_DEF on the first difference of the 3-year government bond is significant. The significantly positive association of the change in fiscal deficit with the change in government bond yields is consistent with (Malešević, 2015; Jalles, 2019). In other words, the increase in Government Deficit leads to the increase in the change in government bond yields because large government deficit decreases the ability of government to finance the budget deficit and increase the national debt. Government bond yields is known as the compensation for the higher deficit. Additionally, the relationships between the percentage change of Government Deficit and the government bond yields change are weaker than the association between other significant independent variables and government bond yields change. In other terms, the most significant impacts on the change in government bond yields is not Central Government Balance.

In term of inflation, by using GARCH(1,1) and EGARCH(1,1) model, the coefficients of inflation on 5-year government bond yields change are not significant, while the impact of inflation on 10-year government bond yields change is significant at the 1% level. Moreover, in GARCH model, the impacts of Inflation on the change in 3-year government bond yields is significant at the 5% level. In other words, the effect of inflation on the change in long-term government bond yield such as 10-year government bond is more significant than the impact of it on the change in shorter-term government bond yields as (Zhou, 2021) claimed. Most of the coefficients are negative. This is in line with (Mihelja et al., 2018; Zhou, 2021). The reason for it is that based on the fisher effect, the negative association between inflation and real interest rate occurs when the nominal interest rate frequently remains unchanged. Particularly, the lower inflation leads to the higher real interest rate, which increases the cost of borrowing or the bond yields.

Regarding to domestic policy rate, in both GARCH and EGARCH model, the coefficients of DPIR on three types of government bond yields change are positive at the 1% level of significance. It means that the policy rate is the key driver that changing the government bond yields, which is in line with (Simoski, 2019). This is also agreement with the Keynesian Theory that the ability of government to adjust short-term interest rate through setting policy rate is one of the key factors determining the long-term interest rate. When increasing the policy interest rate, the prices of government bonds fall, which results in the increase in the government bond yields.

For exchange rate, the coefficients of exchange rate on 3-year and 5-year government bond yields change are significantly negative while the impact of the change in exchange rate on the first difference of 10-year government bond yields is insignificant. It interprets that the increase in exchange rate USD/VND (the depreciation of Vietnam Dong) makes the government bond yields change fall. This is contrast to some previous research such as (Afonso & Nunes, 2015; Hsing, 2015; Tjandrasa, 2017; Zhou, 2021). Those studies indicate that the depreciation of domestic currency make the fixed income asset less attractive, so the government bond yields rise to compensate for the investment. Moreover, after the 2008-2009 crisis and the period that the exchange rate experiences the increase, the government applied effective exchange rate policy so the exchange rate less volatized. Specifically, to stabilize the exchange rate and foreign currency markets after the crisis, the government implemented measures to buy and sell foreign currencies to intervene the market when needed. Moreover, the government combine the exchange rate policy and monetary policy to reduce the pressure on the foreign currency market and encourage people and organizations to switch from holding the USD to the VND. Besides, the State Bank of Vietnam issued the bills on the open market to attract money. From 2011 to 2015, the government also implemented effective policy to stabilize the exchange rate such as the issuance of Circular No. 03/TT-NHNN dated March 8, 2012, narrowing the cases of borrowing capital in foreign currencies. In the current year, the government also effectively stabilize the exchange rate to deal with the COVID-19 crisis as Ministry of Finance claimed.

In both GARCH and EGARCH model, most of the coefficients of DVN_INDEX on the variances of the first difference of government bond yields is significant at the 1% level. Specifically, the first difference of VN Index significantly and negatively impacts the 3-year and 5-year government bond yields change while it significantly and positively affects the 10-year government bond yields change. It means that 3-year and 5-year government bond yields change rise, and 10-year government bond yields change declines when the change in VN Index decreases. For 3-year and 5-year bond yields, when the stock market declines, investors demand more

government bonds because of its safety to balance their portfolios. That is why the price of government bonds decrease and the government bond yields rise. But this is not true for the 10-year government bonds because of its longer maturity.

By employing GARCH and EGARCH model, most of the coefficients of DVIX is insignificant apart from the coefficient of DVIX on 10-year government bond yields change. Additionally, the coefficient of DVIX on the change in 10-year bond yields is positive. It means that the increase in the implied volatility of S&P500 stock market index, representing global market uncertainty or global risk aversion, leads to the increase in the 10-year government bond yields. This result is not in line with (Hsing, 2015; Pinho & Barradas, 2021). However, this is consistent with the results from (Miyajima et al., 2015). The explanation for this is that when global risk aversion increases, the investors seek for safe asset such as Vietnam's 10-year government bond, which increase the demand for 10-year government bonds. This leads to the decline of bond price and the rise in the 10-year bond yields.

5. Conclusion

To contribute to developing the government securities market, the determinants of the government bond yields play a big role in portfolio management for individuals and organizational investors and in smoothing credit markets. Through consideration of the factors affecting the government bond yields, the related parties can find the effective ways to benefit them in investment and issuance of bonds.

Our study examines the effects of fiscal position (central government deficit) and macroeconomic factors including inflation, exchange rate, domestic policy rate, stock market return, S&P500 stock market volatility index (VIX) on 3-year, 5-year, and 10-year government bond yields in Vietnam from August 2007 to August 2020. The estimated results shows that the GARCH model is more reasonable to model 5-year and 10-year government bond yields change and the other independent variable while EGARCH model effectively model 3-year government bond yields change and explanatory variables. From the research's results, the change in Central Government Deficit/Surplus, Policy Rate have a significantly positive impact on the 3-year and 5-year government bond yields change while the change in Exchange Rate USD/VND, VN Index have a significant and negative effects on these bond yields change. For 10-year government bond, the Inflation significantly and negatively affects the first difference of government bond yields. Otherwise, the change the Policy Rate and VIX significantly and positively affects the first difference of government bond yields.

From the obtained results, we have some recommendations for individuals, organizational investors, policy makers and future research. The consideration of several determinants affecting the government bond yields helps investors realize the potential risks when investing in the government bond with different maturities. The choice of appropriate government bonds contributes to the effective construction of investment portfolios. For government and policy makers, they should focus on considering policy rate, exchange rate USD/VND, and VN Index in priority when examining the cost of borrowing from 3-year and 5-year government bond because they are the most significant determinants affecting the government bond yields rather than the rest. Moreover, Central Government Deficit or Surplus should be also concerned to develop a sound fiscal policy to reduce the cost of borrowing for government. For 10-year government bond, Inflation and VIX are suggested to be considered due to the most significant impacts of them on the government bond yields change. Furthermore, the higher inflation and the lower VIX leads to the lower government bond yields. In other words, the increase in inflation and the decrease in VIX reduce the government's cost of borrowing.

This paper is challenged due to several limitations including the unavailability of data, the ineffective data facilities, small sample size, the explanation based on empirical research and controversial theories. Hence, we suggest that the future studies should consider more government bonds with different maturity and explanatory variables such as government debt, government net lending/borrowing, tax rate, government revenue and spending, credit rating, and so on to have a clear picture of the determinants of government bond yields. Additionally, the future study can apply more advanced models such as TGARCH, GARCH-M to sufficiently model the government bond yields and explanatory variables. In addition, the future research can employ model comparison test to find the best fit models.

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Appendix A. LM test for autoregressive conditional heteroskedasticity

H_0: No ARCH effects

H_1: ARCH(p) disturbance

Table A1. LM test for autoregressive conditional heteroskedasticity – D3_GOV_Y

LM test for autoregressive conditional heteroskedasticity (ARCH) chi2	df	Prob>Chi2
15.310	1	0.000
16.455	2	0.000
18.509	3	0.000
23.660	4	0.000
40.829	5	0.000
42.324	6	0.000
44.201	7	0.000
44.908	8	0.000
44.688	9	0.000
58.498	10	0.000
59.054	11	0.000
60.566	12	0.000

Table A2. LM test for autoregressive conditional heteroskedasticity-D5_GOV_Y

LM test for autoregressive conditional heteroskedasticity (ARCH) chi2	df	Prob>Chi2
0.707	1	0.400
0.781	2	0.677
0.768	3	0.857
0.782	4	0.941
2.059	5	0.841
18.694	6	0.005
21.012	7	0.004
21.108	8	0.007
27.566	9	0.001
29.424	10	0.001
29.870	11	0.002
32.134	12	0.001

Table A3. LM test for autoregressive conditional heteroskedasticity-D10_GOV_Y

LM test for autoregressive conditional heteroskedasticity (ARCH) chi2	df	Prob>Chi2
9.626	1	0.002
13.352	2	0.001
14.183	3	0.003
18.125	4	0.001
26.287	5	0.000
28.935	6	0.000
28.867	7	0.000
28.686	8	0.000
28.803	9	0.001
32.173	10	0.000
35.541	11	0.000
37.903	12	0.000

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A Literature Review of Privatization Models, Theoretical Framework for Nigerian Railway Corporation Privatization

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Abstract

Privatization is the transfer of ownership from the state to the private sector. The main idea behind this economic strategy is to relieve government from the saddle of management of state enterprises that can be seen to be best managed by the private sector for maximum performance. The main method and critical choices for the privatization of the Nigerian Railway Corporation are management-buyout, concession, management contract, leases, share option and franchises. In addition, the research paper discusses the main performance indicators, such as effectiveness, efficiency, productivity, infrastructural investment, and profitability. These are the parameters set to measure the performance of privatized state enterprises after privatization discussed in the research study.

Keywords: privatization, models, theoretical framework, critical choices

1. Introduction

This study provides a literature review of the overall background study, options, theoretical framework of privatization, and railway development. It provides an evaluation of the arguments for and against privatization, its implications, the benefits of privatization and strategies of privatization. It reviews the theoretical framework of privatization including the study of privatization policies and a critical evaluation of privatization choices. Finally, it examines the performance indicators and the critical success factors of privatization strategies including the issue of informed consent of the public, the middle class, and the employees of the NRC.

2. Privatization: General Overview

Most government run establishments and enterprises are presently in a state of disrepair, devoid of market driven ideologies let alone operated as a business for profit motives. They are all saddled with poor productivity, poor performance, inefficient and less competitive globally. They suffered from poor, yet basic strategic infrastructures such as power, road, telecommunication which could assist their efficient and effective operations. The above economic ills were exacerbated because of overblown government size, increasing cost of governance, over centralization of management authority resulting in administrative inefficiency, ineffectiveness and a battered economy. As such, Fatemi and Behmanesh (2012, p. 42) observed that there is "a new paradigm for public management which is called 'New Public Management' that has emerged since the 1980s which was formed to confront the present economic problems." In the empirical study, there was an evidence of chronic government overload which was observed together with fiscal distress, of which in view of these situation, the respective administrative reforms put in place to tackle the worldwide pandemic, mismanagement of state-owned enterprises failed to achieve the desired results. In view of this, it has led government policy makers to enthusiastically accept privatization as a major component of major economic reforms and as a potential panacea for better and new world order of the New Public Management (Peters, 1996 as cited in Durrant & Legge, 2002). The NPM therefore embraced a radical market reforms resulting in decreasing government size, reducing cost of governance, decentralization of management authority, while laying emphasis on efficiency, effectiveness and the economy which were now encapsulated in the privatization policy (Fatemi & Behmanesh, 2012).

The theory of privatization strives to enhance efficiency in addition to effectiveness and equity of operation in the delivery of public services. It also suggests that unless there is a radical approach to address the current situation, including an adoption of economic models for political and administrative motives. The concept of

competition, performance based, service delivery and customer satisfaction, will merely be a far cry and hence without the achievement of the desired result considered as the gain or the economic policy thrust of privatization (Kaboolian, 1998 cited in Savas, 2000, p. 1736).

Several schools of thought were considered, in terms of defining the term "privatization", in ways that reflects the different economic and developmental stages of the country as well as the objectives sought from adopting the strategy. Agba, Agba, Ushie, and Festus, (2010), in their contribution commented that privatization can be seen as a reform mechanism that is aimed at ensuring an effective and efficient operation of state-owned enterprises in the provision of their respective statutory obligation to the Nigerian people.

3. Privatization Definitions

"Privatize (vb.) to transfer (the production of goods or services) from the public sector of an economy into private ownership and operation" (Collin English Dictionary, 1995, p. 375). Similarly, Agba et al. (2010, p. 95) described it to "involve the transfer of government owned shares in designed SOEs to private shareholders." Whereas Cowan,1987 as cited in Agba et al. (2010, p. 96) defined privatization to include "an activity that ranges from selling of state-owned enterprises (SOEs) to contracting out of public services to private contractors."

