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RESEARCH ARTICLE



Globalisation, ICT Investment and Firm Dynamism

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ABSTRACT

There have been strong evidence showing a declining trend of firm dynamism in many other OECD countries over the last three decades. However, so far there has no compelling evidence that points to any intrinsic factor(s) that may have affected the trend of declining firm dynamism. This paper investigates some potential candidates for the intrinsic factors that might be responsible for the decline in firm dynamism. Specifically, it hypothesises that globalisation and ICT (information and communication technology) have increased the flexibility in business operation, which has contributed to the decline in firm dynamics because firms can better weather positive/negative shocks with increasing business flexibility. Using data from Canada, we find empirical support for the linkage between business flexibility and firm dynamics in Canada.

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1. Introduction

Firm dynamism – the process of business birth, growth, decline and exit – is central to Schumpeter's key idea of creative destruction in the theory of economic development.¹ Economically speaking, firm dynamism is the process of reallocation of resources from less productive to more-productive economic activities. Thus, a healthy pace of firm dynamism is vital to the long-run growth in productivity, employment and living standard, even though job destruction and firm exit are costly to some in the short-run.

In recent years, there have been a number of studies showing that firm dynamism has been declining in many countries, including Canada and the United States. The decline in firm dynamics is pervasive across industries. The trend development has caused serious concerns among researchers and policy makers.

A natural question is if the decline in firm dynamism is the new normal, which has limited economic impact, or it has a serious consequence for efficiency resource reallocation? This may depend on what causes the decline in firm dynamics. Different causes may have different adverse consequences for resource reallocation. Thus, an answer to the question is essential for policy design to minimise the negative impact.

There have been a number of studies attempting to uncover the underlying factors.² But to our knowledge, only one consistent and strong finding has emerged from the literature, that is, industry structure change plays no role in the downward trend. This leads to a continuing effort in searching for answers. Many factors have been suggested to be the potential suspects. They include increasingly burdensome regulation and institutions, a change in labour market condition, the increasing ability of firms to respond to external shocks, and globalisation. However, there has been no strong evidence showing that these factors actually play an important role.

The purpose of this paper is to explore whether an increase of the flexibility in business operation plays a significant role for the decline of firm dynamics in Canadian industries. By business flexibility, we mean more options for inputs (labour, capital, and intermediate inputs), scalable production (including multi-plant firm or cross-border firm structure), efficient inventory management (of materials and final product), and larger product markets.

We hypothesise that business flexibility reduces firm dynamics since business flexibility makes firm operation more efficient and allows firms to better absorb economic shocks, whether positive or negative. The increasing in business flexibility can be broadly attributed to two developments in the past several decades: the advancement of information and communication technologies (ICTs) and more globalised economies. The adoption of advanced ICTs allows firms to

be more efficient in conducting business operation, managing inventories, and engaging in international business activities. Similarly, globalisation enables firms to have more options for intermediate inputs, more opportunities for obtaining capital, quicker adjustment of production, and larger markets for their products. These factors potentially may cause the decline in firm dynamics with regard to firm entry, exit, and turnover in a particular industry.

As globalisation and information and communication technologies are likely here to stay, lower firm dynamism may become a new normal.

The rest of this paper is organised as follows. [Section 2](#) discusses firm dynamics, data and trend development in Canada. [Section 3](#) describes business flexibility, measurement and trend development in Canada. [Section 4](#) establishes the linkage between firm dynamics and business flexibility. [Section 5](#) discusses policy implications.

2. Firm dynamics

Firm dynamics commonly refers to the process of the entry of new firms that are often equipped with advanced technology and superior managerial practices and the exit of unprofitable laggards that are most likely operating with obsolete products and poor business practices. Firm dynamism is inherently disruptive, but it is also critical to long-run economic growth. Research has firmly established that firm dynamism is vital to productivity and sustained economic growth. In a study of OECD countries, Bartelsman, Haltiwanger, & Scarpetta (2005) find that the process of creative destruction provides an important contribution to productivity growth. In particular, Bartelsman, Haltiwanger, & Doms (2000, p. 16) find that about 25% of within-industry gains in total factor productivity (TFP) occurs from new entrants in manufacturing establishments in the United States. Lentz and Mortensen (2008) find similar results for Denmark. Net entry has also been found to contribute to productivity growth in the United States. For example, Foster, Haltiwanger, & Syverson (2008) has found that entrants have substantially higher productivity than existing establishments, and 35 percent of industry-level productivity growth is accounted for by net entry. Recently, a positive link between slowdown in firm dynamism and productivity in the United States has been identified, especially for the high-tech sector in the post-2000 period (Decker, Haltiwanger, Jarmin, & Miranda, 2016).

