

Improving Canada's Productivity Performance: The Potential Contribution of Firm-level Productivity Research

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ABSTRACT

Canada's recent productivity growth has been low by historical and international standards. Canadian and international studies have suggested this may be partly due to firm-level determinants. A chance to study this hypothesis has arisen from the improved availability of firm-level data through the Canadian Centre for Data Development and Economic Research. We argue that this creates an important opportunity for researchers and describe one attempt to capitalize on it by developing a research network.

DRUMMOND (2011) HAS POINTED OUT that output per hour worked in the business sector in Canada has only grown at 0.7 per cent per year since 2000, compared to about double that from 1973 to 2000 and more than five times that from 1947 to 1973. Labour productivity growth in the United States since 2000 has been more than triple that of Canada's, and the level of output per hour in the business sector and in manufacturing is only about 70 per cent of that in the United States.

Drummond (2011) goes on to consider a productivity policy target list he put forward five years earlier (Drummond, 2006), which included low, stable inflation, lower public debt-to-GDP ratios, free trade externally and internally, promotion of competition, removal of foreign ownership restrictions, the elimination of barriers to firm growth including high rates of taxation for large businesses, removal of work disincentives including those in Employment Insurance, reduction in regulatory burden,

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lower taxation of capital, lower marginal personal income tax rates, a shift from taxing income and capital toward consumption, improvement in the selection and integration of immigrants, increased investment in public infrastructure, and attention to literacy, apprenticeships and training. He then argued, subjectively, that Canada had implemented about 70 per cent of this agenda but, as noted, productivity growth has declined not increased—especially relative to the United States. Even though he writes, “This does not mean the agenda should not be completed,” he asks the question, “if implementing 70 per cent of the original agenda did not bring on stronger productivity growth, can one be confident doing the remaining 30 per cent will do the trick?”

This question heightens the importance of research at the level of the firm to try to resolve this productivity puzzle and identify policies and actions to improve productivity growth.² Drummond (2011) raises some questions, perhaps most notably regarding the relatively small average firm size in Canada as compared to the United States, an average that did not increase significantly after the implementation of the North American Free Trade Agreement. Other questions have arisen regarding the management of Canadian firms, as will be discussed further in the next section.

While these are factors that increase the potential returns from Canadian firm-level research, we argue that the time is even more opportune because of a factor affecting the supply of such research. Statistics Canada’s Centre for Data Development and Economic Research (CDER) has improved the accessibility of firm-level data for research purposes while maintain-

ing security and confidentiality. In particular, the availability and potential “linkability” of data sets including firm-level tax data and new firm-level national accounts micro-data could permit analyses involving the relationships between a wide variety of financial variables and variables gathered in other surveys. This would provide insight into the dynamics of firm creation and destruction, the growth decision by firms (perhaps, e.g. affected by special tax and regulatory provisions for small firms in Canada or access to different forms of capital), managerial decisions on innovation and business strategies and much else. Such research requires resources. We discuss our attempt to develop a research network as one means to enhance research efforts in this area.

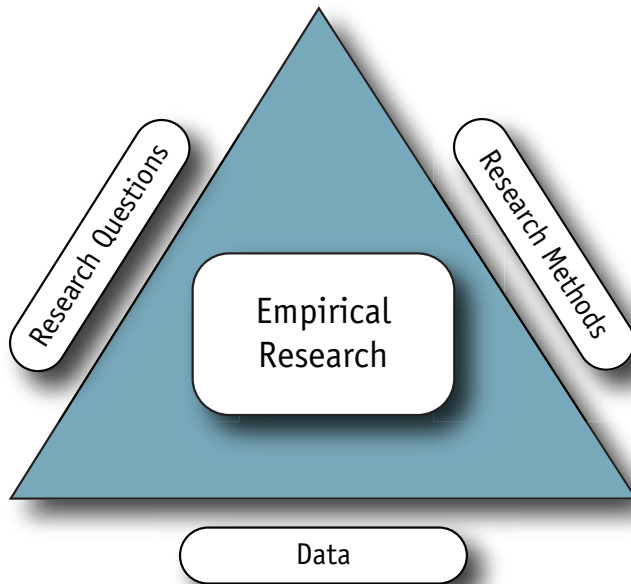
In the first main section, we describe briefly our argument for more firm-level research into the Canadian productivity puzzle. The second section provides some information regarding the research network we are helping to develop. The third section provides brief concluding remarks.

