

**FIRM DYNAMICS IN JOB GROWTH -
EMPLOYMENT GROWTH DETERMINANTS**

A Thesis

Submitted to the College of Graduate Studies and Research

In Partial Fulfillment of the Requirements

For the Degree of Master of Science

In the Department of Bioresource Policy, Business & Economics

University of Saskatchewan

by

Dimitrios Zikos

© Dimitrios Zikos, April 2008. All Rights Reserved

Permission to use

The author has agreed that the University of Saskatchewan and its library may make this thesis freely available for inspection. The author further has agreed that permission for extensive copying of this thesis for scholarly purposes may be granted by the professor or professors who supervised the thesis work or, in their absence, by the Head of the Department or Dean of the College in which the thesis work was done. It is understood that any copying or publication or use of this thesis or parts thereof for financial gain shall not be allowed without the author's permission. It is also understood that due recognition will be given to the author of this thesis and the University of Saskatchewan in any scholarly use of the material in this thesis.

Request for permission to copy or make other use of the material in this thesis in whole or in part should be addressed to:

Department Head
Department of Bioresource Policy, Business & Economics
University of Saskatchewan
51 Campus Drive
Saskatoon, Saskatchewan
Canada, S7N 5A8

Abstract

Zikos, Dimitrios, M.Sc. University of Saskatchewan, Saskatoon, March 2008.
Firm Dynamics in Job Growth - Employment Growth Determinants.

Supervisor: Dr. Margaret Rose Olfert

Understanding the determinants of employment growth is important in light of the concentration of population and employment in urban centres. As economic activity concentrates, smaller urban centres, and rural areas and towns find themselves at a growing disadvantage. Yet not all small urban or rural towns share the same experience. Moreover, not all urban centres grow significantly. It is thus of academic interest to discover more precisely what the employment growth determinants are.

Another aspect of employment growth is the particular source of employment change. Employment growth is not single-dimensional, but it has four components (growth from firm births and business expansions; and decreases from firm deaths and business declines), each of which may have unique determinants. Thus, in investigating the determinants of employment change, it is important to recognize the businesses' life cycle and test whether the key influences vary over that life cycle.

This study empirically estimates the determinants of employment growth and assesses their role and relative importance in a community's job growth. The major determinants include industrial composition, human capital, spatial variables and policy variables. The study is carried out at two levels: sub-provincial and provincial and covers the years 1983-1999. Two econometric methods of estimation are applied, random effects and fixed effects.

An important finding is that there are significant differences among the four components of employment change. This implies that when we simply examine overall employment growth we are masking very different effects that the determinants of employment change have among the four components of job growth. At the community level industrial diversification assists the growth of expanding firms and boosts employment due to the establishment of new businesses. On the other side, communities that have high industrial concentration experience lower employment losses from declining and exiting firms. Regions with a higher share of population that has received some post secondary education have, *ceteris paribus*, higher job growth rates. Another finding is that the farther away a community is situated from a large Census Metropolitan Area, the less employment growth it has. These results offer significant refinements to undifferentiated employment change findings.

Acknowledgements

I would like to thank the following persons for their time, expertise, and support for the successful completion of this thesis.

I would like to express my sincere gratitude to my supervisor Dr. Rose Olfert for her valuable guidance, helpful advice and moral support during the preparation of this thesis. I would also like to thank my advisory committee, Dr. Hartley Furtan and Dr. Richard Gray, for their encouragement, insightful comments and suggestions at various stages of the process. Moreover, I would like to thank Dr. Mark D. Partridge for supervising the initial stages of my research. His input and advice has been very valuable. Special thanks are extended to Dr. Mobinul Haq for agreeing to be the external examiner for my thesis and for his helpful comments.

I am also grateful for the financial support provided by the University of Saskatchewan, College of Graduate Studies and Research.

I also wish to thank the faculty, staff and graduate students in the Department of Bioresource Policy, Business and Economics for creating a warm and friendly atmosphere.