2.1. Measurement and data sources

By definition, firm dynamics is measured at the industry or aggregate level. Firm dynamism indicators used in our analysis are based on the information from micro databases and then aggregated to the industry level, which are then merged with other industry-level data. Specifically, we use two Canadian micro files to estimate firm dynamics at the industry level: the Longitudinal Employment Analysis Programme (LEAP) dataset³ and the Labour Force Survey (LFS) micro file.⁴ LEAP data are used to categorise firms by their employment appearance. Labour-tracking mechanism in LEAP ensures that merger and acquisition activities (M&A) are excluded from entry and exit counts.

In this paper, the three-period⁵ window is used for categorising firm. A firm is called an active firm at a reference period when the firm hires (employment > 0) at that time; otherwise, it is called inactive. An active firm can be either an entrant, or an exit, or an incumbent, or a short-lived firm. Specifically, an entrant at a reference period is one being active at the reference period and one period after but being inactive one period before; an exit at a reference period is one being active at the reference period and one period before but being inactive one period after; an incumbent at a reference period is one being active at the reference period and one period before and after; and a short-lived firm at a reference period is one being active at the reference period but being inactive one period before and after.

We use the following intensity measures to capture firm dynamics, which is based on firm counts. The intensity measures of firm dynamics include entry rate (E), exit rate (X) and turnover intensity (T). They are defined as follows:

$$\begin{aligned} E_t^N &= \frac{\text{Number of entrants}_t}{\text{Number of active firms}_t} \\ X_t^N &= \frac{\text{Number of exits}_t}{\text{Number of active firms}_t} \\ T_t^N &= \frac{\text{Number of (entry + exits + short-lived)}_t}{\text{Number of active firms}_t} \end{aligned} \quad (1)$$

Thus, the intensity of firm dynamics is measured by the change in the counts of firm entry and exit. The turnover intensity is the ratio of the sum of the number of entrants, exits, and short-lived firms to the total number of active firms.

LEAP data have many vintage files. A vintage file will be created when the data are added for each new year. Within each vintage file, the last year of firm structure represents the true firm structure. In this paper, a three-year rule is used to measure entry and exit, that is, in each vintage file, the data of last three years are used to calculate entry and exit rates for the second last year. There are in total 15 vintage files from 2001 to 2015 that are used for the calculation of firm dynamics for years of 2000 to 2014.

Although our econometric analysis is only for 2000–2014, our estimation of firm dynamics goes back to 1992. We do not have vintage files based on years before 2001. Thus, each vintage file of 2001–2015 is used to estimate the firm dynamism measures for each year in the period 1992–2000. Consequently, there are 15 sets of estimates of firm dynamics measures for each year over the period of 1992–2000. These 15 sets of estimates for each year are then averaged. We have two sets of results for the year 2000, one is based on the 2001 vintage file, and the other is based on the average of 15 vintage files. The ratio of these two sets of results for 2000 are used to rescale the corresponding averaged measure over 1992 to 1999.

In addition to above measures, we also introduce a measure of new entrepreneurship as firm dynamism in the Canadian economy. Like firm entry, new entrepreneurship is an important source of firm dynamics because it adds new blood and competition into the economy by introducing new technologies and new business practices. Entrepreneurs are generally more dynamic than incumbents since they are still testing and establishing their products and learning the markets and their position in the productivity distribution. The decline in firm dynamism is also attributed to the decline in entrepreneurship. There are no direct data available on entrepreneurship. Following Cao, Salameh, Seki, & St-Amant (2015), this paper defines new entrepreneurs as the number of new self-employed workers⁶ who hire employees. The micro file from the labour force survey is used to measure new entrepreneurs in Canada.

In this paper, we have 38 industries for the business sector, with manufacturing at the three-digit North American Industry Classification System (NAICS) level and two-digit for other industries. The grouping is largely due to the data availability as some variables are based on official industry level data.