Firm-level Data and the Canadian Productivity Puzzle

Boothe and Roy (2008) survey some of the many previous contributions to the analysis of Canadian productivity and innovation and emphasize the importance of further research aimed at potential firm-level factors (firm size and scale, managerial skills and experience) as well as a number of industry factors that may interact with firm-level factors (competitive pressure/rivalry, foreign ownership/direct investment). As discussed, Drummond (2006, 2011) concurs, given the persistence of low pro-

2 It is perhaps a commonplace to the readers of this publication, but consider the following calculation as a reminder of the potential power of productivity policies. Suppose Canada has productivity growth of 1 per cent per year and we abstract from population growth or changes in labour participation. Given current Canadian flow GDP of \$1.75 trillion and a real social discount rate of 3 per cent per year, the present value of permanently increasing productivity growth to 1.1 per cent per year has a present value of about \$5 trillion, or almost three times annual GDP.

Figure 1
Framework for Empirical Research



ductivity growth in the face of a significant productivity shift in public policy. Currie, Scott and Dunn (2012) suggest excessive risk aversion by firms and an insufficiently competitive environment are important factors behind low productivity growth in Canada. Currie and Scott (2013a,b) focus on low investment at the firm level and its implications for management, finding in a survey that 36 per cent of Canadian companies mistakenly believe that they are investing more than their peers when they are in fact not.

This misperception seems to be a management issue. If so, it is consistent with findings of Bloom and van Reenen (2007 and 2010) that international differences in productivity are related to differences in observable variables related to management skill, such as the education level of managers. Bloom (2011) finds that such differences could account for the difference between productivity levels in Canada and the United States, while Brouillette (2013) finds

that Canadian manufacturing enterprises facing stronger competition are those adopting best management practices, and in turn having better economic and innovative performance.

Besides firm size and managerial skills and experience, another important, related issue that has arisen is heterogeneity, or differences, in productivity levels across firms.³ Just as heterogeneity in productivity performance across countries may shed light on economic policies, heterogeneity across firms may suggest reasons for the relatively poor measured productivity performance of some Canadian firms relative to those of much higher productivity. Other important firm-level productivity issues are the use of information technology (Rai and Sharpe, 2013) and learning-by-doing within the firm (Levitt, List, and Syverson, 2013). There has been considerable research regarding the linkages between trade and productivity at the firm level (Baldwin and Gu, 2003, 2009; Baggs, 2005; Lileeva, 2008; Lileeva and Trefler, 2010) and in particular whether it is firms with higher productivity levels that export or whether some aspect of the decision to export can be causal in improving productivity. Still other examples are: firms and intellectual property (Law, 2004); innovation and firm productivity (Therrien and Hanel, 2012); the relationship of firms to university research (Agrawal and Henderson, 2002; Agrawal and Goldfarb, 2008); firm size and productivity (Dixon and Rollin, 2012); firm finance, particularly at early stages (Huynh and Petrunia, 2010; Huynh, Petrunia and Voia, 2011; Kelly and Kim, 2013) and more broadly financial sector productivity (Cummins, Dionne, Gagné and Nourira, 2009). In any case, these are all issues that can clearly be better studied and understood with detailed business micro-data.

Empirical research can be described as a triangle involving the research questions, the research methods and the data (Figure 1). We

³ See Syverson (2004); Fox and Smeets (2011); and Gandhi, Navarro and Rivers (2011) for examples.

have touched on the research questions; let us turn to methods and then to data. On methods, there has been an international explosion of research into productivity. The papers in this journal continue to speak to this, as do surveys such as Syverson (2011). Akerberg, Benkart, Berry and Pakes (2007) provide a reasonably recent survey of econometric tools.

Finally, we turn to the third part of the research triangle, data. As discussed in the introduction, an important stimulus to this endeavour has been the development of CDER at Statistics Canada,⁴ which has improved the potential access for research to business micro-data. The available data sets are very rich although not always ongoing. They are well described on the CDER website.

Surveys include the Annual Survey of Manufacturing (linked with the Export and Import Registry Database); the Survey of Innovation and Business Strategies (responses from firms on their innovation and competitive positioning); the Survey of Financing of Small and Medium Enterprises; and the Workplace Employee Survey (which linked workplace and employee surveys and has since been discontinued).