Taking another view at the policy, privatization of SOE is seen as the transfer of government equity shares in these ventures to private owners (Ayodele, 1994; Carter, 2014). For commercialized enterprises, the government retains ownership of the relevant infrastructure, but realigns the company toward maximizing the return on capital as in private enterprises. Both scenarios are a means of attaining a higher level of performance. However, where privatization implies commercialization, the reverse is not necessarily true of commercialization (Carter, 2014).

Ramanadham (1996, p. 138), however, defined privatization as a term that is employed to convey a variety of ideas, noting that "in the United Kingdom, the idea that is most prominently suggested is denationalization, in the sense of transferring the ownership of a public enterprise to private ownerships. Another idea in vogue is 'liberalization and deregulation' which unleash forces of competition. By the idea of deregulation allowing private participation in the market economy, "this idea enhances corporate efficiency, effectiveness and, above all, foster consumer choices."

Furthermore, Adeyemo and Salami (2008) defined Nigerian commercialization and privatization in Decree No 25 of 1988 to include the restructuring or the re-organization of state-owned enterprises that is either wholly, solely or partly owned by government such that the state enterprise becomes privately owned therefore becoming performance driven and a profit orientated ventures operating without any government financial assistance or subventions operating as a profit oriented private business entity.

From the literature reviewed, and for the purpose of this research therefore, privatization is referred to as the transfer of ownership and control of SOE from government to private ownership and control for the primary purpose of an efficient and effective driven operation leading to better productivity and profitability of the state owned enterprises (Agba et al., 2010); Cowan (1987) resulting to development and economic prosperity; Yodeled (1994); Ramanadham (1996); Adeyemo (2008). The reason for privatization is because of the poor performance of the NRC by measuring its activities against the performance indicators identified above.

4. Privatization: Theoretical Framework

In view of the above discussions and in relation to the theme of the study, the theoretical framework for the research examines the privatization policy in four theory dimensions which informed the theoretical research philosophy discussed later. The following are the research theoretical framework lenses considered relevant to the study.

4.1 Property Rights Theory

This theory argued the notion that property is best managed if it is privately owned, especially where there is a strong belief of a perceived threat to ownership and risk of bankruptcy if investments are not well managed. That is, if assets are not well managed to bring to bear a commensurate and required return on investment to cover the initial investment cost, bankruptcy could occur. Which implies that, if such assets are in the public domain, otherwise state owned controlled enterprise, because of the perception that it is government owned, no particular attention is usually paid to this aspect of bankruptcy threats, therefore returns on investment are usually not pursued with the desired vigor as compared to being in private control, so much so that profit motives are relegated to the back burner, therefore resulting in poor performance as it is witnessed in most public managed businesses today, which incidentally account for the poor performance of SOE's (Rowley & Yarrow, 1981 cited in Carter 2013; Kay & Thompson, 1986). However, Nheri (2014, p. 98) in a research study, observed that there was "higher improvements in efficiency and output for firms privatized after financial liberalization and where the government relinquishes control" which clearly supports the property rights theory approach.

Also, Adeyemo (2008, p. 404) argues that "the character of the traders and that of the sovereign are inconsistent, that public administration was negligent and wasteful because public employees have no direct interest in the outcome of their actions." This explains the reasons for the SOEs' abysmal performance despite the colossal amounts spent on them and, as such why the NRC is performing so poorly with the various sums of money spent on it at different periods of each government (Omoleke, Salawu, & Hasan, 2011).

4.2 Agency Theory

The agency theory is concerned with the relationships between the principals of a firm, who are owners or shareholders, especially in an incorporated business, and the agents who are the management team of the firm (Omoleke et al., 2011; Nellis, 1994; Clarke, 2004, cited in Muogbo, 2013). The principals, who are typically the investors or shareholders, are interested in their return on investment, hence, having a vested interest in the company performance. Whereas, the agents who are the management team, want to protect their employment, on the one hand, as well as other management perks for good performance, on the other hand. Therefore, the profit motive is the only avenue in meeting their respective economic goals as well as increasing shareholders wealth. As such, effective control will be put in place to ensure the achievement of overall corporate goals, whereas with a SOE, the motive of profit is usually of less importance, hence not vigorously pursed. For example, Eisenhardt 1989 cited in Carter (2013, p.114) observed that agency theory assumes that individuals are risk averse; "suggesting that privatized firms may assume higher risks or costs for engaging in opportunistic behaviors against their government especially in cases that effective monitoring and control mechanisms are in place".

4.3 Resource-Based View

The resource-based view theory takes a strong view of procuring and sustaining a state-of-the-art infrastructure, which gives the enterprise a competitive advantage. The theory suggests that firm's infrastructure will enhance the achievement of competitive advantage, improved performance and simultaneously achieving advancement. Whereas, if left in the public sector control, the objective of a sustained and effective infrastructure will not be important and thereby making the enterprise to become less competitive, as presently observed in the case of Nigerian Railways (Omoleke et al., 2011).

Wade and Hulland, 2004 cited in Carter (2013, p. 114) hence argued that "resources that are valuable and rare can lead to the creation of competitive advantage, which can be sustained over longer time periods to the extent that the entity is able to protect against resources being imitated, transferred or substituted." Whereas, in most SOE, because of the monopoly power advantage they have and the lack of competition or substitutes for a similar service provide. There is little or no motivation for efficient service compared with the private sector's competitive environment, which enhances competition, efficiency, and profitability. For example, Fatemi & Behmanesh (2012, p. 44) also suggested that "new public management does not emphasize on processes (input) but on efficiency (output)". This view was echoed and shared by Adeyemo (2008, p. 404) who noted that" this theory would reap the advantages of the market system and competition, namely effectiveness, productivity, and efficient service."

4.4 Contingency Theory

The contingency theory argued it by taking the position of privatization in terms of what method is best in implementing the privatization program. It considers the cultural background, values and beliefs as important factors that affect the success of the privatization program and, hence, posits that all these factors have bearing and impact on the implementation and success of the policy when the privatization program is implemented. For example, according to Smircich & Stunnart, 1985 cited in Carter (2013, p. 112), "every country has its own unique environment that historically constitute a set of forces to be adapted to, co-aligned with, controlled, or uncontrolled." This is what informed the observation made by Lawrence and Lorch, 1967 cited in Carter (2013, p. 112) who noted that "there is no one best way to privatize."

However, on a broader approach, Joseph (2010, p. 145), in a recent empirical study, saw the process of privatization as "carrying a wide range of possibilities from decentralization at one end to market discipline at the other. Whereas Agada, 2002 cited in Joseph (2010, p. 145) looked at the process in a broader sense to also "involve not only the sale or other form of transfer of state assets but also the transfer of the management of state enterprises to the private sector." From all the above definitions, the main goal of the privatization process and which is equally shared by all the empirical studies identified, suggests that privatization, is the process of relinquishing government control of SOE's to private control for better performance which also espoused the privatization theoretical framework discussed above as well as align with the epistemology belief of the research (Ojo & Fajemisin, 2010).

For example, Kouser, Azid, and Ali (2011, p. 36) stated further that the policy of "privatization is the termination of public programs and separation of state from its manufacturing and other different kind of corporate activities." This view was also shared by Nellis (1994, p. 1), who described the issue of privatization as a "neoclassical economic theory which suggests that the relationship between ownership and performance is tenuous; efficiency is seen mainly as a function of market and incentive structures". Nellis (1994, p. 1) therefore stated further that, "in theory, it makes little difference whether a firm is privately or publicly owned as long as it operates in a competitive or contestable market without barriers to entry or, just as important, barriers to exit", which clearly espouses the resource-based theory discussed earlier.

In addition, Nellis (1994, p. 1) noted that "the owner instructs management to follow the signals provided by the market and gives it the autonomy to do so. Management is rewarded and sanctioned based on performance." This is typical of a private entrepreneur demonstrated by the agency theory discussed earlier, which also corroborates the fact that reward and punishment is a motivational factor that encourages efficiency, productivity, and profitability. This is obviously not normally evident in SOEs which suggests why most SOEs are inefficient, let alone not profitable. Moreover, any hardline actions taken can equally be misconstrued to be politically motivated hence the soft stance sometimes adopted in the running of the SOE's by the government officials. Another dimension is the employment protection, potential risk, or fear of stepping on toes of powerful individuals in government which may also have grievous consequences.

Furthermore, Nellis (1994, p. 1) discussed the empirical study's "evidence that the theory does indeed apply in practice—with two crucial qualifications. First, the full set of necessary conditions is only rarely met. And second, even when it is met, it tends to stay met for only a while; the necessary conditions cannot be made to endure." Nellis' assertions presuppose the reasons why new governments in Nigeria target the railway transport for investment: for the increased performance and efficiency of the rail transport and to act as a catalyst for achieving the public's acceptance of the new government as discussed earlier.

To buttress the above point further, Gupta and Sathye (2008, p. 4) equally observed the Nellis study with the Indian Rail (IR) study and noted that "the key reason for the IR's financial performance decline was politicization of the decision-making processes that emphasized taking populist action over hard business decisions". The above observation by Gupta and Sathye (2008) is quite like the NRC's situation of which the result is the usual favorable response to the government funding initiatives with an increase in turnover through increased patronage by the helpless teaming population. However, the improved performance is usually not sustained because it was an ad hoc measure in the first place, which is rather political just to fulfil political manifestoes of the government of the day and never a business decision which as well is lacking both strategic or long-term views. Hence shortly after diverting attention from the rail sector, performance drops and services become erratic (Gupta & Sathye, 2008; Odeleye, 2010). As a follow up with another perspective, privatization is seen as a process of disencumbering the state from the burden of running business enterprises that could better be managed by the private sector. This mobilizes the private sector to take the lead in entrepreneurship and industrial investment, leaving the state to play a supportive role (Babangida, 1986). This dimension clearly supports the property right philosophy of the theoretical framework.

Furthermore, in considering the operational indicators of privatization, another study defined privatization as a move by the public sector towards the pursuit of efficiency and effectiveness in the attainment of objectives with a dominance of financial considerations through the adoption of management styles that reward good and penalize poor performance (Nheri, 2014; Kayode, 1986). This study corroborates the views of the research theoretical framework, particularly the agency and resource-based theories. However, Adam, Cavendish, and Mistry (1992, p. 2) argues that "no definition of privatization is ever likely to be watertight, and in many cases the extent to which privatization has occurred is a matter of degree and interpretation." Hence, the research will take the position of the privatization theoretical framework, discussed earlier, as it describes the direction of the study. In other words, it is a known fact that publicly run enterprises are inefficient, they lack clear goals, suffer from chronic political interference, lack goal congruency and, as such, are susceptible to poor performance. They have been seen as a drain on public funds and usually do not merit the motives of their establishment. The Nigerian Railway was profitable during the colonial administrators' era and, as a matter of fact, Nigeria inherited a very vibrant railway service, pre-independence, but just shortly after independence which also orchestrated a change to an indigenous management, performance in the system started declining (Durant & Legge, 2002; Odeleye, 2000; Nheri, 2014; Fatemi & Behmanesh, 2012).

In addition, it was observed that Nigeria inherited a flourishing, efficient and effective rail system prior to independence from the colonial administration. Again, notwithstanding the fact that Nigeria inherited a single-track, with narrow-gauge system running diagonally across the country, the railway service was still able to efficiently haul agricultural products harvests from far North to the seaports situated in Lagos and Port Harcourt. For example, the

cocoa harvests from the West, groundnut pyramid from the North and palm oil from the East were contributions to the Nigerian economy that were facilitated by the rail service and are a good reminder of the NRC past good old days (Odeleye, 2000).

Therefore, judging from the performance experience of the railway system during the colonial administration, the dilemma for serious consideration appears not to be an issue of ownership problem that is affecting the Nigerian Railway but rather management of the corporation that is the major problem confronting the efficient performance of the system. Where ownership is seen to be the problem, the research therefore explores the critical choices and different forms of ownership that could best be suited for the NRC situation.

5. Privatization: The Theoretical Arguments

Privatization would induce a market led operation which may also enhance efficiency as observed by Adam et al., (1992, p. 4), who emphasized that while "deregulation and liberalization policies may expose state owned enterprises to greater commercial pressures, they do not necessarily either alter control and ownership structures in the economy or change the source of supply of goods and services." This may force competition as well as encourage the provision of an efficient infrastructure to obtain competitive advantage argument equally supported by the resource-based ideology (Omoleke et al., 2011).