2.2. Trend development in firm dynamics

In this sub-section, we describe the trend development in firm dynamics. Figure 1 plots turnover intensity and its components. Consistent with the literature, firm dynamism is trending down in the Canadian business sector. From 1992 to 2014, the turnover intensity decreased by 5.5 percentage points from 26.8% in 1992 to 21.3% in 2014, of which 1.3 percentage points or about 23% come from the decline in entry rate, 2.3 percentage points or

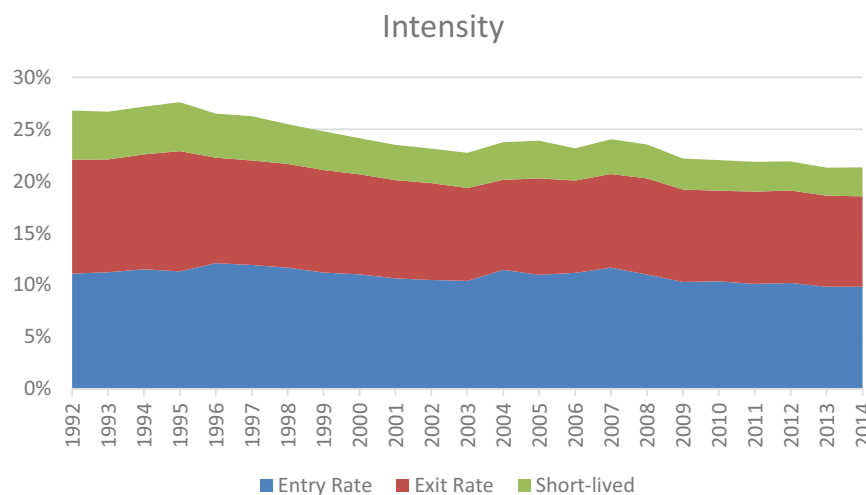


Figure 1. Firm Entry, Exit, and Turnover Rates in the total Business Sector, 1992–2014. Source: Authors' compilation using Longitudinal Employment Analysis Programme dataset from Statistics Canada.

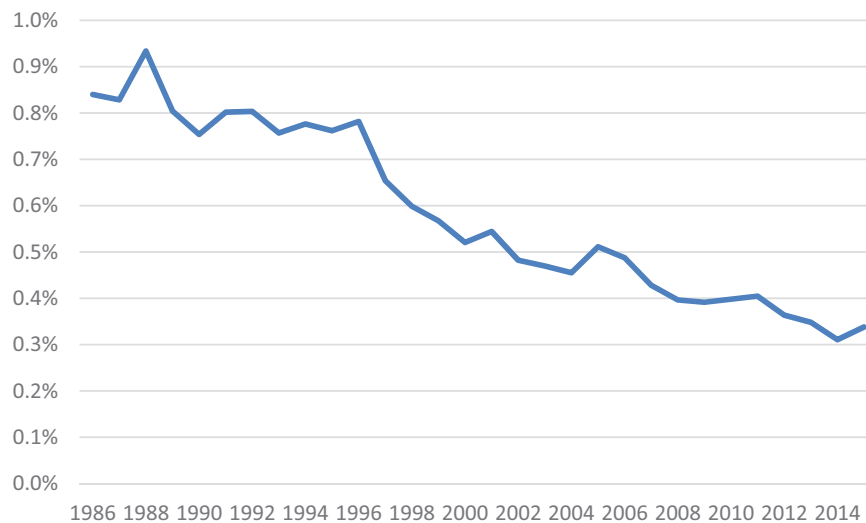


Figure 2. Trend in one-year entrepreneur rate in the total business sector, 1986–2015. Source: Authors' compilation using Labour Force Survey from Statistics Canada.

Table 1. Trend in firm dynamics measures.

	Entry rate	Exit rate	Turnover intensity	Entrepreneur rate
Time trend	−0.0024 (0.00)***	−0.0012 (0.00)***	−0.0045 (0.00)***	−0.00015 (0.00)***
Industry Dummies	Yes	Yes	Yes	Yes
Number of Observations	874	874	874	874
R-squared	0.72	0.57	0.79	0.87

*** represents significance at 1% level. The numbers in parenthesis are *p*-values.

42% come from the decline in exit rate, and 1.9 percentage points or 35% come from the decline in the share of short-lived firms.

