Productivity in Canada: Does Firm Size Matter?

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- *A smaller average size is one of the most distinctive structural features of Canadian firms relative to those in the United States, which in the past has systematically registered a higher productivity level than Canada.*
- *Both theory and empirical evidence suggest that a larger average size supports higher productivity at the plant and firm levels, especially in manufacturing.*
- *Canada-U.S. differences in the distribution of employment over categories of firm size accounted for nearly 20 per cent of the Canada-U.S. gap in sales per employee at the aggregate level, and roughly 50 per cent of the corresponding gap in manufacturing productivity in the late 1990s.*
- *Theory suggests that financial constraints, institutions, market size, tax codes, labour market legislation, and product-market rigidities likely play a role in jointly determining both the average firm size and aggregate productivity, but the importance of each determinant remains an open question.*

The structural features of an economy influence its level of productivity, and their evolution over time affects productivity growth, an important source of potential output growth and improvement in living standards. This article examines the findings of recent research on the effect that one such feature, the average size of firms, may have had on Canada's productivity performance. This issue is particularly relevant because a smaller average firm size is one of the most distinctive structural features of Canadian firms relative to those in the United States, which in the past has systematically registered a higher productivity level than Canada.[1] The article is organized as follows. We begin by reviewing the factors that lead to a relationship between firm size and productivity and then look at Canadian evidence of this relationship at the firm level. We subsequently quantify the extent to which the change in Canadian productivity can be accounted for by the change in the importance of large firms, and how much of the Canada-U.S. gap in labour productivity can be explained by the differences in the two countries' distribution of employment over firms of various sizes. We conclude by discussing the determinants of firm-size distribution.

Why Are Large Firms More Productive than Small Ones?

A common empirical observation in advanced economies is that large firms and plants have, on average, higher labour productivity than do small ones (Organisation for Economic Co-operation and Development

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1. There have been periods where labour-productivity growth in Canada has been stronger than in the United States (e.g., 1980–84, 1993–95).

2008). In this section, we discuss reasons for the relationship between size and productivity.

Labour productivity (i.e., output per unit of labour input) depends in part on productive efficiency. Efficiency in this context refers to the supplementary output that a firm can produce by using more advanced technology, better organization, and other factors to improve its inputs, or by exploiting increasing returns to scale in the presence of certain factors, such as fixed set-up costs.[2] Labour productivity also depends on the degree to which other inputs are employed. Where output is measured by the value added (i.e., sales minus the cost of intermediate inputs), giving each unit of labour more capital to work with would raise labour productivity. When output is measured by sales, then both higher capital intensity and intermediate input intensity would raise labour productivity. The effect of size on labour productivity can thus be traced to the relationship between size and efficiency, capital intensity, and intermediate input intensity.

Firm size and efficiency

One of the first studies to connect firm size and efficiency was Williamson (1967), which used a model to demonstrate that one factor limiting the optimal size of firms is loss of managerial efficiency in large hierarchical firms. Dhawan (2001) suggests that partly because of their greater organizational flexibility and because managers of small firms are more likely to take risks, small firms are more open and able to innovate. The bulk of the empirical evidence seems to suggest, however, that various efficiency-enhancing activities, such as the use of information and communications technology (ICT), labour training, the level of research and development (R&D), and the introduction of innovations, are positively related to size.[3] Baldwin and Sabourin (1998) show that use of advanced production technology rises with plant size in the Canadian and U.S. manufacturing sector. For the Canadian non-agricultural private sector as a whole, Charles, Ivis, and Leduc (2002) find that a gap exists between large and small firms, not only in their use of advanced ICT applications such as a websites and online transactions, but also of basic applications, such as personal computers, the Internet, and email. With respect to labour training, Chowhan (2005) finds that its incidence is much higher in large workplaces than in small ones. In the case of R&D, Boothby, Lau, and Songsakul (2008) show that the level of R&D rises with firm size in Canada; in the case of innovations, Baldwin (1997) finds that large manufacturing firms are more likely than small firms to introduce both product and process innovations.

Various efficiency-enhancing activities are positively related to size.