While direct public enterprise reform interacts with privatization, it could also be said that all privatizations might generally involve some reform of public enterprise management structures and state shrinkage, there is also a large class of public enterprise reforms, mainly the adoption of private sector practices, which entail neither privatization nor state shrinkage. For instance, the adoption of 'private sector-style' management systems (commercialization), employment incentive structures, balance sheet restructuring as well as debt and capital restructuring are all reforms that will bear directly on the efficiency of the sector, but they are not privatization, as observed with the situation for the Indian Rail reform (Gupta & Sathye, 2008).

5.1 Privatization Implications

The following are some of the implications of a privatization program. Privatization is expected to act as a turnaround strategy, particularly for turning loss-making corporations into more profitable businesses. Amakon (2003, p. 4), opined that "as a last resort in Nigeria today, privatization is seen as a means that will guarantee the most rapid and irreversible progress towards solving and surmounting the legion of problems confronting and antagonizing most state-owned enterprises especially the problem of low productivity and inefficiency and at the same time help in reducing the financial burden through government borrowing in order to meet up with its commitments."

By way of a follow up, Abubakar (1998) equally observed that if a government divestment of 40 per cent of its holdings in public utilities means a withdrawal of subsidies attached to infrastructural facilities, consumers will have to pay for improved services. The populace will have a variety of choices and they are at liberty to decide who to patronize as observed with the previously deregulated and privatized telecommunication sector and the recently deregulated and privatized power sector.

Stating further, Galang (1993) cited the experience of the Philippine Government of 1992 when it formally turned over control of Philippine Airlines (PAL) to a private-sector consortium in the country's biggest privatization, thereby reducing the government's holdings in PAL to 13 per cent. The outcome of this process was an efficient and profitable PAL, seen today. Another benefit expected from the program is a change in the employee morale towards joint action and responsibilities for increased performance of the corporation (Nellis, 1994; Eisenhardt, 1989). This corroborates the agency theory and the research theoretical framework, discussed earlier.

However, Smith (1995, p. 10) viewed the subject by considering the five management buyouts bidding for British Coal with the two successful bids (i.e., Betws Anthracite and Hatfield). For example, it was observed that "both were already running, and trying to make money out of pits in the latter years of British Coal's stewardship which were previously unprofitable. But Betws Anthracite in 1995 was exceeding its weekly target after taking over in April 1994. Also, instead of the company's reported target of 2,340 tons a week it was producing 2500 tons. In addition, their 100 employees were achieving high levels of productivity by returning to traditional mining methods using shovels rather than mechanical coalface shearers." This is in consonance with the agency theory which emphasize cost control and monitoring for better performance currently lacking in SOE's (Eisenhardt, 1989 cited in Carter, 2013b).

Furthermore, Gawith (1992, p. 5), in a research study, noted that "when the Chiluba government took over power in November 1991 and installed new management at the Zambia Consolidated Copper Mines (ZCCM), the corporation was in serious financial trouble where debts to overseas suppliers had reached a level where these companies had

stopped selling to ZCCM. The 1992 annual report was awash with references to plant breakdowns, equipment obsolescence and shortages of spare parts and supplies as a direct result of financial difficulties." These were because of the government's increasing failure, over several years, to invest in the core activity of metals production. However, the government's stance was to privatize the corporation with a mandate to return it to its core peripheral businesses activities. The benefits of these changes were observed to be filtering through with increased production and a trimming of the labour force; unit costs also improved dramatically.

6. Privatization and Performance Indicators

Success of the privatization is measured using the following criteria noted by Berg (1994) in his paper 'Privatization: A Pragmatic Approach', a well-developed financial market, which creates the proper legal, fiscal, and institutional framework conducive to increasing the volume and efficiency of the flow of financial resources and as a prerequisite for a successful privatization. Therefore, the following are the performance indicators of a privatized corporation which also form part of the prime motive for their privatization are hereby discussed.

6.1 Effectiveness

SOEs in Nigeria are ineffective because of several factors, among which are the decades of neglect, decay and lack of maintenance culture that have made them to be less productive Oyedepo and Fagbenle (2011). For example, Kikeri et al. (1994), cited in Salawu (2005, p. 172) noted that "the high costs and poor performance of state-owned enterprises (SOEs) with modest and fleeting results of reform efforts have turned many governments towards privatization". In other words, most SOEs have constituted a source of budget drain as opposed to supporting the economic development agenda of government through the creation of jobs and could have resulted to increasing the disposable income, stimulating economic growth and by extension increasing the economic propensity to consume. This is currently not the case and is the reason for SOE's clamor for their privatization.

For example, citing an empirical study by Ayodele (1994, p. 301), who also noted that "in most cases, particularly in the case of NEPA (now Power Holding Company of Nigeria - PHCN), product prices of PEs were subsidized to the tune of between 36% and 52% of the production cost in the pre-Structural Adjustment Program period. As a result of this situation, Kouser, Azid, and Ali (2011, p. 35) noted that "governments took privatization stances to reduce their burden in terms of the underutilization of resources, over and redundant employment, fiscal burden, financial crises, heavy losses and subsidies in order to improve and strengthen competition, public finances, funding to infrastructure, and quality and quantity of services in terms of management." Hence with the various government reform initiatives, effectiveness of the SOE is enhanced and achieve the much desired benefit of privatization.

6.2 Efficiency

Efficiency involves the elimination of redundancies or factors which may not add value to the process. According to Ugorji, 1995, cited in Mercy (2011, p. 491) in an empirical study, viewed "privatization to have become an acceptable paradigm in the political economy of states, it was seen as a strategy for reducing the size of government and transferring assets and service functions from public to private ownership and control." In addition, Jerome (1999 and 2005) further argues that privatization brings operational efficiency, increases productivity, creates employment, ensures job security, and widens the distribution of wealth in society. Similarly, Bishop, Kay, and Mayer (1996) opined that, privatization as a policy was designed to improve the operating efficiency of public sector enterprises through increased exposure to competitive market forces, which is also in line with a suggestion in another study by Adeyemo (2008).

Therefore, the private sector sees a strong correlation between lean structure and an increase in efficiency also enhancing effectiveness, productivity, and profitability, which is usually not present in SOEs (Adeyemo, 2008). Additionally, Salawu and Akinlo (2005, p. 171) further observed that, "privatization has been recognized as a key element to promote efficiency, reduce fiscal burden and helps in developing capital market." Additionally, Omoleke et al. (2011, p. 77) noted that "in Nigeria, privatization came as an integral part of economic adjustment program and policy aimed at enhancing the efficiency in the government resource allocation."

6.3 Productivity

Mercy (2011, p. 490), opined that "in assessing the productivity of the privatized state-owned enterprises in Nigeria, certain indices were used for analysis, such as profitability, output, and employment. Analysis showed that certain factors such as corruption, lack of transparency, etc., have led to low levels of productivity in the goal attainment of the policy. Consequently, suggestions were made for the sustainability of the reform and a better level of productivity in Nigeria."

Hence, if the public enterprise were privatized and became a public corporation, the corporate governance provisions in place would help to sustain the transparency and integrity of the financial statements. As such, Muogbo (2013, p. 81) defined corporate governance as "a response to the agency problems that arise from the separation of ownership and control in a corporation." The financial statements of privatized corporations are subjected to an annual audit, which is statutorily required. The statutory requirement to produce a published set of financial statements will increase and improve accountability and transparency, which is currently absent in SOEs.

For example, in accordance with the provisions of effective corporate governance, internal control is another statutory requirement, which is also the subject of an annual audit and evaluation to assess its effectiveness. All these provisions will assist in corporate transparency and, hence, reduce the incidence of corporate corruption, ultimately improving productivity which is currently not available in virtually all state-run state-owned enterprises (Omoleke, 2011; Muogbo, 2013).

An empirical study by Muogbo (2013, p. 81) posited "the results to show that corporate governance has a significant positive relationship with privatization in terms of setting up sound corporate objectives and maximizing shareholders' wealth. This indicates that investment in privatized firms will be more profitable than investment in firms with government presence." Also observed in an empirical study by Gupta & Sathye, 2008 appears to be a replicate what is happening to the Nigerian Railway which also explains the cause of its present abysmal performance in spite of the colossal amounts of money spent.

Another argument derives from the property rights theory of Kay and Thompson (1986, p. 20); they perceived the privatization policy as a "change in ownership; in that by altering the structure of property rights it will improve the incentives for productive efficiency." This argument presupposes the fact that private firms need to perform efficiently to remain in business. Hence, if privatization merely converts a public monopoly into a private monopoly, the enterprise will not be compelled by competitive pressures to improve its productive efficiency (Carter, 2013).

It was argued further that the change in ownership may impose the discipline of a private capital market on the enterprise which in theory will ensure that management performs in a manner that is consistent with a profit maximization goal. Help maintain its public listing on the stock market or through the threat of take-over or delisting from the stock market, if it is a public quoted company. This argument hence supports the property rights theory philosophy which is the main argument in support for the NRC's privatization.

6.4 Infrastructural Investment

According to Sarbib Jean-Louis 1997, cited in Amakom (2003, p. 2), "privatization in Africa is not only bringing about a change of ownership or management control; it is also encouraging much needed new investment in these businesses." In addition, Iyoha 2000; Ndebbio 2000, cited in Agba (2010, p. 99) also opined that, "privatization of SOEs is expected to attract substantial investment, increased employment and reduce poverty." Hence, because of the increase in investment through acceleration effect, it will lead to an increase in productivity which will also warrant an increase in employment. This view also corroborated with the resource-based view which emphasized firm's competitiveness. This position was also supported by Ndebbio 2000, cited in Agba (2010, p. 99), who suggested that "labour demand is directly related to industrial investment; that is, in every 10 percent increase in capital investment, in small and medium enterprise (SME), labour demand (new jobs) would increase by 1.97 percent." Furthermore, looking at the process from another angle of positive investment, Mahmoud 2005, cited in Omoleke (2011, p. 74) observed that, "the core objectives of the privatization policy are to reduce fiscal deficits, building a broader tax base, attracting more investment and growing of the private sector" this will hence assist in achieving the investor's goal of wealth creation motives of the private operator which is also espoused with the position taken by the property right theory philosophy.

6.5 Profitability

According to Adewale 2011, cited in Mercy (2011, p. 493), "the primary drive for the so-called private sector is quick and super profits they could appropriate by cheaply seizing of the formerly state-owned enterprises. It was not a desire to contribute to economic development and job creation.*"* Particularly if this is considered form the agency theory lens, however, when profit is generated, it increases the shareholders' value and as well as an increase in wealth. The new wealth created therefore increases the economic activity and lead to an increase in the propensity to consume which will also assist in achieving economic development.

The profit maximization actions therefore are typically the result of the lean structure of the six sigma, which tends to identify areas of waste and duplication that the private sector seeks to identify and eliminate to achieve profitability. The state enterprises were established to aid economic development objectives as opposed to the

profitability views of the private sector; the ideology of the lean structure is typically not an agenda of the state-run enterprises.

7. Privatization: Models and Policies – An Evaluation of Critical Choices

Having studied the theoretical arguments for privatization, it is also important to evaluate the respective methods and the potential success rates. The following presents the tested methods considered (see Table 1).

Table 1. Privatization methods – a comparative analysis

Management Function	Methods of Privatization					
	Management-Employee Buy-Out	Private Ownership	Management Contract	Franchising	Leases	Concession
Privatization type	Full	Full	Partial	Full	Partial	Partial
Management of operation	Private	Private	Private	Private	Private	Private
Commercial Risk	Private	Private	Public	Private	Private	Private
Operating Risk	Private	Private	Public	Private	Private	Private
Investment Risk	Private	Private	Public	Private	Private	Private
Ownership of Rolling stock	Private	Private	Public	Private	Public	Private
Ownership of Infrastructure	Private	Private	Public	Private	Public	Public

Source: World Bank (2003, p. 3), Abioye (p.50,2016).

7.1 Management-Employee Buyouts (MEBO)

Bennett, Estrin, Urga (2007, p. 662), defined management-employee buyout (MEBO) as privatization by a market transaction at a positive price, but the buyers are insiders to the firm – managers or workers. From Bennett et al. (2007, p. 662) it was concluded that the method of MEBO privatization hardly ever has a statistically significant effect on the privatized state-owned enterprise. However, using the property rights theory, issues of property protection is achieved (Muogbo, 2013) equally in terms of transparency and accountability which is currently not present in SOEs is corrected (Kay & Thompson, 1986).