The new entrepreneur rate, defined as the share of new self-employed workers with paid help and job tenure less than one year in the total respondents of the Labour Force Survey (LFS) has also been declining since 1988. As in [Figure 2](#), the entrepreneur rate dropped by 60% from 0.93% in 1988 to 0.34% in 2014.

To provide further evidence about the trend movement of those firm dynamics indicators, we run regression of each indicator against time with controlling for industry special effects. The coefficients on the time variable are negative and statistically significant for entry rate, exit rate, turnover intensity and entrepreneur rate ([Table 1](#)). The finding of declining in firm dynamics is consistent with the visual observations from [Figures 1 and 2](#).

3. Business flexibility

How is firm dynamism influenced by business environment? In this paper, we focus on business flexibility. Specifically, we refer business flexibility as the options of firms in the choosing inputs (labour, capital, and intermediate inputs), scalable production (including multi-plant firm or cross-border firm structure), efficient inventory management (of materials and final product), and larger product markets. Below we further elaborate the concept of business flexibility, how we measure it, and its trend development.

3.1. Concept and the underlying factors

Business flexibility can be indicated by a number of factors, including the ability of accessing diversified external markets for inputs and output (e.g. outsourcing, import and export), internal capability of production reallocation (e.g. multi-plant firm structure, foreign-controlled ownership and multinationals), and better business management (e.g. information and communication technology). For example, the ability of accessing diversified external markets allows firms to better endure adverse shocks in the domestic market. Firms with multi-establishments can also better absorb shocks to a particular/regional plant. Similarly, firms with foreign-control ownership or

multinationals are more likely for a more flexible reallocation of production in case of temporary adversities in Canada (Kogut & Kulatilaka, 1994). The advancement in information and communication technology (ICT) can also allow firms to adopt flexible-manufacturing technology in production (e.g. Eaton & Schmitt, 1994).

Various data from Statistics Canada are used to measure business flexibility. From the KLEMS database from the Multifactor Productivity Accounts at Statistics Canada, we extract intermediate inputs and gross output at the industry level. We then calculate the share of intermediate inputs in the gross output to measure an industry's outsourcing intensity.

Import and export data by industry are obtained from the Industry Canada Trade-online database. Import intensity and export intensity are calculated as the ratio of the value of imports or exports to the firms' gross output aggregated to the corresponding industry level. Trade intensity is the sum of the import and export intensities.

Business Registry (BR) database is used to identify firms with multi-establishments, and the employment, revenue, and asset shares of firms with multi-establishments are calculated using data from National Accounts Longitudinal Microdata File (NALMF).

BR information and IOFD (Industry Organisation and Finance Division) information on firm ownership are used to identify foreign-controlled firms. The employment, revenue, and asset shares of foreign-controlled firms by industry is calculated using NALMF data.

Using firm-level data from the survey of Canadian Direct Investment Abroad (CDIA) and the administrative micro data file General Index of Financial Information (GIFI), we estimate CDIA intensity as the ratio of total CDIA to total assets for each industry.

The final indicator for business flexibility is the investment in ICTs. As discussed earlier, the adoption of ICTs allows firms to be more efficiently organise their inputs (including timely adopt advanced technology and business practices), manage their inventories, and conduct international business activities. We measure ICT intensity by the ratio of ICT capital stock to total assets with data from the administrative micro data file General Index of Financial Information (GIFI). ICT capital stock series are estimated using perpetual inventory model (PIM). Detailed data on ICT investment, asset prices and depreciation rates are obtained from the Multifactor Productivity Accounts at Statistics Canada.

3.2. Business flexibility and its measurement

Instead of examining the impact of each of these different factors on firm dynamics, which often leads to multicollinearity problem, in this paper, we treat business flexibility as latent variables that is the weighted sum of some similar influencing factors.⁷ The weights are estimated based on the confirmatory factor analysis, as shown in [Appendix A](#). The weight for each factor depends on not only its correlation with the latent variable (or loading), but also its variance and its covariance with other influencing factors. The smaller the variance of the factor, the higher its weight.