At least two factors, fixed costs and financial constraints, might facilitate higher efficiency in large firms than in small ones, notwithstanding the possibility that small firms might be more willing and able to take risks. The effect of fixed costs can be illustrated by the results of two studies. Cohen and Klepper (1996) theoretically derive and empirically verify that the propensity of firms to undertake R&D rises with their size, because the larger the firm, the greater the output over which it can average the costs of its R&D; and hence, the higher the returns from spending on R&D. In a similar vein, Åstebro (2002) presents empirical evidence that non-capital investment costs, such as fixed costs related to information acquisition, explain the positive relationship between firm size and technology adoption in the U.S. metal-working industry.

The effect of fixed costs could be exacerbated by financial constraints, to which smaller firms are more susceptible. Hall (1992) argues that firms prefer to use internal equity to finance R&D because of several factors: the risky nature of R&D, the preference of banks to secure loans using physical assets, and less willingness among entrepreneurs to reveal information about their innovations compared with other investments. Internal equity may be limited in smaller firms, however, because retained earnings are uncertain and share capital could be restricted to the owner's personal assets. Firms that do turn to debt and outside equity (when available) find that the cost is higher for small firms than for large ones. Leung, Meh, and Terajima (2008a) find evidence that, conditional on other firm characteristics, loan applications from larger U.S. small and medium-sized enterprises (SMEs) are more likely to be approved by a financial institution. Furthermore, larger SMEs pay lower interest rates on their loans than smaller SMEs, conditional on approval and firm and loan characteristics. Witmer and Zorn

2. Productive efficiency is also referred to as total factor productivity (TFP).

3. Hanel and Therrien (2008) and Leung and Zheng (2008) cite many papers that link ICT use, R&D expenditures, or innovations with TFP.

(2007) show that the cost of equity is negatively related to firm size in a sample of publicly traded non-financial firms in Canada and the United States. Financial frictions in turn can stifle productivity-enhancing but riskier activities. Indeed, in a sample of successful Canadian small businesses, Baldwin, Gellatly, and Gaudreault (2002) provide evidence that debt-intensive financial structures act to constrain R&D investment.

The role of economies of scale in favouring greater efficiency in large firms or plants than in small ones is also difficult to determine. Some micro studies suggest that exploiting increasing returns to scale could contribute significantly to productivity gains; for instance, in Canadian and U.S. banking services (Allen, Engert, and Liu 2006; Wang 2003) and Canadian manufacturing (Baldwin and Gorecki 1986). Other studies indicate, however, that returns to scale are constant, for example, in U.S. manufacturing (Nguyen and Lee 2002).

Firm size and input intensity

Large firms are more productive than small firms in part because they are more capital intensive. There may be at least two reasons for their higher ratio of capital to labour. First, large firms may face a lower cost of capital relative to labour. Indeed, the cost of debt and equity is lower for large firms, which in turn implies that their cost of capital is lower. Moreover, many studies find that workers in large firms are paid more than those in small firms, controlling for observable firm and worker characteristics (Oi and Idson 1999). Second, small firms may be less capital intensive than large ones because they may serve different markets and produce different products. For certain types of product, for example, the production technology is such that the optimal scale of production at the prevailing set of relative factor prices is beyond the size of small firms or plants. Another reason is that small firms may compete by offering a more stylized product and serving a niche market. The production of these individualized products does not easily lend itself to a capital-intensive, standardized process, but it does align well with the perceived adaptability of a small firm's production process.

Higher intermediate input intensity could contribute to higher productivity in large firms than in small ones. Indeed, Baldwin, Jarmin, and Tang (2004) show that the greater use of intermediate inputs in large manufacturing plants does play a role in explaining their higher output per worker than that of small firms. The incidence of outsourcing is likely greater with large firms than with small ones, given the fixed costs of outsourcing and the likelihood that large firms have more bargaining power with suppliers, which would allow them to reap greater cost savings from outsourcing.

Size and Firm-Level Productivity: Evidence from Canada

If the exact mechanisms that underpin the relationship between size and productivity are somewhat elusive, the robustness of the relationship leaves no doubt. In this section, we will examine the evidence for Canada in detail.