7.2 Public Offering and Share Issue (Private Ownership)

Bennett et al. (2007, p. 662), defined a public offering "as a sale which includes any method in which ownership in the bulk of enterprises is transferred on the basis of sale at an agreed (market) price of shares to people not previously associated with the firms, including foreigners." From Bennett's empirical study, it was concluded that privatization by sale never exerts a significant independent influence on growth of the SOEs; however, other indices of the benefits of privatization will be achieved such as profitability, productivity, and wealth creation for the new shareholders of the now privatized company.

7.3 Management Contract

Galenson and Thompson 1993, cited in Mescht (2005, p. 998), defined a management contract as "the form of technical assistance, where the contractor carries no financial risk, to more complex cases where compensation is based partly on results which could include performance incentives. The contractor assumes responsibility for operations and maintenance of a particular activity which includes running the entire railway." This invokes the method in which the government provide the infrastructure and an enabling environment for the private operator to run the SOE's as a profit orientated enterprise, this method typically supported the NPM new management style discussed earlier (Osborne & Gaebler, 1993). This method limits the financial risk of the private operator and puts most of the financial risk of liability to the government which also makes it less risky method and potentially an attractive method.

7.4 Franchising

Preston and Nash 1993, cited in Shires, Preston, Nash and Warden (1994, p. 19), defined franchising as the type of contract in which franchises are required "to provide all the capital assets involved in the production of that good or service prescribed in the contract. Such capital investments constitute 'sunk costs' which prevent 'costless entry and exit'. With an operating contract, capital is provided by either the state or a public body. Whilst overcoming the problems associated with 'owning franchises' 'operating franchises' lead to inefficiencies in the deployment of assets which are not under the control of the operating agents who have the incentives to minimize costs."

In view of Preston and Nash's position, shines et al., (1994, pp. 19-20), suggested that "franchising makes a market more contestable, improving both productive and allocative efficiency. It increases market contestability by allowing firms to bid for the 'rights to supply' before they have committed any resources to the attempted entry. Put another way, franchising reduces the 'sunk cost' element to purely the costs of constructing the bid." Hence, making the privatization option much more competitive and clearly in line with the resource-based view philosophy of company obtaining competitive advantage with an efficient infrastructure (Carter, 2013).

7.5 Leases

Regarding leases, Mescht (2005, p. 998), sees them as the type of contract in which "the contractors could be charged a fee for the use of fixed assets." Thompson, Budin, and Estache (2001, p. 2), similarly, defined "leases is a form of agreement in which a rail operator rent locomotives and or rolling stock from a private entity for a predetermined periodic regular payment (rent)." This type of leasing is usually an operating lease agreement in which ownership revers to the lessor at the termination of the lease agreement. The lessee is generally responsible for maintenance of the coaches and locomotives, always keeping them in top operational performance for the contract period. Bullock (2009, p. 46) also added, "Lease contract, is that in which the private operator assumes only the risks to the operation's revenue and costs but not the risks to investments."

7.6 Concession

Budin 1997, cited in Metscht (2005, p. 998), defined concession "as a partnership between the government (the property owner) and a private operator (the concessionaire), where the government maintains ownership of the rail infrastructure and transfers the operations to the concessionaire as spelt out in agreement. Bullock (2009, p. 44) noted that, "concessionaire under the terms and conditions stipulated in the agreement, operates the rail transport as a profit-making business activity at its own risk, cost, and expense."

In addition to the Budin's definition, the World Bank (2003, p. 2), defines "a railway concession as a form of public-private partnership under which the operation of railway activities on a network is entrusted to a concessionaire, while the ownership of the railway infrastructure is directly or indirectly retained by the State, the conceding authority." Typically, in most concession contracts, it is usually for a limited period of about 5-15 years at a time to enable the supervisory agency to assess the private sector's performance and then decide to either renew for a longer period, or re-negotiate the terms of contract, or revoke the license if the performance does not justify contract renewals.

7.7 Voucher Privatization Shares of Ownership

Bennett et al. (2007, p. 662), defined voucher privatization as a "method which entails the transfer of the enterprise at a zero or nominal price, either to insiders, as was common in Russia, or to outsiders, as occurred in the Czech Republic." An empirical study by Bennett demonstrated that this method of voucher privatization is shown to be positively associated with growth of the state-owned enterprises.

8. Privatization of Railway Transport: Experience of Other African Countries

Since 1993, thirteen concessions have been awarded in Africa, with a further seven in the process of being concessioned (Table 2). Bullock (2009, p. 9) observed that the Sub-Saharan railway system shared fairly in the country's transport partly due to poor road infrastructure or restrictive regulation, but following liberalization of the transport sector, and coupled with improvements in road infrastructure, had led to much stronger competition, leading to fewer, but much more efficiently functioning, smaller railways. Also noted in a World Bank (2003, p. 3) report which also stated that "traffic is once again on a growth path after a decade of decline, and a portion of the traffic volume that had been lost to road transport is returning to the railways. The customer base recognizes the improvement in quality of the service provided and notes that these railway systems have ceased to be government administrations and are becoming commercial enterprises".

As such consumers were left with many choices, hence act as catalyst for driving up competition that, in turn, enhance acquisition of better infrastructure (resource based view), which helps in achieving competitive advantage. Equally, competition will encourage better performance and customer service (agency, property right theories) which is lacking in rail transport management in Nigeria today (Rowley & Yarrow, 1981 cited in Carter 2013; Kay & Thompson 1986).

Table 2. Railway Privatization by Concession

(A Comparative Analysis of African Countries Experience and Outcome)

Concession by Country	Concessionaires	Year Awarded	Year Started	Pre-Qualification	No. of Yrs.	No. of Bidders	Successful bidder	Outcome of Privatization
Cameroun	Camrail	1994	1999	Yes	20	3	2	Successful
Congo Brazzaville	Sizarail	1995	1995	Yes	5	23	5	Cancelled
Côte d.Ivoire – Burkina Faso	Sitarail	1993	1997	No	15	3	2	Successful
Ethiopia	CDE			N/A				N/A
Gabon	Transgabonais	1996	2003	Yes	20	15	2	Cancelled
	Gabon Rail							
Ghana	United Rail	2002	2005	N/A	N/A	N/A	N/A	In process
Kenya	Tangayika Rail	2002	2004	Yes	N/A	N/A	N/A	N/A
Madagascar (North)	Madarail	2002	2003	Yes	25	2	1	Failure
Malawi	CEAR	1999	1999	N/A	20	N/A	N/A	Failure
Maputo/Corridor	NLPI/Spoornet	2002	N/A	N/A	15	N/A	N/A	N/A
Mozambique-Beira	Beira Rail	2004	2004	N/A	25	N/A	N/A	In Process
Mozambique-Nacala	CBN	2000	2005	N/A	15	N/A	N/A	In Process
Namibia	Transnamib Ltd			N/A		N/A	N/A	N/A
Senegal-Mali	Transrail	2003	2003	N/A	25	2	N/A	Failure
South Africa	Transvaal						N/A	Successful
Tanzania	Tazara Line	1997	2007	Yes	5	7	4	In Process
Togo	WACEM	1995	2002	N/A	5	N/A	N/A	N/A
Uganda	Uganda Rail	2002	2004	Yes	N/A	N/A	N/A	N/A
Zambia	RSZ	2002	2003	N/A	20	4	2	In Process
Zimbabwe	BBR	1998	1998	N/A	5	N/A	N/A	In Process

Source: Bullock (2009, p. 49), Abioye (p.54, 2016) and Literature Reviews.

In another study by the World Bank (2003), the research findings saw an improvement in the performance of the railway service privatized by concession in Africa. It reported a very positive outlook for the privatization exercise of some African country's railway services (see Table 2, above). The World Bank (2003, p. 3) report stated further that "these railway systems have been improved and modernized; they employ fewer people but who are better trained and highly motivated; infrastructure has been rehabilitated and is well maintained; and rolling stock is available and reliable." As a result of the above reforms, appreciable improvements have been witnessed in terms of efficiency, effectiveness and productivity which ultimately lead to a profitable rail transport operation. Equally, government is relieved of the mundane tasks of running SOEs that could be best operated efficiently and effectively by the private sector.

These clearly support the research epistemology as well as the theoretical frameworks discussed earlier. For example, the reasons for the improved performance can be inferred to be because of the commercial orientation structure, clear corporate goals, sound business objectives, and profit motives of the agency theory. Equally, efficient infrastructure of the resource base theory which also enhances competitive advantage and the property rights theory view discussed earlier (Rowley & Yarrow, 1981 cited in Carter 2013; Fatemi & Behmanesh, 2012; Kay & Thompson 1986).

8.1 Effectiveness

Effectiveness is measured in term of the use of train infrastructure reducing operating cost, while increasing service delivery and ensuring passenger safety. It was observed that concession strategy enhances service efficiency which could also lead to resource surplus that can be redeployed to selected users. These benefits large corporation or extractive industries shipping in large quantities or other rail users willing to pay for premium services which enhance economies of scale and ultimately reduce costs and improve operation's effectiveness (Bullock, 2005).

Bullock (2009, p. 15) noted that "rail travel is still safer than road travel, but the safety record of Sub-Saharan African railways is much worse than that of comparable railways elsewhere due to a combination of obsolete track infrastructure, poorly maintained rolling-stock, and a lack of operational discipline. But, as with productivity, safety has generally improved following concession." This also assists in achieving lower downturn of train operation and improving customer patronage and satisfaction. Bullock (2009, p.60) however noted

further that "concessioned railways cannot necessarily improve transit time, but they do generally try to address other aspects of service quality such as safety, security, and reliability."

8.2 Efficiency

In an empirical study by Nheri (2014, p. 98), the research "find higher improvements in efficiency and output for firms privatized after financial liberalization and where the government relinquishes control". In corroborating Nheri's stance, it was observed that productive efficiency has clearly improved. It was noted that allocative efficiency might be difficult to evaluate directly, however, there was a general positive outcome. Equally, the concessionaires' constant search for new traffic as well as an improvement in general business practices have led to an improvement in railway cost structure. Also more importantly is the quality of service which has significantly contributed to the improvements in rail service level and helping in attracting more rail users (Bullock, 2005). It was further noted that technical efficiency in productivity equally increased after railway concession which also provide a very positive outlook for an increase improvement.

Additionally, in making concessionaires to be justifiable and in consonance with the profit motive philosophies of the private operator (agency theory), it tends to improve the passenger transport allocative efficiency objectively and by not hesitating to notify government of a loss-making passenger services, it enhances exploring other feasible alternative arrangements. Also, where it is almost a matter of necessity to run a loss-making network, then concessionaires do so in the most efficient manner particularly in the areas of revenue drive and collection. In other words, the private sector runs the concessionaires as a business venture and purely for-profit motives as opposed to the government social welfare posture. Hence the private sector will ensure it runs the concessionaires in a very profitable manner (Bullock, 2005).

8.3 Productivity

Productivity is in terms of output which is a measure of labour usage to output per hour. Bullock (2005, p. 28), observed that "asset productivity has also generally increased and has improved railway productivity." This has equally increased steadily in all the concessions that were observed to be in operation for a period of five years and with a similar expectation during the life of the concessionaires.

This is made possible owing to the most economic deployment of resources such as using fewer trains' staff, efficient and tactical asset utilization which also supports the resource-based views as well as the property rights theorists discussed above (Kay & Thompson, 1986; Carter, 2013). For example, in two African countries railway privatization by concession experience, Camrail labour productivity sharply increased as traffic grew after concession before stabilizing and steadily increasing again. CEAR productivity equally grew when it only re-absorbed about two-thirds of the previous workforce after concession while growing its traffic level by about 30 percent on an adjusted annual basis (Bullock 2005).

8.4 Infrastructural Investment

Bullock, (2005), observed that privatization by concession in most African countries have been associated with significant investments in infrastructure and funded principally by bilateral and multilateral lending agencies while noting that investments in infrastructure maintenance have not been kept up to date. Furthermore, Bullock (2005, p. 20) commented that "infrastructural renewals typically arrived after the damage was done, and in some cases not at all, thus making the continent full of railways that can best be described as walking wounded."