The latent variable model is first used to measure foreign ownership and multi-establishment structure of an industry. Foreign ownership of an industry can be indicated the share of foreign-controlled firms in an industry in terms of output (revenue) or inputs (employment or asset). Similarly, the multi-establishment structure of an industry can be indicated as the share of firms with multi-establishment structure in the industry in terms of output or input. To reflect the importance of both output and input, we measure foreign ownership and multi-establishment structure as a weighted sum of revenue share, employment share and asset share. The loading and variances that are needed for measuring the weights of those indicators are estimated based on the confirmatory factor analysis (latent variable model). The estimation results are reported in [Table 2](#). All indicators are weighted significantly for either foreign ownership or multi-establishment structure. For foreign ownership, employment share has the smaller loading, but this is offset by its error variance that is the smallest. Similarly, for multi-establishment structure, revenue share has the largest weight as it has the largest loading and the smallest error variance.

In addition to foreign ownership and multi-establishment structure, we also gathered the following four factors that may affect business flexibility: outsourcing intensity, trade intensity, CDIA intensity and ICT intensity. To see the trend movement of those six indicators, we regress each of them against a time trend variable after controlling for industry-specific effects. The regression results are reported in [Table 3](#). As shown in the table, the

Table 2. Measuring foreign ownership and multi-establishments structure.

	Foreign-Owned Firms		Firms with multi-establishments	
	Coefficient	p Value	Coefficient	p Value
Loadings				
Revenue share	1.0000	–	1.0000	–
Employment share	0.7963***	0.00	0.8637***	0.00
Asset share	0.9809***	0.00	1.0760***	0.00
Error variance				
Revenue share	0.0042***	0.00	0.0008***	0.00
Employment share	0.0017***	0.00	0.0018***	0.00
Asset share	0.0053***	0.00	0.0049***	0.00
Factor variance	0.0461***	0.00	0.0852***	0.00

*** represents significance at 1% level.

coefficients on the time trend variable for all indicators are positive and statistically significant, suggesting that all these indicators are trending up over time.

To construct the index for business flexibility, we perform a confirmatory factor analysis. An initial confirmatory factor analysis suggests that the six indicators can be divided into two groups whose movements are different (i.e. with signs to be opposite). The first four factors (outsourcing intensity, trade intensity, share of foreign ownership, and the share of multi-establishment structure) have the similar movement. Therefore, these four indicators can be grouped together to form a latent variable – business flexibility 1. The remaining two factors (i.e. IDIA ratio and ICT intensity) follow a movement pattern that is different from this first group of indicators and form the second latent variable – business flexibility 2.⁸ The grouping is purely based on the confirmatory factor analysis, and therefore, it is difficult to provide an economic rationale for the splitting.

The corresponding confirmatory factor analysis results on loadings and variance–covariance are reported in Table 4. Those estimates are used to estimate business flexibility 1 and business flexibility 2. For business flexibility 1, share of foreign ownership has the largest weight as it has the largest loading with the smallest error variance. For business flexibility 2, ICT has the largest weight as it has very small error variance.

4. The relationship between firm dynamics and business flexibility

To evaluate the impact of business flexibility on firm dynamics, we set up the following regression model:

$$D_{it} = \beta_0 + \beta_1 F_{it} + \beta_2 C_{it} + \varepsilon_{it} \quad (2)$$

where D_{it} denotes firm dynamics index for industry i at time t ; F_{it} is business flexibility index i for industry i at time t ; C_{it} is a set of vector consisting of controlling variables for industry i at time t ; and ε_{it} is the error term for industry i at time t .

In addition to business flexibility, we control for other factors that may affect firm dynamics. The first controlled factor is firm size, which is measured as the average firm size in an industry.¹⁰ Firm size may affect firm dynamics since large-sized firms tend to be more stable and are better able to manage shocks than small-sized firms. Our second control variable is productivity dispersion, as large productivity dispersion may encourage exiting and market shifting among firms. In this paper, we have used three measures of industry-level labour productivity dispersion. The first one is the ratio of average labour productivity of top 10% firms to that of bottom 10% firms, the second is the ratio of average labour productivity of top 50% firms to that of bottom 50% firms, and the third is the coefficient of variation of labour productivity. In addition, we have also included industry and year dummies to control for industry- and year-specific effects.

Table 5 reports the estimation results for entry and exit rates. Several interesting results emerge. We first observe that the impact of both business flexibility indices on entry and exit are all negative, but they are only statistically significant for entry rate. Thus, the finding is consistent with our hypothesis that business flexibility reduce firm dynamism, at least in terms of entry rate.

On the control variables, firm size is found to be statistically insignificant. The coefficients of these productivity dispersion measures are found to be negative and insignificant for entry rate. However, the factor under the first two measures is found to be positive and significant for exit. The result is consistent with the expectation that productivity dispersion induces firm exiting.