Finally, I would like to thank my parents, Veatriki and Sotiris, my sister, Katerina, and my brother, Stavros, for their love, encouragement and moral and financial support in my academic pursuits. This thesis is dedicated to them with a lot of love.

Table of Contents

Permission to use	i
Abstract.....	ii
Acknowledgements.....	iv
Table of Contents	v
List of Tables	viii
Chapter 1: Introduction	1
1.1 Introduction.....	1
1.2 Need for the study.....	4
1.3 Purpose and Objectives.....	5
1.4 Hypotheses to be tested.....	6
1.5 Organization of the thesis.....	7
Chapter 2: Literature review	8
2.1 Introduction.....	8
2.2 Determinants of job growth	8
2.3 Spillovers and externalities	11
2.4 Human Capital	12
2.5 Decomposition of job growth.....	14
2.6 Chapter summary	16
Chapter 3: Theoretical Framework.....	17
3.1 Introduction.....	17
3.2 Determinants of Equilibrium Employment and Employment Growth	18
3.2.1 Labour Demand.....	18
3.2.2 Labour Supply.....	20
3.2.3 Equilibrium Employment.....	21
3.2.4 Determinants of Employment Growth	21
3.3 Decomposition of Employment Growth	22
Chapter 4: Methodology.....	24
4.1 Determinants of job growth	24
4.1.1 Industrial composition / Industry mix	24

4.1.2	Human capital – Demographics	27
4.1.3	Spatial Variables	28
4.1.4	Government policies	29
4.1.5	Unionization	29
4.2	Econometric Model	30
4.2.1	Estimated equation	30
4.2.2	Decomposition of Employment Growth	31
4.2.3	Econometric method of estimation	32
4.3	Data sources and data extraction	34
4.3.1	Sub-Provincial data	34
4.3.2	Provincial data	37
4.4	Variable selection	41
4.5	Chapter Summary	42
Chapter 5:	Empirical results	43
5.1	Introduction	43
5.2	Sub-Provincial Regressions	44
5.2.1	Random Effects	44
5.2.1.1	All Businesses	45
5.2.1.2	Expanding firms	48
5.2.1.3	Declining firms	49
5.2.1.4	Newly Identified firms	51
5.2.1.5	Exiting firms	52
5.2.2	Fixed Effects	54
5.2.2.1	All Businesses	54
5.2.2.2	Expanding firms	56
5.2.2.3	Declining Firms	58
5.2.2.4	Newly Identified Firms	59
5.2.2.5	Exiting Firms	59
5.2.3	Sub- Provincial Results Summary	60
5.3	Provincial Regressions	62
5.3.1	Random Effects	62

5.3.1.1 All Businesses	62
5.3.1.2 Expanding firms	64
5.3.1.3 Declining firms.....	65
5.3.1.4 Newly Identified firms	66
5.3.1.5 Exiting firms.....	67
5.3.2 Fixed Effects	69
5.3.2.1 All Businesses	69
5.3.2.2 Expanding firms	71
5.3.2.3 Declining Firms.....	72
5.3.2.4 Newly Identified Firms	73
5.3.2.5 Exiting firms.....	74
5.3.3 Provincial Results Summary	75
Chapter 6: Summary and Conclusions	77
6.1 Introduction.....	77
6.2 Summary	77
6.3 Conclusions and Policy Implications	79
6.4 Limitations of the Study.....	83
6.5 Recommendations for future research	84
References	86
Appendix A: Variable Definition and Data Sources.....	89
Appendix B: Descriptive Statistics	92
Appendix C: Industry groups	94

List of Tables

Table 5.1: Sub-Provincial Regressions; Random Effects Models.	46
Table 5.2: Sub-Provincial Regressions; Fixed Effects Models.	55
Table 5.3: Provincial Regressions; Random Effects Models.	63
Table 5.4: Provincial Regressions; Fixed Effects Models.	70
Table A-1: Variable definition and data sources for the sub-provincial study	89
Table A-2: Variable definition and data sources for the provincial study	91
Table B-1: Descriptive Statistics, sub-provincial variables	92
Table B-2: Descriptive Statistics, provincial variables	93
Table C-1: Industry groups, using 2-digit SIC (1980) codes	94