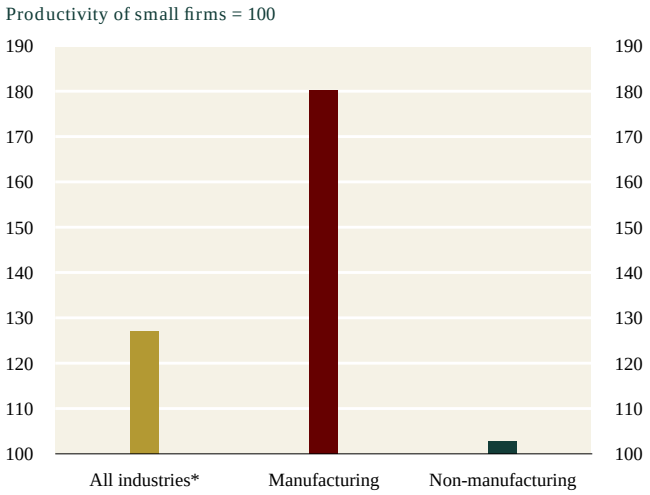
Many small firms are more productive than the average large firm.

Leung, Meh, and Terajima (2008b) calculate sales per employee by firm-size category, using Canadian administrative data on non-financial corporations with employees for the years 1984–97.[4] They find that, relative to firms with less than 100 employees, firms with 100 or more employees are 27 per cent more productive (Chart 1). There are also considerable differences across industries. The advantage large firms have over small firms is greatest in manufacturing. Here, firms with 100 or more employees are 80 per cent more productive. Outside of manufacturing, the relationship between size and productivity is much weaker. Other industries that exhibit a clear positive relationship include transportation and storage; arts and recreation; wholesale trade; construction; and mining, oil, and gas. Still other industries, such as other services, agriculture, and forestry and fishing, exhibit a strong negative relationship.

4. Leung, Meh, and Terajima (2008b) use Statistic Canada's T2-LEAP data. These data cover all corporations with employees. Firms in educational services and in finance, insurance, and real estate are excluded from the analysis because of measurement issues. A key contribution of Leung, Meh, and Terajima (2008b) is the inclusion of non-manufacturing firms in a study of size and productivity. The data currently end in 1997, but data up to 2004 may be available in the near future. Sales are deflated using industry gross output deflators from Statistics Canada. Note also that labour productivity is defined as output per worker instead of the more conventional output per hour. Thus, variations in hours worked per employee are not taken into account in the analysis.

Chart 1

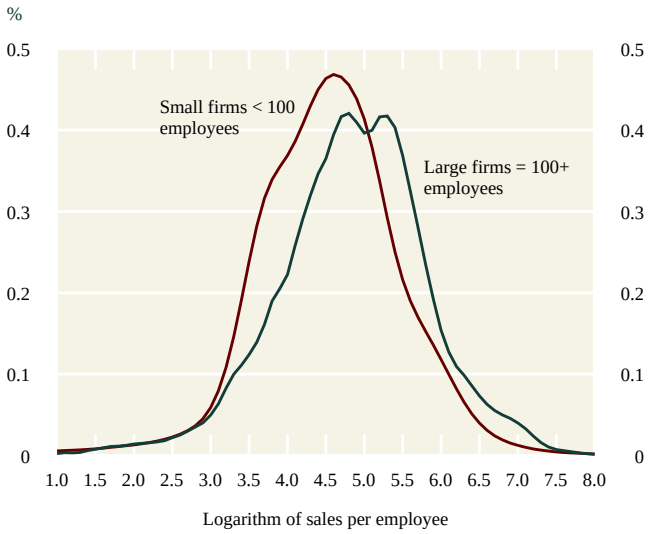
Productivity of Large Firms Relative to Small Firms in Canada



Note: Productivity is defined as sales per employee; large firms = 100 or more employees; small firms = less than 100 employees
* Excludes public administration; finance, insurance, and real estate; and educational services
Source: Leung, Meh, and Terajima (2008b)

Chart 2

Distribution of Productivity by Firm Size



Source: Leung, Meh, and Terajima (2008b)

The estimates above refer to differences in average productivity levels. There is much heterogeneity within these firm-size categories. Although the distribution of sales per employee for firms with 100 or more employees is clearly to the right of that for smaller firms, there is much overlap, indicating that many small firms are more productive than the average large firm (Chart 2).