Table 3. Trends in flexibility indicators.

	Outsource intensity	Trade intensity	Foreign controlled firms	Multi-establishment firms	IDIA intensity	ICT intensity
Time	0.0010*** (0.00)	0.0513*** (0.00)	0.0099*** (0.00)	0.0424*** (0.00)	0.0132*** (0.00)	0.0006*** (0.00)
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	874	874	570	570	570	874
R-squared	0.96	0.63	0.87	0.61	0.64	0.93

*** represents significance at 1% level. The numbers in parenthesis are *p*-values.

Table 4. Confirmatory factor analysis: two latent variables for business flexibility.

	Coefficient	<i>p</i> Value
Loadings		
Factor 1 (business flexibility 1)		
Outsource ratio	1.0000	–
Trade share	2.8262***	0.00
Foreign controlled firms	4.4101***	0.00
Multi-establishment firms	3.6087***	0.00
Factor 2 (business flexibility 2)		
CDIA ratio	1.0000	–
ICT intensity	0.1162***	0.00
Error variance		
Factor 1 (business flexibility 1)		
Outsource ratio	0.0175***	0.00
Trade share	0.7905***	0.00
Foreign controlled firms	0.0021**	0.05
Multi-establishment firms	0.0570***	0.00
Factor 2 (business flexibility 2)		
CDIA ratio	0.0467***	0.00
ICT intensity	0.0004***	0.00
Factor variance-covariance		
Factor 1 – Factor 1	0.0022***	0.00
Factor 1 – Factor 2	–0.0021***	0.00
Factor 2 – Factor 2	0.0019	0.28

*** and ** represent significance at 1% and 5% levels, respectively.

Table 5. Regression results for the impact of business flexibility on entry and exit.

	Entry Rate			Exit Rate		
	(1)	(2)	(3)	(1)	(2)	(3)
Flexibility Indicator 1	–0.0903*** (0.01)	–0.0901*** (0.01)	–0.0908*** (0.01)	–0.0361 (0.23)	–0.0368 (0.23)	–0.0369 (0.23)
Flexibility Indicator 2	–0.0438*** (0.00)	–0.0437*** (0.00)	–0.0439*** (0.00)	–0.0101 (0.46)	–0.0104 (0.44)	–0.0109 (0.42)
Firm Size ln log	–0.0014 (0.78)	–0.0015 (0.76)	–0.0010 (0.85)	–0.0061 (0.47)	–0.0059 (0.49)	–0.0059 (0.49)
Dispersion 1 in log	–0.0009 (0.64)			0.0034* (0.06)		
Dispersion 2 in log		–0.0011 (0.69)			0.0040* (0.09)	
Dispersion 3 in log			–0.0019** (0.03)			0.0009 (0.32)
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.1069*** (0.00)	0.1055*** (0.00)	0.1054*** (0.00)	0.0868*** (0.00)	0.0923*** (0.00)	0.1011*** (0.00)
Number of Observations	570	570	570	570	570	570
R-square	0.87	0.86	0.87	0.65	0.65	0.65

***, **, and * represent significance at 1, 5, and 10% levels, respectively. The numbers in parenthesis are *p* Values.

Table 6 reports the estimation results for turnover intensity and entrepreneur rate. Again, the results show that the impact of both business flexibility indices on turnover intensity and entrepreneur rate are negative and statistically significant (at 1% and 5% level, respectively).

The coefficients of three productivity dispersion measures are all negative and statistically significant for entrepreneur rate, but they have no impact on turnover intensity. The coefficient of firm size is not statistically significant for turnover intensity, but it is negative for with mixed statistical significance for entrepreneur rate (at 10% level). The result may suggest that increased firm size is a negative factor for entrepreneurship.

Thus, overall we find the evidence that increasing business flexibility has contributed to the decline in business dynamics in Canada. The findings have also been supported by other studies in the literature. For example, reductions in trade costs and regulatory barriers in trade and investment also help domestic firms to access foreign markets and become multinationals.¹¹ Zhao, Yu, & Onuma (2005) show that large multinational companies can better endure adverse shocks because they are able to share risks among different markets. Furthermore, development and maintaining foreign markets require larger size/scale and hence larger sunk costs. This will

Table 6. Regression results for the impact of business flexibility on turnover and Entrepreneurship.