This situation characterized the railway infrastructure in many African countries and is responsible for the current poor position. For example, this has been the fate of rail transport in Guinea, Sierra Leone, the north-east network in DRC and some of the Angola short lines. In addition, rail transport infrastructure has also suffered during civil wars in some African countries such as in Mozambican Central and Northern Systems, Angola, Ethiopia, Eretria, and Ivory Coast which have either damaged the train lines or prevented the rail service because of those conflicts. In other cases, the trains have also been unable to operate due to other operational and logistical reasons. Although in most cases it is the desire of the governments of the affected countries to reinstate services to those rail lines, but because they are often too expensive or uneconomical to do so owing to the enormous amounts of financial resources it involved in comparison to the return on investment makes the idea railway resuscitation to be shelved in most cases (Bullock, 2005).

8.5 Profitability

Bullock (2005) in an empirical study observed, it was that the concession arrangement in rail privatization in most African countries have been successful, citing CAMRAIL as an example. It was noted that CAMRAIL has been generating significant returns on investments for its operators, also showing improvements in its financial performance and has equally achieved the expected profit margins projected by its concessionaires. However, the

main drawback was their inability to fund long-term renewals. Hence if CAMRAIL can generate sufficient return but cannot sustain its ability to fund its long-term renewals, then privatization policy alone will not result in profitability, but instead a formidable and feasible business processes in terms of cost cutting, efficient application of resources, effective dispensing of all productive factors and backed up with sound management will ensure a profitable operation. This is further reiterating the property rights and agency theories discussed above (Kay & Thompson, 1986; Carter, 2013).

8.6 Critical Evaluation of African Railway Concession Experience

On a critical analysis and a closer look, few of railway privatization in Africa through concession process appears to be successful as well as their results, indicating that the concessionaires are operating more efficiently and achieving increased productivity. Infrastructural investments have equally increased and largely funded through bilateral and multilateral loans at competitive concessional rates although after substantial delays. It is also observed that funding concessions from other sources other than bilateral or multilateral loans has been comparatively smaller; to sustain and ensure long-term survival, further injections of funds from public investments is highly desirable possibly through share option scheme or public sale of equities of privatized rail companies.

Furthermore, railway shows an improvement after concession, however, it was observed that political interference was a major setback to the performance in most cases. For example, Briceno-Garmendia & Dominguez-Tores (2011, p. 17) "indicated that SITARAIL is one of the strongest performers on a wide range of operational indicators, including labour productivity, traffic volumes, and average tariffs. Strong traffic growth took place during the first five years of the concession, from 1995 to 2000, when the volume of freight almost tripled from 450 million to 700 million tons-km." This also highlights the need to constantly support the rail system with adequate funding, sound management and congruent corporate goals that support the overall business initiatives (Gupta & Sathye, 2008).

Briceno-Garmendia et al. (2011, pp. 17-18), commenting further observed that "due to political disruptions that started in 2002, SITARAIL's traffic volumes dropped dramatically however after the crisis, SITARAIL recovered progressively, and from 2006 onwards it once again reached, and then exceeded, the peak volumes of the early 2000s. As of 2010 SITARAIL was on track to achieve the highest-ever traffic volume of more than 900 million tons-km." This is similar to the findings of an empirical study by Gupta and Sathye (2008), in the case of the Indian Railway.

9. Privatization of Railway Transport: Empirical Study and Analysis of the UK Experience

Martin (2002) in his study observed that, British Rail (BR) was previously a single entity and known to be an integrated network bound together in a hierarchical bureaucratic structure. The entity was subsequently re-organized and restructured into more than 100 separate business entities and subsequently privatized as a standalone autonomous entity. This exercise resulted in a few modern concessions to divisional and decentralized strategic business units, interconnected companies that are now accountable to their supervisory, regulatory bodies and their shareholders.

Faulks (1999), cited in Mescht (2005, p. 998), noted that the "British Rail era ended on 1 April 1994 when the strategic business unit of the national rail system were dismantled and fragmented into separate units while each then operate and become accountable as different business and as an investment center. The process therefore saw train services being distributed among 25 different operators who leased the rolling stock from another third-party leasing companies. Rail infrastructure was also separated from train operations which came under ownership of a private company call Rail track."

9.1 Effectiveness

Effectiveness measures operational indicators such as timeliness of the service, quality of the service, customer satisfaction, price of the service and customer safety. The privatization of the rail transport in the UK saw an increase in investment of new coaches which led to an increase in quality of service, however, despite this, safety standards dropped in the quest for high profits. According to a study, Martin (2002) observed that with the increase in the train frequency, it also resulted to an increase in maintenance costs of the rail tracks at a much faster rate. This therefore resulted in an increase in Railtrack's operating costs which was also disproportional to the revenue it was generating from the operation.

Incidentally, the privatization terms and conditions also fail to stipulate any maintenance schedule for Railtrack's, nor were there any investment target requirements as well as failing to empower the Office of Rail Regulators (ORR) for ensuring and enforcement of a strict maintenance regime for rail users and public safety. All these

inadvertently resulted in an inevitable growing maintenance backlog. These put together, was responsible for severe rail track wear and tear leading to the multiple crashes reported within the few years after the privatization of the rail service (Martin, 2002).

9.2 Efficiency

Sylvester (2011, p. 4), identified a few reasons why the BR privatization failed among which include an increase in wage costs. This was without commensurate increase in performance to justify the wage increases, which were the result of key BR staff becoming consultants at a very high price. The wage induced frequent strike actions all too often, bringing trains to a halt. Also, the fragmentation of the industry, with costs rising at all the different interfaces between train operating companies (TOCs) and rail network as roles are duplicated and the different parties have to compensate each other for their possessions and other inconveniences (Akwara et al., 2014).

9.3 Productivity

In evaluating the effects of privatization on productivity, it was observed that between 1996 and 2000, passenger journeys witnessed an increase of about 25 percent of total passengers that use the service in the period. Also, the freight services equally observed an increase in activities with a report of about 40 percent increase in freight volumes hauled. To improve labour productivity, concessionaires were observed to have used fewer staff thereby reducing operating costs and improving performance, asset utilization index which also helps in contributing to a better performance to the bottom line and profitability of the concessionaires in general (Martin, 2002).

9.4 Infrastructural Investment

In assessing the impact of privatization on the infrastructural investments, the general belief is that privatization will promote investments in infrastructure particularly in line with the resource-based theoretical framework which suggested the pursuit of competitive advantage and profitability of operation by the private sector (Omoleke et al., 2011; Carter, 2013). It was therefore observed that the resource-based theory belief was evidenced with an increase in infrastructural investment. However, the supposed benefits of competitive advantage were negated by the private sector aggressive pursuit of profitability where safety was then compromised for profitability. Maintenance of the rail track was therefore not properly carried out and this has contributed to the multiple crashes previously witnessed and with the fourth crash resulting in seven rail user fatality. While carrying out an investigation into the cause of the of the fourth crash in particular, it was observed that there were poor maintenance, while all the necessary checks and balances as well as safety standards were equally neglected or compromised (Martin, 2002).

9.5 Profitability

Profitability motive, at the expense of public safety, increased the incidence of crashes with the experience of UK privatization and this was one of the reasons why it was judged a failure (Eisenhardt, cited in Carter, 2013). For instance, after the Hatfield BR crash, as part of panel of inquiry's outcome investigating into the accident. It was evident that public and rail user safety were compromised in favour of aggressive pursuit of profitability and improvement to the bottom line. As part of the evidence, the CEO was reported to have submitted that to make profit, Rail track might have to compromise its safety standard and avoid doing what will make the railways better. Hence, the aggressive pursuit of profits at the expense of public safety led to the train crashes (Martin, 2002; Glaister, 2004).

9.6 Critical Evaluation

Glaister (2004, p. 53), concluded that, "the fundamental principle driving the British Railways policy of the 1990s was not about change in ownership through privatization, but rather a change orchestrated by competition in every aspect of the business to achieve cost efficiency, increased performance through transparency of policy. The policy was designed to maximize the opportunities for effective competition while catering for natural monopoly in infrastructure. It also created the need to continue to pay subsidy in order to preserve the scale of the industry which was successfully implemented and started to produce some remarkably good results."

10. Privatization of Nigerian Railway Corporation – Historical Perspectives

Ogunsanya (2006), cited in Odeleye (2010, p. 5), asserted that "government intervene in transport development because a malfunctioning transport system can affect adversely national and international trade; and consequently, retard spatial economic development. Hence, up till late 19th century the global transport sector-railways inclusive, operated in a monopolized market structure."

For example, Odeleye (2000) observed that railway transport system just like any other state-owned enterprise

has been inefficient let alone effective over the years. It has suffered from neglect from successive governments, poor management from the senior management of the corporation with series of conflicting policies and lack of continuity of company policy usually orchestrated from the frequent changes on top management. In addition to the above, efforts made to reposition the railway are usually seen as a populist agenda, for successive and new governments to achieve acceptance amongst the people. Hence, Odeleye (2000) opined that total ownership of the Nigerian Railway by the federal government has contributed greatly to the neglect the corporation is facing today a position also supported by Carter (2013). However, with more investment seen from 2017 to 2022, there is little efficiency or productivity that has been seen due lack of will power or due to political implications. Which implies that government lacked the business acumen to run state enterprises for profit but rather as a social amenities.

Odeleye (2000) noted further that because of the capital-intensive nature of railway transport, the Federal government of Nigeria should encourage competition through private participation. This will allow private investors in participating and enhance private sector funding as well as encouraging bilateral and multilateral funding which will increase infrastructural investment requirements, assist in modernizing and improving the quality of service of the rail transport sector. This position was also shared by Gupta and Sathye (2008).

10.1 Effectiveness

NRC is presently dogged by lateness, poor customer service and inadequate availability of locomotives and passenger coaches, despite the colossal sums of money invested on the network over the years. An improvement in its effectiveness is yet to be appreciably seen in the service. In terms of customer safety, rail transport is generally safe; however, this can only be maintained if the train infrastructures are maintained through a form of regulated schedule. Safety is a serious issue particularly with the recent bombing of Kaduna-Abuja rail line on March 28, 2022, and the subsequent kidnapping of the train passengers for political reason is evidence of the government failure of securing the properties (property right theory) or profit motive (resource-right theory).

10.2 Efficiency

This is a measure of the capital outlay to asset utilization. Efficiency drives down cost as well as increases return on investment. Currently, there is high capital cost though the sunk cost of the rail project (Odeleye, 2000). From various experiences observed, concessions by leases will probably be an ideal situation in the Nigerian Railway privatization. It will encourage multiple operators, therefore increasing customer choice as well as the asset utilization factor. With rail concession by leases, the infrastructures and their maintenance will be in public control, whereas the service part will be handled by the private sector (Nheri, 2014; Gupta & Sathye, 2008).

10.3 Productivity

This measures the number of inputs to outputs. Currently, NRC is not productive in relation to the asset cost and the return on investment. Concession will enhance the productive use of the capital assets by increasing the number of rail operators. Therefore, the initial capital outlay invested can be justified.

10.4 Infrastructural Investment

Kakumoto (1999), cited in Odeleye (2010, pp. 9-10) observed that "politicians often influence the direction of growth and development in all modes of transport- railways inclusive for political gains, because investment in transportation facilities offers socio-economic benefits" and an immediate and direct benefits of democratic governance to the populace. Additionally, Odeleye (2010, p. 10), stated that "state owned enterprises sometimes dictate the direction of investment as well as the day to day running of the railways, while the institution management has little or no say in determining the priority areas of investment." This single act tends to be counterproductive and has resulted in the several billions of dollars spent on the system, so far, without any appreciable benefit, neither to the corporation nor to the target market the rail transport meant to serve.

10.5 Profitability

Odeleye (2010, p. 10) observed that "the railway tariff, among other important issues, cannot be reviewed by the management of the Nigerian railways, without recourse to government Ministry of Transport." This, therefore, is another factor which affects its profitability and hence the inability of the corporation to sustain its operation and has been a major source contributing to the corporation being a perpetual loss-making venture (Gupta & Sathye, 2008).

10.6 Critical Evaluation of the Success or Failure of Privatization Policy

To assess the efficacy of the privatization policy therefore, the foregoing critically evaluates the success or failure of the policy. Omoleke (2011, p. 78) observed that most public goods cannot be efficiently provided by

the market mechanism and hence government becomes a substitute. This hence explains why SOEs are relevant as well as the reasons for their establishment. As such having noted this drawback, it was suggested that because the individuals and firms are motivated by self-interests (property right theory) for example, individuals maximize utility while the firms maximize profits (resource-based theory), the neoclassical price-auction model explains the research theoretical framework particularly the agency theory of profit maximization. Property right theory which emphasizes the private sector as an efficient property manager and the resource-based theory which emphasize on securing and sustaining an efficient state-of-the-art infrastructure to achieve a competitive advantage. All these therefore invariably assist in profit maximization motives of the private sector which equally demonstrates the benefits of privatization.