The 27 per cent productivity gap between large and small firms at the aggregate level reflects not just pure productivity differences at the firm level, but also compositional effects. Leung, Meh, and Terajima (2008b) perform a regression analysis that examines the size-productivity relationship while controlling for three such effects: (i) the concentration of large firms in more-productive industries, (ii) firm life-cycle effects, such as the smaller size and lower productivity of entrant firms in an industry, and (iii) firm organizational type (Canadian-controlled private corporations, other private corporations, and public corporations). Allowing for the industry-concentration effect reduces the overall 27 per cent advantage for large firms to 10 per cent, and allowing for the life-cycle and organizational effects reduces it further, to 5 per cent. Within manufacturing, allowing for the industry-concentration effect reduces the advantage for larger firms from 80 to 40 per cent, and including the life-cycle and organizational effects further reduces it to 24 per cent. Even after these compositional effects are taken into account, the finding that firm size does matter, especially in the manufacturing sector, is not altered.

Firm Size and Aggregate Productivity

With large firms more productive than small ones, the productivity of a country would increase if its employment became increasingly concentrated in large firms, all else being equal. This section provides the results of two experiments conducted by Leung, Meh, and Terajima (2008b) that address the following issues: (i) what is the effect on aggregate labour productivity of changes in firm size in Canada over the 1984–97 period, and (ii) how much of the Canada-U.S. productivity gap in 1997 can be accounted for by differences in firm size?

The experiments were carried out using shift-share analysis (Box), in which aggregate labour productivity is defined as the sum of the labour productivity of each firm-size category multiplied by its employment share.[5] The importance of firm size is determined by allowing the employment shares to change exogenously while holding labour productivity for each

5. For our analysis, we use four firm-size categories: 1–19, 20–99, 100–499, and 500+ employees.

Shift-Share Analysis

Changes in labour productivity across time, or differences between countries, can be decomposed into changes (or differences) in productivity within the firm-size category and changes (or differences) in the distribution of employment across firms. For example, the change in labour productivity between 1997 and 1984 ($LP_{97} - LP_{84}$) is decomposed as follows:

$$LP_{97} - LP_{84} = \sum_k (LP_{k,\,97} - LP_{k,\,84}) w_{k,\,84} + \sum_k (w_{k,\,97} - w_{k,\,84}) LP_{k,\,84} + \sum_k (LP_{k,\,97} - LP_{k,\,84})(w_{k,\,97} - w_{k,\,84}),$$

where $w_{k,\,97}$ is the share of employees in firm-size category k in 1997, and $LP_{k,\,97}$ is the sales per worker in firm-size category k in 1997. The first term of the decomposition gives the change in labour productivity resulting from changes in labour productivity within the firm-size category while holding the distribution of employment constant. The second term gives the change in labour productivity resulting from changes in employment distribution while holding labour productivity within size categories constant, and the third term is a cross-product term that is usually small.[1]

1. The cross-product term, sometimes called the dynamic effect, weights the changes in labour shares with the growth of labour productivity. The dynamic effect is positive if there is an increase in the employment shares of firm-size categories with above-average changes in productivity (MTI 2003).

firm-size category constant. In reality, a change in employment share would alter the response of aggregate productivity because the factors that determine a country's average firm size are likely to have an effect on the productivity of firms as well. For instance, a sharp appreciation of the Canadian dollar would tend to depress employment in manufacturing and thereby the average firm size, given that manufacturing has larger firms than the rest of the economy.[6] All else being equal, this would result in a decline in aggregate productivity, given that manufacturing enjoys an above-average level of productivity. If, however, the labour shedding in manufacturing boosts productivity as firms attempt to reduce costs to remain competitive, then the aggregate outcome for productivity of the shift in the distribution of employment might turn out to be positive instead of negative. The results of the experiments described below should thus be interpreted with caution and should be used as starting points for a deeper analysis of the joint determinants of average firm size and productivity.