	Turnover Intensity			Entrepreneur Rate		
	(1)	(2)	(3)	(1)	(2)	(3)
Flexibility Indicator 1	−0.1470*** (0.00)	−0.1477*** (0.00)	−0.1485*** (0.00)	−0.0174** (0.05)	−0.0173** (0.05)	−0.0173** (0.05)
Flexibility Indicator 2	−0.0645*** (0.00)	−0.0648*** (0.00)	−0.0655*** (0.00)	−0.0090** (0.04)	−0.0090** (0.04)	−0.0089** (0.05)
Firm Size In log	−0.0102 (0.33)	−0.0099 (0.34)	−0.0094 (0.35)	−0.0010* (0.10)	−0.0011* (0.08)	−0.0010 (0.11)
Dispersion 1 in log	0.0033 (0.15)			−0.0007*** (0.00)		
Dispersion 2 in log		0.0039 (0.20)			−0.0009*** (0.00)	
Dispersion 3 in log			−0.0007 (0.57)			−0.0004*** (0.00)
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.2265*** (0.00)	0.2317*** (0.00)	0.2426*** (0.00)	0.0093*** (0.00)	0.0083*** (0.00)	0.0066*** (0.00)
Number of Observations	570	570	570	570	570	570
R-square	0.89	0.89	0.89	0.91	0.91	0.91

***, **, and * represent significance at 1, 5, and 10% levels, respectively. The numbers in parenthesis are *p* Values.

likely increase the entry barriers for entrants/start-ups. In the consumer goods industry, for instance, there is empirical evidence that advertising (and R&D) as a sunk cost is even more important to the total entry barrier than tangible sunk costs (Kessides, 1986).

There is also a plenty of evidence that increasing international outsourcing has greatly increased firm's ability to deal with adverse shocks through global supply chains. In addition, the progress in ICT over the last few decades has also greatly increased firm's ability to flexibly adjust production (e.g. via flexible manufacturing and economies-of-scope in production) as well as contributed to increasing in international outsourcing (Eckel & Neary, 2009; Yu, 2012).

5. Conclusions

Firm dynamism is the process of the entrance of new firms that are often equipped with advanced technology and superior managerial practices, and the exit of unprofitable firms that are most likely operating with obsolete technology/products and poor business practices. Firm dynamism is inherently disruptive but it is also critical to long-run economic growth. Research has firmly established that firm dynamism is vital to productivity and sustained economic growth. It is hard to say what is the optimal pace of firm dynamism but a healthy pace of firm dynamism balances the benefits of productivity and economic growth against the costs associated with reallocation. All else equal, a less dynamic industry will slow down job creation and productivity growth, which will ultimately hinder business competitiveness in international markets, and hence have important implications for achieving robust economic growth.

This paper shows that firm dynamism, mainly entry rate and entrepreneur rate, is negatively associated with business flexibility that is indicated by globalisation and ICT investment. Lower firm dynamism may become the new normal as business flexibility is probably still going to trend up in the next few decades because of the ever increasing progress in ICTs and globalisation. Although the advancement in ICTs may reduce barriers for new and small firms to enter, it may also increase the barriers to enter (as discussed earlier) and overall it reduces firm dynamism. Similarly, globalisation and ICT investment that in general increase firm productivity could also reduce/increase firm dynamics, depending on how they change the dispersion of firm productivity in the industry.

Other factors for low firm dynamism may include changes in government regulation and policies. In order to compete with foreign/global rivals, national governments are more likely to allow their domestic firms to become large multinationals (e.g. via mergers and acquisitions), which will also lower firm dynamics. In addition, the increasing willingness of governments and citizens over time to use stimulus packages to save small and large firms from bankruptcy may also contribute to the trend down in firm dynamism.

Nevertheless, governments should continue their effort on fostering entrepreneurship in the society and helping young/small firms because many studies have found that most of the job-creating prowess of small business is due to the contribution of start-ups and young businesses.¹² These efforts will not only improve firm dynamism but also create jobs in Canada.