However, most of the failures of the privatization exercise in Nigeria were as a direct result of continuous government intervention, bending the rules for short-term political gains, lack of due process and inconsistency of policies among others. For example, in the most recent privatization of the power project in Nigeria. For example, Onuorah (2013, p. 5), observed that: "there were apprehensions in Abuja and the electricity industry to the point that the government had to interfere. This has impacted negatively on previous privatization initiatives orchestrating its avoidance of the exercise. Stakeholders were worried over government's alleged interference in the process. For example, the privatization of 15 successor companies of the Power Holding Company of Nigeria (PHCN) would have been concluded earlier than scheduled. The delay in concluding the process adversely affected the scorecard given by international development partners who funded some aspects of the reforms in the power sector. They had called it 'a world class model' because of its openness and adherence to all laid-down rules and agreements." These also explain the incidences of policy inconsistencies and summersaults discussed earlier, which affects most of the SOEs operations.

11. Critical Success Factors for Railway Privatization in Nigeria

A privatization program requires effective, practicable and achievable policies and targets for its successful implementation, which is an assertion also noted by Hemming and Mansoor (1988). For example, Glaister (2004, p. 48) noted that for a privatized rail transport to work "it manifestly can be in a stable and fairly predictable way, but only on the three crucial provisos mentioned by Hemming and Mansoor (1998) which includes: an effective legal system that is sufficiently competent, robust and respected; appropriate performance regime; uninterrupted by government or political interference."

11.1 Issues Regarding Informed Consent of Respondents

Overall, the starting point of a major policy thrust, such privatization of the NRC, is the achievement of the agreement and informed consent of the Nigerian people. Many stakeholders will be affected either positively or negatively and, hence, all parties involved, as well as their respective concerns, must be fully addressed before taking a firm stand on the policy decision and implementation. For example, Temperman (2011, p. 43) commented that "privatization may not only affect the enjoyment of the right to public participation itself but might also impact other substantive rights." For this reason, it is quite understandable that a necessarily radical solution might have far reaching consequences, which may be resisted, so there is the need to fully engage the public on the policy direction of any reform initiatives (Temperman, 2011).

The middle-class users of the rail transport need to be educated about the various privatization methods available as well as fully understand the implications of each choice will have on the public. In other words, a full enlightenment campaign needs to be launched to fully sensitize and inundate the public. Employers and senior managers need to fully understand the various methods available as well as their implication on the NRC. This will be in terms of various reorganization efforts such as staff retrenchment exercise, possibly downsizing or right sizing and outsourcing of inefficient operation as part of rationalization efforts to streamline to achieve efficiency, effectiveness, and productivity. In addition, NRC employees need to ascertain the employment security implication of the privatization method adopted as well as any contractual obligation therein (Temperman, 2011).

11.2 Regulation

The regulation and legal system must be sufficiently competent, robust, and respected to put in place the necessary contractual arrangements. For example, Bathelemy et al. (2004), in Hilary (2004, p. 3), noted that the absence of an effective regulation was also observed with the experience of the BR privatization discussed earlier, increasingly led to profit maximization behaviour of private led sector to keep investment below necessary levels.

On the topic of why some African countries' privatization policy and implementation may have failed, as noted

by Bathelemy (2004) who also suggested that there were failures, particularly in the case of public utilities, when privatization has not been preceded by the creation of a regulatory framework to ensure that contractors or bidders respect their undertakings made at the time of privatization and obliges them to maintain a competitive environment. Similarly, this has resulted in the rural area communities and the urban poor to be sidelined and further marginalized in terms of access to electric power and water supplies despite the utilities privatization.

In a study to strengthen the regulatory powers by the World Bank (2003, p. 15) it was recommended that "managers of the national public rail companies should not have a steering authority in preparing for the concession of operations and should rest preferably with an independent agency."

Furthermore, Bullock (2005, p. 14) suggested that, to increase the success of concessionaires as well as deliver the benefits of privatization to the public, it was suggested that an extremely strong regulator must be present, of which its absence led to the failure of the Rail track discussed above.

11.3 Monitoring

Galcier (2004, p. 48) suggested that "monitoring must be possible to specify an appropriate performance regime with its consequential repercussions for non-compliance that will help instigate the desired incentives that induces the required and acceptable behaviour of efficient service delivery. This is open to question: there are both analytical questions (such as, what are the right financial penalties to use?) and legal questions (such as, can they be successfully drafted into contracts that are enforceable in practice). Finally, once created, these arrangements must be left alone to mature, without the fatally damaging consequences of interventions by government or others that undermine the incentives carefully designed into the 'fragmented' structure."

11.4 Formidable Consumer Pressure Group

A formidable consumer pressure group is another factor considered necessary for the effective operation of the privatized rail system. The pressure group will act as a watch dog and advocate, including the monitoring of the service. Any lapses will be reported to the commission in charge and any necessary action taken (Onion, 2014).

11.5 Strong Political Commitment and Support

A strong political commitment will enhance a successful privatization program in the sense that there will be all necessary checks and balances as well as an established repercussion available to deal with defaulters. As stated by Berthelemy et al. (2004, p. 8), "good governance, at a time of privatization, the authorities can strengthen their initiatives in the struggle against poverty through transparent, participative and equitable public policy."

In a study report produced by the World Bank (2003, p. 15), it was identified that as a factor to have "adversely affected the privatization process and has contributed to the failure of the Railway privatization. The proposed concession project is to have political support which the Gabonese and Senegal-Mali projects lacked for a number of years."

Bathelemy et al. (2004, p. 102), observed that "the privatization of the Société Nationale d'Electricité (Sonel) in Cameroon and of the Société Nationale d'Electricité du Sénégal (Sénélec) are relevant examples of privatizations that failed owing to inadequacies in political commitment and the regulatory framework" a stance espoused by Glacier (2004).

Onuorah (2013, p. 6), cited a similar experience with the privatization of the Daily Times of Nigeria PLC. It was noted that with "the privatization of Daily Times, a core investor was originally slated to be used but following stories that a former vice president Atiku Abubakar was poised to influence the sale to one of his associates, former President Olusegun Obasanjo opted for the nation's oldest government-owned newspaper to be privatized through an Initial Public Offer (IPO). However, it turned out that Daily Times offering was the least capitalized in the history of Nigeria's capital market. The Federal Government was forced to revert to the original choice of sale to a core investor and was sold to a private investor in 2004. However, operations were suspended after Folio Communications which formally took over the media giant on March 14, 2007, was accused of asset-stripping. The fate of the newspaper is still uncertain as it has not restarted production." This scenario is also witnessed with the sale of Ajaokuta steels in which the buyers were accused of asset stripping.

Onuorah (2013, p. 6) also noted that there was a similar situation with the privatization exercise of the Aluminum Smelter Company of Nigeria (ALSCON), "The American firm, BFIG, won the bid after the Russian firm, RUSAL, was disqualified for conditional bid. At the airport on their way back to Russia, RUSAL officials were called back and told they could get the bid under the willing buyer, willing seller option. In addition, they were given concessionary terms for gas, which made ALSCON unattractive and unprofitable for the Nigerian Gas Company (NGC) to supply gas."

12. Conclusion

In summary, Bourguignon et al. (2004, pp. 15-16), in their forward statement, opined that "there is a clear discrepancy between scholarly assessments and the public perceptions of privatization. In recent years, the alleged failures of privatization have led to street riots, skeptical press coverage, and mounting criticism of international financial institutions. Concerns are increasingly being expressed about the potential negative consequences of privatization and market liberalization on the living cost and the living standard especially their effects on basic services for poor households and other disadvantaged groups."

Bourguignon et al. (2004, p. 16) stated further that there is "extensive information that is required to analyze the links between specific policy reforms and infrastructure outcomes, including their distributional dimensions. As such, because comprehensive data on distributional dimensions of costs and benefits are currently unavailable, it is imperative that a systematic cross-country data collection effort be undertaken" to ascertain the true impact of the reform on the living standards.

Furthermore, Nellis (1994, p. 1), in an empirical study, posed a question: "is privatization necessary?" It was reported that "the answer was a decided 'yes'. Privatization is necessary, and not simply to improve the performance of state-owned enterprises—though the evidence is striking that it can and does improve performance. Privatization as a change agent was designed as an essential contribution to 'lock in the gains' achieved earlier in reforming public ownership or in preparing a firm for sale, to distance the firm from the political process, and to inoculate it against the recurrence of the common and deadly ailment of state-owned enterprises: interference by owners who have more than profit on their minds."

Odeleye (2010, p. 1) observed that the "discontinuity and incoherence in policy implementation by successive governments, policy reversal as well as uncoordinated national transport policy goal and objectives are clogs in the wheel of progress of railways development in Nigeria," a stance which was corroborated by Adeyemo (2008). Furthermore, Odeleye (2010, p. 2) stated that ownership change will enhance, "the rapid development of the rail industry in Nigeria on institutional paradigm shift, whereby the rail authority will enjoy a reasonable level of autonomy in decision making, policy consistency finance and investment in rail operations, infrastructure supply and technological advancement in Nigeria."

Therefore, it is from a private participation perspective that this can take place and will ensure consistency of policies, which is the major, problems confronting the NRC presently. Tynan 1999, cited in Mescht (2005, p.997) confirms this position while noting that: "concessions is more common than any other form of private participation in most countries that aimed at improving the financial performance of the loss-making rail service, as well as restoring deteriorating rail infrastructure" from new cash injections from investments by the private sector.

Thompson et al. (2001), cited in Mescht (2005, p. 999), in an empirical study, revealed an upsurge in "traffic that was orchestrated by an increase in patronage after years of decline in most of the previously state-owned railways. Similarly, labour productivity has improved significantly while tariffs have been reduced to the benefit of rail users." Typically, this is part of the benefits of privatization as an incentive for putting all productive inputs to maximum use. In addition, infrastructure will be efficiently deployed therefore enhancing competitive advantage (resource-based view theory), while the privatized firm will pursue wealth creation vigorously and profit maximization in line with the agency theory philosophy (Rowley & Yarrow, 1981 cited in Carter, 2013; Kay & Thompson 1986).

In closing, regarding informed consent about privatization policy, Temperman (2011, p. 68) concluded that although "privatization affects the enjoyment of the right to public participation itself, it also impacts on other rights as well. However, the key to remedying this situation lies largely – though not exclusively or necessarily, as illustrated in the case of the privatization of education in a critical, renewed discourse concerning participatory rights." In other words, engaging the public in an open communication, enlightenment campaign as well as allowing the freedom of expression will have a far-reaching effect in dousing tension that policies of this nature usually generate. Particularly, where skeptics doubt the success of the policy, for instance Durant and Legge (2002, p. 318), in an empirical study, noted that "practitioners and researchers should expect citizen's attitudes toward market-based New Public Management reforms like privatization of SOEs to be affected by perceptions of what is or is not working in other nations." This is a normal experience and another form of human resistance to change, however, if the policy is adopted in an atmosphere of open communication, transparency and public participation by policy makers as suggested by Temperman (2011), who also suggested that if all parties including internal, external, and connected, affected by the policy are fully involved, they will all accept change and support change initiatives fully.

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Stock Market Volatility and Persistence: Evidence from High-Income and Middle-Income Economies

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Abstract

This study examines the volatility of stock market indices in high-income and middle-income economies. Relying on daily closing prices from January 4, 2005 to May 4, 2021 and using the Generalized Autoregressive Conditional Heteroscedastic (GARCH) model with one ARCH term and one GARCH term, the study finds evidence of long memory and mean reversion, suggesting that volatility persists but that it returns to its mean. In addition, the study finds that the latest news and prior information about volatility influence the volatility of indices, but prior information exerts greater influence. By providing a deeper understanding of stock market volatility in high-income and middle-income economies, this study contributes to the literature and provides investors, policymakers, and regulators additional insight.