Chapter 1: Introduction

1.1 Introduction

Understanding the determinants of employment growth is important in light of the concentration of population and employment in urban centres. As economic activity/employment concentrates, smaller urban centres, and rural areas and towns find themselves at a growing disadvantage. Agglomeration economies in the largest urban centres perpetuate the benefits to these places. Yet not all small urban or rural towns share the same experience. There is considerable heterogeneity among them in terms of their employment growth. It is thus of academic interest to discover more precisely what the employment growth determinants are.

Apart from the academic interest, there is also a strong policy interest in employment determinants. For many smaller urban centres or rural towns, employer recruitment and retention policies are designed to retain or increase employment opportunities in those locations. A better understanding of the policy instruments that might be used to increase local employment, as well as the general economic patterns underlying employment change would thus be of policy interest.

It is a well-observed phenomenon that declining population and employment bases are adversely affecting rural communities and small towns across Canada. This problem is particularly severe in the Prairies, along with Atlantic Canada, where people are exiting those places in search of employment. The dwindling population base in

small Canadian towns and the Prairies is making it even more difficult to fund necessary government services and infrastructure that are required elements of a vibrant economy.

What causes employment declines in rural towns and their move to the urban areas?

This is one of the questions that this study will address. In the midst of this widespread decline, there are some rural towns and small urban centres that have overcome the problem of declining population through employment and economic growth. This means that some towns have been able to attract businesses, expand existing businesses and stem the closure and decline of existing businesses, while others have not. What are the determinants of businesses remaining or exiting a community?

One possible explanation is that the location of smaller urban centres and rural towns is important for their employment growth. For many smaller urban centres and rural towns, access to the benefits of urban agglomerations may become an important determinant of their population and employment growth through spread effects. That is, small towns that are well-linked to large urban centres, due to close proximity, may experience population and employment growth resulting from urban agglomeration economies (Partridge et al, 2007). Therefore, in addition to community level employment growth by region and by community size, the scope for benefiting from agglomeration and other size and location advantages/disadvantages is also important.

On the other side, urban areas are growing systematically and some big cities have achieved significant employment gains over the years. However, not all cities are growing, or at least not to the same extent. So, what are the factors that influence businesses' location decisions? A possible explanation is that the skills of the workforce play an important role, as communities with a better educated and trained workforce are

expected to have a higher probability in attracting businesses. At the same time a more highly skilled work force may increase the productivity of the firms where they are employed, leading to their expansion. Another hypothesis to be tested is whether the presence of a “prime-age” workforce in a community leads to subsequent employment growth. Indeed, the regional output depends not only on the physical quantity of labour but also on the productivity of the workers in the labour force. Thus, communities with a supply of high-skilled workers may perform better in keeping their existing businesses and attracting new ones. Moreover, tax and other government regulations can also influence business location and expansion decisions, because they represent a significant part of the cost of production and thus businesses take them into consideration when they choose their place of location.

Another aspect of employment growth is the source of employment change. Community level employment growth may occur through the expansion of existing businesses or through the attraction of new firms. Moreover, communities may experience employment losses from declining or exiting firms. In this sense, employment growth is not single-dimensional, but it has four components, each of which may have unique determinants. Over any given time period a creation/destruction process is taking place, where some firms are expanding, some are declining, others are shutting down, while new firms are also being born. Thus, in investigating the determinants of employment change, it is important to recognize the businesses’ life cycle and to test whether the key influences vary over the firm’s life cycle.

Within any community, employment changes driven by new firms, exiting firms, expansion or contraction of existing firms may be sensitive to different factors, and may

thus call for different policy initiatives. Identifying those differences can inform local policymakers about the policies that may be more appropriate depending on which type of firm is the main focus. Some policies may be more effective for the recruitment of new businesses, while others may be appropriate for the retention and expansion of existing businesses.