Notes

1. Business dynamism and firm dynamics are used interchangeably in the literature. In this paper we use firm dynamics as we specifically study dynamics associated with firm entry, exit or entrepreneurship.
2. For example, see Hathaway and Litan (2014b), Haltiwanger, Jarmin, & Miranda (2013), Decker et al. (2014a, 2014b, 2016) and for the U.S.; Criscuolo and Menon (2014) and Calvino, Criscuolo, & Menon (2015) for OECD countries; Macdonald (2014) and Cao et al. (2015) for Canada.
3. See <http://www23.statcan.gc.ca/imdb/p2SV.pl?Function=getSurvey&SDDS=8013> for a short description of LEAP dataset.
4. See <http://www23.statcan.gc.ca/imdb/p2SV.pl?Function=getSurvey&SDDS=3701> for a short description of LFS.
5. The three-period window is $(t-1, t, t+1)$ with period t as the reference period. See Ciobanu and Wang (2012) for a detailed discussion on the pros and cons of this approach.
6. New self-employed workers refer to those with their current job tenure less than one or two years.
7. Appendix A provides with a description of the latent variable approach and the rationale for adopting this approach.
8. The negative covariance between Factor 1 and Factor 2 in Table 4 also indicates this relationship.
9. To our knowledge, there is no real academic concern about firm dynamics affecting business flexibility. However, we should interpret the result as association rather than causality if this is a serious concern.
10. When firm size is regressed against time trend, controlling for industry and year dummies. The coefficient for the firm size is negative but not statistically significant, indicating that firm size is stationary over time.
11. Moreover, in order to compete with foreign/global rivals, national governments are more likely to allow their domestic firms to become large multinationals (e.g. via mergers and acquisitions).
12. See Haltiwanger et al. (2013) for the U.S. and Bartelsman et al. (2005), Calvino et al. (2015) and Andrews, Criscuolo, Gal, & Menon (2015) for OECD countries.

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Appendix A. A latent variable model

In this appendix, we document how to measure a latent variable with several observed indicators by using a latent variable model. A latent variable is not observable but is indicated by several observed indicators. In this appendix, we document how a latent variable is estimated as the weighted sum of its multiple observed indicators, using confirmatory factor analysis. As shown in Tang and Wang (2005) and Tang (2006), the latent variable approach has three main advantages. First, it can provide us with a more comprehensive measure of a latent variable than a single indicator since different indicators measure the latent variable from different perspectives. Second, it solves multicollinearity problems associated with directly using multiple indicators in a regression. Finally, it reduces the number of variables in the analysis and helps us to summarise the data.

Latent variable model

The latent variable model and estimation follow Kolenikov (2009), which is also used by Tang and Wang (2005) and Tang (2006). Let ξ denote an unobservable latent variable that is to be estimated from its n indicators. The empirical relationship between the latent variable and its indicators can be formulated as:

$$\mathbf{x} = \boldsymbol{\mu} + \boldsymbol{\lambda}\xi + \boldsymbol{\delta}, \quad (\text{A1})$$

where $\mathbf{x} = (x_1 x_2 \dots x_n)^T$ is the vector of indicators, $\boldsymbol{\mu} = (\mu_1 \mu_2 \dots \mu_n)^T$ is the vector of the means of the indicators, $\boldsymbol{\lambda} = (\lambda_1 \lambda_2 \dots \lambda_n)^T$ is the vector of coefficients (or factor loadings) of $\mathbf{x}$ on ξ , and $\boldsymbol{\delta} = (\delta_1 \delta_2 \dots \delta_n)^T$ is the vector of error terms. The error terms are assumed to be orthogonal to the latent variable ξ .

According to Kolenikov (2009), by using the usual convention that assumes $E(\xi) = 0$ and $E(\delta) = 0$ and by minimising the sum of squared deviations of the latent variable from its true value, the unobservable latent variable can be estimated by as following:

$$\hat{\xi} = \Phi \boldsymbol{\lambda}^T \boldsymbol{\Sigma}^{-1} (\mathbf{x} - \mathbf{u}), \quad (\text{A2})$$

where $\Phi = V(\xi) = E(\xi\xi^T)$ and $\boldsymbol{\Sigma} = \boldsymbol{\lambda}\Phi\boldsymbol{\lambda}^T + \Theta$ with $\Theta = V(\delta) = E(\delta\delta^T)$ being diagonal.

It is clear from equation (A2) that the weight of an indicator depends not only on its correlation with the latent variable, reflected by $\hat{\lambda}$, but also on its variance and its covariance with other indicators. The smaller the variance of the indicator, the higher is its weight.