Administrative data include the export and import registry; customs data; company-level capital and investment data compiled from corporation income tax filings; and the Longitudinal Employment Analysis Program.⁵ There is also the constructed National Accounts Longitudinal Micro-data file designed to track and analyze GDP and employment at the firm level and across firm-size categories.

In addition to the key issues of data confidentiality and security, there is an issue of cost as the data use is not free of charge. But there are two economies of scale. First, researchers in effect pay

a “fixed cost” in learning to use the data efficiently. Once that is paid, subsequent applications are easier. They are also likely to collaborate with other researchers, so that the fixed costs fall over time. Second, there are also tangible fixed costs in such matters as data linkage. Once two data sets are linked, subsequent researchers may not have to bear those costs again. We also note that while survey data are an important part of CDER, administrative data are equally important and could contribute significantly to future empirical advances (Card, Chetty, Feldstein and Saez, 2011).

Let us turn to some further considerations regarding firm-level productivity research. One is how this type of research may be influenced by the debate about measurement of total factor productivity in Canada, as seen in the symposium on the measurement of multifactor productivity in Canada in the Fall 2012 issue of the *International Productivity Monitor*—specifically Diewert and Yu (2012); Gu (2012); Diewert (2012); Schreyer (2012); and Harper, Nakamura and Zhang (2012). Diewert and Yu (2012) argue that Canadian multifactor productivity has grown much faster over the past fifty years than Statistics Canada estimates indicate. In terms of firm-level empirical research, this debate heightens the importance of increased use of business micro-data (Baldwin and Gu, 2013). But we note that it does not change our view of the immediate problem as both the Diewert and Yu (2012) and Statistics Canada estimates find that multifactor productivity growth since the year 2000 has been essentially zero. Even over the longer term, the differences between the Diewert and Yu (2012) and the Statistics Canada estimates largely involve different contributions from multifactor productivity growth and the contribution of capital growth to labour produc-

4 www.statcan.gc.ca/cder-cdre/

5 The Longitudinal Employment Analysis Program has longitudinal payroll enterprise data linked through the T2-LEAP file to sales, gross profits, firm equity and assets. It is also linked with the Export and Import Registry Database.

tivity growth, which advances at roughly the same rate in both the Statistics Canada and Diewert-Yu time series. Their estimates also largely agree that labour productivity per hour has been growing more slowly in Canada than it has in the United States.

A second consideration is that there may be alternative firm-level explanations of the productivity growth slowdown relative to the United States. For example, one possibility is that the significant reduction in aggregate demand in the 2000s was met in the United States with a reduction in employment rates in a way that reduced the number of low-productivity workers in the economy.⁶ In Canada, there was not as large a reduction in employment rates albeit with lower productivity growth. Firm-level data could also be used to test this explanation. And while the comparison with the United States can be instructive, it does not solely drive the interest in higher Canadian productivity growth, which is intrinsically desirable.

A third consideration is that there has already been significant research with firm-level data. As noted, some of this is surveyed in Boothe and Roy (2008) and there have been a number of recent papers, some of which we have cited above. An important set of such research comes from Industry Canada and Statistics Canada, in particular the group that John Baldwin directs at Statistics Canada. Very recent papers that focus on the firm level include Baldwin, Leung and Rispoli (2013), Brown and Rigby (2013), Ciobanu and Wang (2012) and Tang (forthcoming). However, some of the data opportunities are quite new, particularly those opened up by firm administrative (tax) data and in the new longitudinal National Accounts firm-level

microdata. It is our belief that the new data accessibility has the potential to transform empirical firm-level research outside the Government of Canada and that the interaction will increase the impact of existing government agency research programs.

To conclude this section, let us describe our overall objectives. Ongoing Deloitte research (see Currie, Scott and Dunn, 2012; Currie and Scott, 2013a and 2013b) discusses government policy but also pays significant attention to what firms as well as other participants, such as universities, should do to improve productivity, independent of government policy. Hence while our intermediate target is to build a strong and sustainable program of research and knowledge transfer, the larger goal is not just to understand the issues and to inform public policy, but also to provide information relevant to the decisions of private firms (and nonprofits) as to which potentially productivity-improving practices are backed by Canadian empirical evidence. An individual firm, particularly a small or medium-sized firm, is likely to under-invest in such information because it cannot capture all the benefits (because of taxation, gains to its workers and imitative gains by its rivals). This is the classic public good argument often used to support public provision, of which a famous example is government agricultural departments distributing to farmers free information on innovation. It further seems plausible to us that better information on best practice may also illustrate to each firm the advantages of acquiring further private information specific to it. None of this precludes the possibility that there may be other kinds of government policies that may affect firm behaviour, for example pro-competitive