Impact of the decline in average firm size

Leung, Meh, and Terajima (2008b) find that, within the non-financial corporate sector, the number of employees in firms with 500+ employees fell from 42.3 per cent in 1984 to 37.2 per cent in 1997 (Chart 3). This is consistent with data for all firms with employees in Canada (Kanagarajah 2006). The decline is predominately the result of the fall in the average size of firms with 500+ employees.[7]

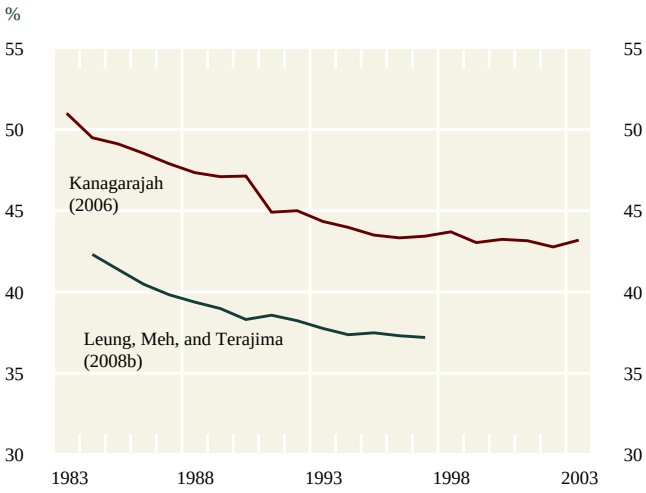
Yet the decrease in the importance of large firms exerts only a small drag on the change in labour productivity (Table 1). Changes in the distribution of employment account for -5.6 per cent of the change in labour productivity in the non-financial corporate sector and -5.3 per cent of the change in manufacturing. Note that, despite the two factors—the stronger size-productivity relationship in manufacturing than in the non-financial corporate sector and the similar decline in the fraction of workers in the 500+ category in both sectors—the drag on productivity from the size reduction in manufacturing is actually smaller. This is because what matters is not only where the decline occurred (the 500+ employee category), but also where those employees went. Compared with the non-financial corporate sector, the decline in the fraction of workers in the 500+ firm-size category in the manufacturing sector was offset more by increases in the 100–499 category and less by increases in the 1–19 firm-size category.

6. This would be the case if all manufacturing firms experienced the same percentage decline in employment. Average firm size might increase if declines occurred only among the smallest manufacturing firms.

7. The cause of this decline is unclear. Changes in industry composition account for little of the decrease. Instead, most of it can be traced to decreases in average size within industries, most notably mining, oil, and gas; manufacturing; transportation and storage; and communications and utilities.

Chart 3

Drop in Number of Employees in Firms with 500+ Employees



Source: Leung, Meh, and Terajima (2008b); Kanagarajah (2006)

Table 1

Change in Labour Productivity of Canadian Firms, 1984–97

	Factors affecting change in labour productivity (%)		
	Within-size category changes	Changes in distribution of employment across firms	Cross-product term**
All industries*	107.7	-5.6	-2.1
Manufacturing	109.1	-5.3	-3.8

Note: Productivity is defined as sales per employee. See Box for a description of the decomposition.
* Excludes public administration; finance, insurance, and real estate; and educational services
** The cross-product term, sometimes called the dynamic effect, weights the changes in labour shares with the growth of labour productivity. The dynamic effect is positive if there is an increase in the employment shares of firm-size categories with above-average changes in productivity (MTI 2003).
Source: Leung, Meh, and Terajima (2008b)

Canada-U.S. Differences in Firm Size and Productivity

Restrictions in the U.S. data limit the Canada-U.S. comparison to the non-agricultural, non-financial corporate sector.[8] In 1997, there was a 14 percentage point difference between the employment shares of U.S. and Canadian firms with 500+ employees, which was greater than the changes over time in this firm-size category in Canada (Chart 3 and Table 2). This gap was balanced mainly by a higher share of workers in firms in the 1–19 employee category. Even in manufacturing, Canada's employment share in the 500+ firm-size category was 13.6 percentage points lower than it was in the United States. In contrast to the overall numbers, this difference in manufacturing was offset by a greater proportion of workers in firms in the 20–99 and 100–499 firm-size categories.

Overall, Canada's level of sales per employee was 82 per cent that of the United States in 1997 (Table 3).[9] This gap is the result of differences in the 1–19 and 500+ firm-size categories, where Canadian labour productivity was 77.4 per cent and 79.6 per cent of the U.S. levels, respectively. In the other categories, Canadian firms were as productive as U.S. firms. Interestingly, the categories in which Canadian firms were not as productive as their U.S. counterparts were the same categories where Canada has smaller firms, on average, than the United States. Canadian firms were 12 per cent smaller in the 1–19 category, 50 per cent smaller in the 500+ category, and roughly the same size as U.S. firms in the two middle categories.