Keywords: stock markets, volatility, mean reversion, GARCH

1. Introduction

The stock market has long been identified as susceptible to volatility, which is a situation involving deviations in stock prices (Mallikarjuna & Rao, 2019; Mamtha & Srinivasan, 2016). High volatility is characterized by stock prices increasing and then decreasing unexpectedly. On the other hand, low volatility is characterized by a gradual change in stock prices (Mamtha & Srinivasan, 2016). Volatility has impacts that extend beyond the stock market. For instance, elevated risk and uncertain returns in volatile markets could diminish investors' confidence, rattle the financial system, and hinder overall economic performance (Bhowmik & Wang, 2020; Mala & Reddy, 2007). As such, an understanding of factors that influence stock market volatility is pertinent. By providing an enhanced understanding of stock market volatility, investors, and policymakers are empowered with additional knowledge for better decisions.

Although stock market volatility can vary by country, the possibility of contagion and spread from one country or group of countries to another (Uludag & Khurshid, 2019; Natarajan, Singh, & Priya, 2014) makes delineating the factors that impact volatility in high-income economies (HIEs) and middle-income economies (MIEs) important for new insights to be generated. In addition, by shedding light on stock market volatility and the level of persistence in HIEs and MIEs, the study enhances policy makers' ability to predict the volatility of stock markets and/or be proactive in mitigating the risks associated with it. The findings show that indices in MIEs offer better average returns than indices in HIEs, but the risk to investors is higher in MIEs. In addition, the study finds that the latest news and prior information influence volatility, however, prior information exerts more influence. Furthermore, the study shows evidence of long memory and volatility persistence. The mean reversion finding in the study indicates that volatility reverts to its long-term averages, but the time it takes for volatility to dissipate varies by index. The remainder of the article is organized as follows. Section 2 provides a brief overview of the existing literature on stock market volatility. The empirical study methodology and data are described in section 3, with results presented in section 4. Section 5 concludes the article.

2. Review of Literature

Stock market volatility is associated with uncertainty relating to stock prices. In a volatile stock market, prices rise and fall rapidly (Haider, Hashmi, & Ahmed, 2017; Ahmad & Ramzan, 2016). Studies (e.g., Bhownik & Wang, 2020; Arestis, Demetriades, & Luintel, 2001) reveal that stock market volatility has economic implications. Given that wide swings in prices affect investors' confidence (Joo & Mir, 2014), consumer confidence and spending (Mala & Reddy, 2007), and investment (Haider, Hashmi, & Ahmed, 2017), it suffices

to say that stock markets play an important role in the economy. A plethora of theoretical and empirical studies suggest that stock market volatility is driven by uncertainties. On the theoretical front, outlooks differ on the cause(s) of volatility. For example, Arestis, Demetriades, and Luintel (2001) and Kumari and Mahakud (2015) link volatility to uncertainty in macroeconomic conditions whereas Kumari and Mahakud (2016) and Rehman (2013), Orlitzky (2013) remark that it is driven by investors' psychology and sentiments. Other studies (e.g., Abdennadher & Hellara, 2018; Asaturov, Teplova, & Hartwell, 2015; Natarajan, Singh, & Priya, 2014) attribute volatility to contagion or spillover effects.

Empirically, there is a broad acknowledgment that stock markets can be volatile in developed and developing economies, but studies seem to differ on the level of volatility and persistence. Joseph, Vo, Mobarek, and Mollah (2020) suggest that volatility persists in developed economies than in less developed countries in central and eastern European markets. A similar outlook is expressed in Mallikarjuna and Rao (2019), which hints that stock markets in developed countries are more sensitive to information than their counterparts in developing countries. However, the inference in Uludag and Khurshid (2018) reveals a contrary view. The study's suggestion that investors should consider holding more stocks from markets in G7 countries than emerging markets creates the impression that stock markets in G7 countries are less volatile. This sentiment is buttressed by Khandaker and Farooque (2021) observation that stock markets in emerging economies exhibit higher volatility than those in developed economies. Additionally, notwithstanding the focus on countries in the same region and/or economic bloc, empirical studies parade an array of approaches and models with a substantial amount of conflicting findings. For example, Hepsag (2016) examination of Central and Eastern European stock markets reveals high variability of volatility and high volatility persistence in Poland and Lithuania, but the study shows that Czech and Hungary have lower variability of volatility. Sosa and Ortiz (2017) study of stock exchanges in Canada, the U.S., and Mexico find that the Canadian stock market exhibited a high level of volatility, however, the inference in Mallikarjuna and Rao (2019) shows that the US has a higher level of volatility than Canada. It is conspicuous that several studies (e.g., Mallikarjuna & Rao, 2019; Abdennadher & Hellara, 2018; Kumari & Mahakud, 2016; Engle, Ghysels, & Sohn, 2013; Mala & Reddy, 2007) rely on AutoRegressive Conditional Heteroskedasticity (ARCH) and Generalized AutoRegressive Conditional Heteroskedasticity (GARCH) models or a variation of it, some (e.g., Alqahtani, Wither, Dong, & Goodwin, 2020; Khalid & Khan, 2017) favour other models, which may have contributed to the observation of conflicting outcomes. In addition, differences in approach adopted, data type, and study period may have elicited inconsistencies in findings.

Furthermore, the broad categorization of countries in studies (e.g., Spulbar, Trivedi, & Birau, 2020; Mallikarjuna & Rao, 2019) limits relevance to high-income economies (HIEs) and middle-income economies (MIEs). To uncover details unique to HIEs and MIEs, this study focuses on stock market volatility and persistence in HIEs (i.e., Canada, Eurozone, France, Germany, Hong Kong, Japan, Korea, Taiwan, UK, and the U.S.) and MIEs (i.e., Argentina, Brazil, China, India, Indonesia, Mexico, and Pakistan). Additionally, the increased importance and contribution of MIEs to the global economy makes comparison with HIEs appealing. Also, studies indicate that negative shocks generate higher volatility than positive shocks of the same magnitude, (Kumari & Mahakud, 2016), but little is known about the length of time it takes for volatility to wane in HIEs and MIEs. By Examining the context of HIEs and MIEs, this study provides insight and contributes to a better understanding of stock market volatility.

3. Methodology and Data

To estimate stock market volatility, studies (e.g., Bhowmik & Wang, 2020; Kumari & Mahakud, 2016; Uyaebo, Atoi, & Usman, 2015) use ARCH, GARCH, or an extension of the GARCH model. Mallikarajuna & Rao (2019) noted that the ARCH model as proposed by Engle (1982) is appropriate when there is volatility clustering, which is a situation that occurs when large changes in volatility are accompanied by large changes and small changes in volatility are accompanied by small changes (Sosa & Ortiz, 2017). The ARCH model as expressed in Poon (2005, pp. 36-37) is:

$$r_t = \mu + \varepsilon_t \tag{1}$$

$$\text{Where } \varepsilon_t \sim N(0, \sqrt{h_t}) \quad \text{and } \varepsilon_t = z_t \sqrt{h_t}$$

Where r_t is the stock market index return at time t, μ is the average return, and ε_t is the residual. z_t as standardized residual returns is i.i.d (i.e., independent and identically distributed) random variable with a mean of zero (0) and variance of one (1)

The conditional variance (h_t) is a function of past squared residual returns (σ_t^2) and it is written as:

$$h_t = \omega + \sum_{j=1}^{q} \alpha_j \varepsilon_{t-j}^2 \tag{2}$$

For h_t to be considered strictly positive variance, the constant term (ω) has to be greater than zero (i.e., $\omega > 0$) and α_j, which is the coefficient of lagged squared residuals (i.e., the ARCH term) must be at least zero (i.e., $\alpha_j \geq 0$). Although the ARCH model can be estimated by using the maximum likelihood of $\{\varepsilon_t\}$ (Poon, 2005), it requires a large number of lags (i.e., high order q) to be effective (Hasan & Zaman, 2017; Alberg, Shalit, & Yosef, 2008). Studies (e.g., Onakoya, 2013; Alberg, Shalit, & Yosef, 2008) indicate that the GARCH model proposed by Bollerslev (1986) addresses the limitation of the ARCH model and that GARCH model with a small number of terms provides a better result than the ARCH model with several terms. The GARCH (p, q) model as expressed in Poon (2005, p. 38) is:

$$h_t = \omega + \sum_{i=1}^{p} \beta_i h_{t-i} + \sum_{j=1}^{q} \alpha_j \varepsilon_{t-j}^2 \quad (3)$$

Where ω is a constant term, α_j is the coefficient of the lagged squared residuals (i.e., the ARCH term) that highlights the short-run persistence of shocks and sensitivity to the latest news or information about prior volatility. β_i is the coefficient of the lagged conditional variance (i.e., the GARCH term) that signals the long-run persistence of shocks (Uludag & Khurshid, 2019; Tripathy, 2017; Joo & Mir, 2014). In addition, while a high value of α_j suggests high sensitivity to new information, a high value of β_i indicates that more time would be required for the volatility to wane (Chaudhary, Bakhshi, & Gupta, 2020). For the most common GARCH (1, 1) model that consists of one ARCH term and one GARCH term, ω must be greater than zero (i.e., $\omega > 0$) and α_1 and β_1 have to be at least zero (i.e., $\alpha_1 \geq 0$ and $\beta_1 \geq 0$) for h_t to be strictly positive (Sosa & Ortiz, 2017; Poon, 2005). In addition, for the GARCH (1, 1) process to be weakly stationary, the sum of α_1 and β_1 has to be less than one (i.e., $\alpha_1 + \beta_1 < 1$). Since the sum of the ARCH term and GARCH terms provides insight into volatility persistence over time, volatility persistence is acknowledged if the sum is close to one (Mallikarjuna & Rao, 2019).

A measure of volatility persistence is the half-life, which is the time it takes for volatility to move halfway back towards its unconditional mean (Ahmed, Vveinhardt, Streimikiene, & Channar, 2018; Engle & Patton, 2001). Similar to Ahmed, Vveinhardt, Streimikiene, & Channar (2018, p. 187), the half-life based on GARCH (1, 1) model in this study is determined by using the expression:

$$\text{HL} = \log[(\alpha + \beta)/2] \,/\, \log(\alpha + \beta) \quad (4)$$

Where HL is the half-life of volatility, and α and β are the ARCH and GARCH terms respectively. To understand the volatility of stock market indices in HIEs and MIEs, this study uses GARCH (1, 1) which is considered the simplest and robust form of the GARCH model (Engle 2001). The model, which consists of one ARCH term and one GARCH term involves estimating the mean and conditional variance as indicated below:

$$h_t = \omega + \alpha_1 \varepsilon_{t-1}^2 + \beta_1 h_{t-1} \quad (5)$$

The stock market volatility is estimated using daily closing price data of major indices in HIEs and MIEs from January 4, 2005 to May 4, 2021. The data is sourced from Yahoo Finance and Oxford-Man Institute of Quantitative Finance databases. The data is transformed into daily returns using the expression:

$$r_t = \ln(P_t/P_{t-1}) \quad (6)$$

Where r_t is the stock market index return at time *t*, ln is the natural logarithm, P_t is the closing stock market price index at the end of day t, and P_{t-1} is the closing price lag one period (i.e., preceding day's closing price). Studies that utilized daily data and approaches similar to this study include Chaudhary, Bakhshi, and Gupta (2020), Mallikarjuna and Rao (2019), and Uludag and Khurshid (2019). The indices relating to the HIEs category include TSX (Canada), Euronext 100 (Eurozone), CAC 40 (France), DAXI (Germany), HIS (Hong Kong), N225 (Japan), KOSPI (Korea), TSEC (Taiwan), FTSE 100 (UK), and NYSE (US). Indices in the MIEs group are MERVAL (Argentina), IBOVESPA (Brazil), Shenzhen (China), BSESN (India), JKSE (Indonesia), MXX (Mexico), and KSE (Pakistan).

4. Results and Discussion

4.1 Descriptive Statistics

Table 1A and Table 1B are displays of the descriptive statistics of the indices in HIEs and MIEs. The mean returns were positive in all markets but with some differences. The mean return in MIEs is higher than the average returns in HIEs. Among the HIEs group, Korea's KOSPI produced the highest returns while UK's FTSE generated the least returns (Table 1A). In the MIEs category, MERVAL, which is Argentina's main stock market index produced the highest returns whereas Mexico's MXX showed the lowest mean return (Table 1B). The standard deviation of indices in the MIEs category is relatively higher than the HIEs group. Indices in the two groups showed negatively skewed returns, which indicates that they are not normally distributed. In addition, the

negative skewness suggests a sharp decline in prices and a high degree of possibility that investors incurred losses (Abonongo, Oduro, Ackora-Prah, & Luguterah, 2016; Jondeau & Rockinger. 2003). Furthermore, Canada's TSX and Argentina's MERVAL are the most negatively skewed in their respective categories, signalling that they experienced more extreme losses than the rest of the indices. Kurtosis of the indices deviates from 3 (Table 1A and Table 1B), indicating a leptokurtic distribution with a high peak and fatter tail, which is typical of distributions with large deviations from the mean (Abonongo, Oduro, Ackora-Prah, & Luguterah, 2016). For the Jarque-Bera of the indices in Table 1A and Table 1B, the p-values indicate that the assumption of normality is rejected at 5 percent level of significance, providing more evidence that the stock market returns in HIEs and MIEs are not normally distributed. The stationarity test was carried out using the Augmented Dickey-Fuller (ADF) test with the null hypothesis (H_0) that the indices have a unit root. The results in Table 2, which reject the null hypothesis (H_0) that the indices have unit root at the significance level of 1 percent affirm that each of the stock market return series in HIEs and MIEs is stationary.