6 Another explanation is that the weak productivity growth in Canada is driven by particular industries, such as oil and gas, and that in turn productivity growth estimates for these industries may be biased by significant and difficult measurement issues. Our view is that this is an argument for more disaggregation rather than less. For example firm-level data allow better study of the mix of exploration, development and extraction in different firms and how that may affect measured productivity. We do not dismiss the significant measurement issues at the firm level but believe that these problems can be resolved and that industry aggregation presents its own analytical problems.

policies that could possibly push firms towards more aggressive innovation.⁷

The Network

In late spring 2012, we and a group of like-minded researchers were awarded a Social Sciences and Humanities Research Council of Canada (SSHRC) Partnership Development Grant (PDG) to build a Network to Study Productivity in Canada from a Firm-Level Perspective.⁸ Network institutional partners are Industry Canada, McMaster University and the TD Bank. As should be clear, the Network has an ongoing collaboration with Statistics Canada and has been inspired by the research program of Deloitte (e.g. Currie, Scott and Dunn, 2012; Currie and Scott, 2013a and 2013b).⁹

Researchers are encouraged to contact the Network to explore collaboration and future initiatives. One purpose of the Network is to help develop the kinds of data-access partnerships with CDER as described on its website: “strategic partnerships that are entered into with highly trained economists to undertake important policy-relevant economic research on topics such as *productivity*, international trade, investment patterns and firm dynamics, while assuring the confidentiality and security of data” (emphasis added). Accordingly the SSHRC grant includes funds to assist researchers at Canadian universities (and in rare cases those from non-Canadian universities) with expenses to travel to Ottawa to access the data at CDER and perhaps with some costs incurred in accessing the data itself. The SSHRC funding also

includes funds that can be used to help support students (most probably but not exclusively doctoral students) at Canadian universities who are working in this area. The Network is also open to approaches that study firms (and public sector organizations) whose data sources are not housed by CDER.

The Network also seeks researchers from the private sector, think tanks, government and academia to participate in our future workshops and conferences. So far it has had a workshop in Ottawa November 1-2, 2012 and sponsored four sessions and two meetings at the Canadian Economics Association annual meeting in Montreal, May 30-June 2, 2013. It held a workshop at the Rotman School at the University of Toronto on October 25, 2013. It again plans to sponsor sessions at the Canadian Economics Association annual meeting in Vancouver (May 29-June 1, 2014). It is a co-host along with Industry Canada and principal host Carleton University of the American Productivity Workshop VIII (<http://northamericanproductivityworkshopviii.yolasite.com/>) where it is sponsoring sessions featuring Dale Jorgenson of Harvard University and John Haltiwanger of the University of Maryland. There are also some individual network projects with the first few working papers now posted on the Network website.

Finally, it is important to emphasize that the SSHRC support is a Partnership *Development* Grant. Through the above activities, and with the collaboration of more researchers, the goal is for this effort to blossom into a broader Network with significant and sustained funding,

7 We note a finding from the Council of Canadian Academies (2013) that “Canadian firms have been as innovative as they have needed to be”.

8 The grant is for approximately \$200,000 over two years. The steering committee is Don Drummond (co-investigator), Annette Ryan (co-investigator) and Michael Veall (principal investigator). Other co-investigators are Ajay Agrawal, Avi Goldfarb, Ignatius Horstmann and Daniel Treffer of the University of Toronto; Audra Bowlus, Lance Lochner and Salvador Navarro of Western University; James Brander of the University of British Columbia; Svetlana Demidova of McMaster University; Robert Gagné of HEC Montreal; Stephen Law of Mount Allison University; Alla Lileeva of York University; Robert Petrunia of Lakehead University; and Marcel Voia of Carleton University.

9 The Network’s website is www.economics.mcmaster.ca/productivity.

that will tap still under-utilized micro-data sources and shed light on the reasons for Canada's weak productivity growth.

Conclusion

The ultimate objective of productivity research is for Canada to benefit from the improved economic growth that can spring from a better understanding of business-level drivers of productivity. We argue that empirical research centred on firm-level data should be a focus, in part because Canadian and international studies point to its potential importance and partly because newly developed and accessible firm data make it feasible. We describe one attempt to capitalize on this opportunity through the development of a research network.

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