Table 2

Distribution of Employment over Firm-Size Categories, 1997

Percentage

	Firm-size categories			
	1–19	20–99	100–499	500+
Canada				
All industries*	23.9	23.2	16.0	36.9
Manufacturing	9.8	20.1	21.4	48.7
United States				
All industries*	15.8	18.6	14.3	51.2
Manufacturing	6.7	15.4	15.6	62.3

* Excludes public administration; finance, insurance, and real estate; and crop and animal farming
Source: Leung, Meh, and Terajima (2008b)

8. Specifically, crop and animal production and several other minor industries are not covered in the U.S. data. The source of the U.S. data used in the comparison is a custom tabulation from the Statistics of U.S. Small Business, available at < http://www.census.gov/csd/susb/susb.htm>. See Leung, Meh, and Terajima (2008b) for more details.

9. Canadian sales per employee were converted to U.S. dollars using the industry purchasing-power parities developed by Rao, Tang, and Wang (2004).

Table 3

Canadian Productivity and Firm Size Relative to the United States, 1997

Percentage

	Firm-size categories				
	1–19	20–99	100–499	500+	All
All industries*					
Productivity	77.4	96.3	106.4	79.6	82.2
Firm size	87.5	99.5	96.9	51.0	60.5
Manufacturing					
Productivity	82.3	89.2	103.6	91.4	84.8
Firm size	84.1	101.0	108.8	79.3	62.4

Note: Productivity is defined as sales per employee, and size is measured by the number of employees.
* Excludes public administration; finance, insurance, and real estate; and crop and animal farming
Source: Leung, Meh, and Terajima (2008b)

In manufacturing, Canadian sales per employee were 85 per cent of those of the United States (Table 3). Canadian labour productivity relative to the United States was lower in the largest and two smallest categories, and Canadian firms were smaller than in the United States in the smallest and largest categories. This roughly mimics the pattern found in the non-agricultural, non-financial corporate sector.

The categories in which Canadian firms were not as productive as their U.S. counterparts were those where Canada has smaller firms, on average, than the United States.

Given these Canada-U.S. differences in firm size and productivity, shift-share analysis allows us to address the question: What would Canada's labour productivity be if it had the U.S. employment distribution over its firm-size categories?[10] In 1997, the differences in employment distribution account for nearly 20 per cent of the Canada-U.S. gap in labour productivity overall and roughly 50 per cent of the gap in manufacturing (Table 4). Although not all data are available to perform the same analysis in a more recent year, the data in Chart 3 and similar numbers from the U.S. Census Bureau for all firms with employees suggest that the employment distributions in both countries did not change significantly between 1997 and 2003.[11] Thus shift-share analysis would likely find that changes in employment distribution would account for little of the widening productivity gap between Canada and the United States since 1997.

The finding that Canada-U.S differences in the distribution of employment over firm-size categories account for 20 per cent of the Canada-U.S. labour-productivity gap in 1997 is consistent with the findings from Leung and Ueberfeldt (2008). They developed a structural model to evaluate the role of job uncertainty in explaining both the Canada-U.S. wage gap and why large firms pay higher wages than small firms. Since some human capital is lost when workers move between jobs, the higher degree of job uncertainty in smaller firms causes workers in these firms to accumulate less human capital. Within this framework, Leung and Ueberfeldt (2008) find that 20 per cent of the Canada-U.S. difference in wages in 1996 was the result of differences in the employment distribution over firm-size categories.

Table 4

Decomposition of Canada-U.S. Differences in Productivity, 1997

	Factors affecting labour productivity (%)		
	Within-size category differences	Differences in distribution of employment	Cross-product term**
All industries*	80.5	19.0	0.5
Manufacturing	48.6	51.2	0.2

Note: Productivity is defined as sales per employee. See Box for a description of the decomposition.
* Excludes public administration; finance, insurance, and real estate; and crop and animal farming
** The cross-product term, sometimes called the dynamic effect, weights the changes in labour shares with the growth of labour productivity. The dynamic effect is positive if there is an increase in the employment shares of firm-size categories with above-average changes in productivity (MTI 2003).

10. Technically, Table 4 shows the results of the average of two decompositions—one where the U.S. distribution of employment is imposed on Canada, and the other where the Canadian distribution is imposed on the United States.