Table 1A. Descriptive statistics for High-Income Economies (HIEs)

	Mean	Standard Deviation	Skewness	Kurtosis	Jarque-Bera
Canada (TSX)	0.0001808	0.0113597	-1.063315	23.22158	70,646
Eurozone (Euronext 100)	0.0001453	0.0126347	-0.398079	12.50236	15,806
France (CAC 40)	0.0001154	0.0137854	-0.287079	11.59056	12,886
Germany (DAXI)	0.0002999	0.0135852	-0.252077	11.45767	12,347
Hong Kong (HIS)	0.0001766	0.0145525	-0.046669	12.06675	13,761
Japan (N225)	0.0002296	0.0147917	-0.487086	11.07035	10,997
Korea (KOSPI)	0.0003142	0.0125212	-0.516775	12.05615	13,954
Taiwan (TSEC)	0.0002554	0.0114074	-0.477475	7.553233	3,612
UK (FTSE)	0.000087	0.011455	-0.31347	11.96486	12,924
US (NYSE)	0.0002024	0.0128152	-0.691114	16.89629	33,397

Source: Authors' computations.

Table 1B. Descriptive statistics for Middle-Income Economies (MIEs)

	Mean	Standard Deviation	Skewness	Kurtosis	Jarque-Bera
Argentina (MERVAL)	0.0009023	0.0230284	-2.628342	52.53197	411,751
Brazil (BVSP)	0.0003858	0.0177524	-0.443205	11.99433	13,723
China (Shenzhen)	0.0003944	0.0184024	-0.525414	6.114298	1,784
India (BSESN)	0.0004898	0.0142259	-0.224367	14.14855	20,992
Indonesia (JKSE)	0.0004453	0.0131331	-0.591058	11.18006	11,297
Mexico (MXX)	0.0003252	0.0121897	-0.030082	9.224575	6,605
Pakistan (KSE)	0.000491	0.0130081	-0.59385	6.937077	2,808

Source: Authors' computations.

Table 2. Augmented Dickey-Fuller (ADF) test

High-Income Economies (HIEs)		Middle-Income Economies (MIEs)	
	ADF Statistics	ADF Statistics	
Canada (TSX)	-47.222***	Argentina (MERVAL)	-44.449***
Eurozone (Euronext 100)	-46.411***	Brazil (IBOVESPA)	-46.100***
France (CAC 40)	-47.018***	China (Shenzhen)	-44.565***
Germany (DAXI)	-45.830***	India (BSESN)	-44.733***
Hong Kong (HSI)	-44.781***	Indonesia (JKSE)	-42.860***
Japan (N225)	-45.059***	Mexico (MXX)	-45.400***
Korea (KOSPI)	-43.641***	Pakistan (KSE)	-40.339***
Taiwan (TSEC)	-42.538***		
UK (FTSE)	-47.505***		
US (NYSE)	-47.805***		

Source: Author's computations.

Note. p-Values are in parentheses. *** indicates statistical significance at the 1 percent level (i.e., $p \leq 0.01$).

4.2 GARCH Model

The Autoregressive Conditional Heteroscedasticity (ARCH) effect test conducted reveals the existence of the ARCH effect in the residuals of the data, suggesting that the estimation process involving the GARCH model is appropriate (Kumari & Mahakud, 2016). The outputs of the GARCH (1, 1) model for HIEs and MIEs are presented in Table 3A and Table 3B. The estimates show ARCH term (α) for indices in HIEs and MIEs are statistically significant, suggesting that news about volatility in the previous period influences the volatility of indices in the two categories of countries. Among HIEs, NYSE in the US has the highest ARCH term (α) coefficient (Table 3A), signifying that it is greatly influenced by information about volatility in the previous period than the rest of the indices in HIEs. Hang Seng Index (HSI) in Hong Kong is the least affected by information about volatility in the previous. In the MIEs category, Argentina's MERVAL has the highest ARCH term (α) coefficient (Table 3B), indicating that it is greatly affected by news about volatility in the prior period than the other indices in the group. The low ARCH term (α) coefficient displayed by China's Shenzhen Index (Table 3B) shows that it is the least affected by information about the prior period's volatility. Also, the GARCH term (β) is significant (Table 3A and Table 3B), which shows that prior volatility influences current volatility (Joo & Mir, 2014). Among indices in HIEs, Hong Kong's HSI has the highest GARCH term (β) coefficient, suggesting that its volatility is greatly influenced by volatility that occurred in the previous periods. Japan's N225 is an index in HIEs in which volatility from the preceding period has the least influence on the current volatility. In the case of MIEs, because China's Shenzhen displays the highest GARCH term (β) coefficient and Argentina's MERVAL the lowest, the volatility of China's Shenzhen can be said to be greatly influenced by prior periods' volatility, which is consistent with Tripathy (2017). Similar to Mallikarjuna & Rao (2019), the ARCH (α) and GARCH (β) terms are greater than zero (0) but less than one (1), signifying the presence of volatility clustering in each stock market. This implies that any observed volatility shocks will be expected to influence volatility in future periods (Engle & Patton, 2001). Consistent with remarks in Poon (2005), the finding that volatility clusters suggest that turbulence in the stock market in HIEs and MIEs will be accompanied by a turbulent period while a period of calm will be accompanied by a calm period. Results in Table 3A and Table 3B show that the sum of ARCH (α) and GARCH (β) terms is less than one for the indices in HIEs and MIEs. This signals evidence of mean reversal, which is consistent with Ahmed, Vveinhardt, Streimikiene, and Channar (2018) and Engle and Patton (2001). However, the sum of ARCH (α) and GARCH (β) terms for China and India in the MIEs category and Canada in the HIEs group is closer to one than the rest of the indices, implying a high degree of volatility persistence in China, India, and Canada. Furthermore, the magnitude of the GARCH term (β) is greater than the magnitude of the ARCH term (α) (Table 3A and Table 3B). This indicates that indices in HIEs and MIEs are more responsive to past volatility than information about volatility in the previous period, creating the expectation that volatility would require more time to dissipate (Chaudhary, Bakhshi, & Gupta, 2020). Given that indices with a high level of persistence tend to exhibit high half-life and weak mean reversion and that those with low persistence show low half-life and strong mean reversion (Abonogo, Oduro, Ackora-Prah, & Luguterah, 2016), the half-life was evaluated to determine the degree of volatility persistence. The results in Table 3A and Table 3B signify the persistence of volatility. Among the HIEs category, the volatility of Canada's TSX takes the longest (79 days) to return halfway back to its long-term average. On the other hand, Japan's N225 has the fastest mean reversion. Its half-life of 32 days indicates that unlike other indices in the HIEs category, its volatility will take 32 days to return halfway back to its mean. In the MIEs group, China's Shenzhen index and India's BSESN have the slowest mean reversion with half-lives of 87 days and 82 days respectively, suggesting that volatility is more persistent in China and India than in the other indices in MIEs and HIEs. Argentina's MERVAL and Brazil's BOVESPA have the fastest mean reversion. The half-life of 20 days for Argentina's MERVAL and 23 days for Brazil's BOVESPA (Table 3B) show low volatility persistence and faster dissipation of volatility than the other indices.

Table 3A. GARCH (1, 1) Output for High Income Economies (HIEs)

	α	β	α + β	Half-life (Days)
Canada (TSX)	0.1226763	0.8684571	0.9911334	79
	(0.000)	(0.000)		
Eurozone	0.1267751	0.8570303	0.9838054	43
(Euronext 100)	(0.000)	(0.000)		
France (CAC 40)	0.1214581	0.8634227	0.9848808	46
	(0.000)	(0.000)		
Germany (DAXI)	0.0981111	0.8848533	0.9829644	41
	(0.000)	(0.000)		
Hong Kong (HSI)	0.0654458	0.924049	0.9894948	67
	(0.000)	(0.000)		
Japan (N225)	0.1268247	0.8509159	0.9777406	32
	(0.000)	(0.000)		
Korea (KOSPI)	0.0861785	0.9003654	0.9865439	52
	(0.000)	(0.000)		
Taiwan (TSEC)	0.0805469	0.9031794	0.9837263	43
	(0.000)	(0.000)		
UK (FTSE)	0.1202217	0.8636764	0.9838981	44
	(0.000)	(0.000)		
US (NYSE)	0.1330854	0.8519221	0.9850075	47
	(0.000)	(0.000)		

Source: Authors' computations.

Note. α represents the ARCH term coefficient; β represents the GARCH term coefficient. p-values are in parentheses.

Table 3B. GARCH (1,1) Output for Medium Income Economies (MIEs)

	α	β	α + β	Half-life (Days)
Argentina (MERVAL)	0.2152769	0.7479822	0.9632591	20
	(0.000)	(0.000)		
Brazil (BOVESPA)	0.082062	0.8862929	0.9683549	23
	(0.000)	(0.000)		
China (Shenzhen)	0.0590705	0.932919	0.9919834	87
	(0.000)	(0.000)		
India (BSESN)	0.0936486	0.8978195	0.99146681	82
	(0.000)	(0.000)		
Indonesia (JKSE)	0.1340747	0.8478837	0.9819584	39
	(0.000)	(0.000)		
Mexico (MXX)	0.0983023	0.8879811	0.9862834	51
	(0.000)	(0.000)		
Pakistan (KSE)	0.0930019	0.891655	0.9846569	46
	(0.000)	(0.000)		

Source: Authors' computations.

Note. α represents the ARCH term coefficient; β represents the GARCH term coefficient. p-values are in parentheses.

5. Conclusion

This study examines the volatility of stock market indices in HIEs and MIEs. It used daily closing data from January 4, 2005 to May 4, 2021 on ten (10) indices in HIEs and seven (7) indices in MIEs and applied the GARCH (1, 1) model. The kurtosis is greater than three (3) for each of the indices, indicating a leptokurtic distribution. This suggests that stock market returns are highly volatile in HIEs and MIEs. Nonetheless, the study finds that mean returns in MIEs are higher than the average returns in HIEs, but the finding that MIEs as a group have higher standard deviation reveals that the high returns in MIEs are accompanied by high risk. Results of the GARCH (1, 1) model showing that the ARCH term (α) and GARCH term (β) are significant indicate that information about volatility in the previous period and past occurrence of volatility influence the volatility of stock markets. Furthermore, the finding that the magnitude of the GARCH term (β) is greater than the magnitude

of the ARCH term (α) shows that indices in HIEs and MIEs are mostly influenced by prior volatility, suggesting evidence of volatility persistence in the two categories of countries. The mean reversion findings show that volatility dissipates and that indices in HIEs and MIEs return to their mean but the time it takes for volatility to dissipate varies by index. Given that investors gravitate toward markets with high volatility persistence and weak mean reversal when positive shocks cause volatility but seek markets with low volatility persistence and strong mean reversal when negative shocks generate volatility (Abonogo, Oduro, Ackora-Prah & Luguterah, 2016), the mean reversal results suggest that in periods when negative shocks trigger volatility, indices in HIEs and MIEs with a strong mean reversal and low persistence (i.e., short half-life) would witness less turbulence due to investors' expectation of quick dissipation of volatility. However, in periods of positive shocks eliciting volatility, such indices would lose activities to indices with a weak mean reversal and high volatility persistence (i.e., high half-life) due to investors' expectations that the resultant volatility from the positive shocks will persist. The finding that the time it takes for volatility to dissipate varies by index signifies that if markets received similar information, reactions would differ. Given this, future studies should examine macroeconomic factors and market-specific events that impact the volatility of stock markets. This study is limited to HIEs and MIEs, for a more generalizable result, future research should consider expanding the sample size and include fast and slow-growing economies.

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