11. See http://www.census.gov/csd/susb/susb.htm. More recent evidence from the Statistics Canada Labour Force Survey suggests that the share of workers in large firms in Canada has increased in recent years. See Table 9 in Dion (2007).

Determinants of Firm-Size Distribution

Beyond the accounting relationship between firm-size distribution and productivity, a fundamental question arises: What drives the evolution of firm-size distribution? This remains an open question. Several recent theoretical papers (Cooley and Quadrini 2001; Cabral and Mata 2003) have emphasized the role of financial constraints in explaining how firm-size distribution has evolved. Empirical evidence (Beck, Demirgüc-Kunt, and Maksimovic 2005) suggests that financing obstacles have a negative effect on firm growth. To have an impact on firm-size distribution, however, financial constraints must affect a significant proportion of incumbent firms. Recent evidence (Angelini and Generale 2008) suggests that while financial constraints play a role in the evolution of firm-size distribution in developing countries, the impact in developed countries is negligible because of the small proportion of constrained firms there.

In a similar vein, the development of legal institutions to protect the property rights of entrepreneurs and outside investors encourages investment in tangible and intangible capital and promotes capital-market depth, both of which allow firms to grow (Rajan and Zingales 2001; La Porta et al. 1998). The empirical literature is mixed, however, on whether the differences between developed countries are significant (Kumar, Rajan, and Zingales 1999; Desai, Gompers, and Lerner 2003).

A larger market size is commonly thought to allow a country to have larger firms. Becker and Murphy (1992) argue, however, that the benefits of specialization are offset by the costs involved in coordinating the activities of specialists, and that these coordination costs limit the size of the firm before it is limited by the size of the market. Furthermore, differences in average firm sizes across countries are as large in industries that produce mostly tradable goods as in those that produce non-tradables (see Table 3). This suggests that market size cannot be the only determinant.

Several authors have suggested that tax codes, labour market legislation, and product-market rigidities affect average firm size and aggregate productivity. Guner, Ventura, and Xu (2008) construct a model to show how policies that drive differences in average size can also account for a sizable part of the difference in productivity between the United States and continental Europe and Japan. Studies that compare Canada-U.S. policy differences in a general-equilibrium framework are limited to Leung, Meh, and Terajima (2006). In this preliminary work, differences in technology-adoption costs and financial constraints are identified as possible determinants of the Canada-U.S. TFP gap. These adoption costs could be related to information acquisition, development, lack of skilled personnel, and workplace reorganizations needed to take advantage of the new technology (Crawford 2003).

Conclusion

The findings highlighted in this article suggest that firm-size differences play a significant role in explaining the productivity gap between Canada and the United States. Much research remains to be done, however, to identify the joint determinants of these differences. Differing tax codes have been suggested as a possible determinant, and work on marginal effective tax rates on capital has shown that there have been substantial historical Canada-U.S. differences (Chen, Lee, and Mintz 2002). The impact of these differentials on investment, productivity, and firm size has yet to be determined.

The findings in Leung, Meh, and Terajima (2008b) also suggest that more than one factor is behind the Canada-U.S. productivity gap. Since the productivity gap and differences in firm size are concentrated in the smallest and largest categories, the barriers faced by the smallest firms are unlikely to be the same as those faced by the largest firms. Relating to small firms, recent research has shown that the rate of job reallocation resulting from firm entry and exit is higher in the United States than it is in Canada (Balakrishnan 2008), and that the United States outperforms Canada in terms of net business creation (Godin and Clemens 2007). The greater level of churning and net business creation suggests that barriers to entry and exit are generally lower in the United States. Lower entry barriers facilitate the trial of new ideas, which consequently improve productivity. Identifying the source of these higher entry and exit costs could lead to an explanation of why small firms in Canada are smaller than those in the United States, and less productive.

With respect to larger firms, Witmer and Zorn (2007) find that the cost of equity among publicly traded firms is 30 to 50 basis points higher in Canada than in the United States. It would be interesting to examine

whether this difference has a significant impact on investment in Canada. As well, Canada-U.S. differences in R&D intensity among large firms account for most of the Canada-U.S. difference in aggregate R&D investment intensity (Boothby, Lau, and Songsakul 2008). Seeing whether large firms also account for the Canada-U.S. ICT intensity gap, as suggested by Fuss and Waverman (2005), could also be a line of research.

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