Therefore, for both academic and policy reasons, a better understanding of the key determinants of employment change in Canada at the community level, especially the differences by source of employment change, is of significant importance. This is what this study aims to do.

1.2 Need for the study

There are several bases for the importance of this thesis. Firstly, this study identifies the factors that are associated with regional employment growth and empirically tests the relative importance of each factor in the employment growth of Canadian communities. The empirical results of this thesis can inform policymakers regarding employment growth determinants and therefore potential policy instruments that may be implemented in order for a community to achieve higher employment growth rates.

Moreover, the study is carried out at two levels, i.e. Provincial and sub-Provincial (Census Metropolitan Area (CA) / Census Agglomeration (CA) / town). In this way we can examine whether the determinants of job growth work in the same way at the community and at a broader regional level (i.e., province). For example, industrial diversification might be an important determinant of job growth in a local community (e.g. CA or town), but it may not be a positive influence at the provincial level.

Furthermore, the present study follows a unique approach when examining employment growth. Specifically, employment change is decomposed into the following four components: job growth from expanding firms, job growth from new firms, employment loss from declining businesses and employment loss from exiting firms. The determinants of each of the aforementioned components are examined separately. This offers a more complete picture of the determinants of job growth and can provide policymakers with additional input. For example, taxation may matter a lot for potential businesses (start-ups), while it may not be as important for established or expanding businesses. Depending on whether a community has a priority to attract new businesses or to assist the growth of the existing ones, different policies can be implemented. Likewise, stemming or reversing employment losses in declining sectors may be sensitive to yet another set of determinants. This is the first known Canadian study that examines the dynamics of employment growth in this fashion (i.e. by decomposing it into its four sub-components and examining each sub-component separately).

1.3 Purpose and Objectives

The purpose of this thesis is to empirically estimate the determinants of employment growth and assess their role and relative importance in a community's job growth, with a primary focus on small urban and rural towns. The key in our approach is the decomposition of employment growth into its four elements and examination of the dynamics of job creation/destruction. In this way, the research can reveal the driving forces in business decisions about their location and whether to expand or downsize. The results of the study will have broad implications for economic development policymaking regarding taxation, education, clustering and industry targeting.

1.4 Hypotheses to be tested

There are several hypotheses that are tested in this thesis. The general hypotheses are that demographics, human capital, industrial composition, taxation and unionization are important determinants of employment growth. The standard determinants of employment change will be tested. The null hypotheses (H_0) will thus be set up as:

- i) Having a mix of industries that are faring well at the national level does not have a positive effect on community employment growth.
- ii) Industrial diversification does not affect employment growth through spillovers, either within an industrial sector or across business sectors.
- iii) Higher education does not have a positive effect on employment growth.
- iv) “Prime-age” workforce does not affect job growth positively.
- v) A community’s distance from a large urban centre does not have a negative effect on employment growth.
- vi) Unionization doesn’t affect employment growth negatively.
- vii) Taxation doesn’t have a negative effect on employment growth.

If those null hypotheses can be rejected, this will imply that the above factors are significant determinants of regional job growth. The primary interest of this study, however, is to test whether the above factors have a different effect on the four types of firms that we identify (expanding, declining, new and exiting firms). If the null hypothesis that the determinants of job growth do not have different effects across the firm’s life cycle can be rejected, this will imply that examining overall employment growth only may mask offsetting influences of employment growth determinants.

Targeting particular variables based on an aggregate measure of employment change may preclude some influential policies and programs.

1.5 Organization of the thesis

The present thesis is composed of six chapters. The following chapter presents a review of the relevant literature, including past empirical studies on regional employment growth. Chapter 3 contains the theoretical framework for this study. In Chapter 4 we describe the methodology employed in the thesis, including the theoretical expectations, the empirical model and the data sources and descriptions. The empirical results that we obtain from the regression analysis are presented on Chapter 5. Finally, our conclusions follow in Chapter 6.

Chapter 2: Literature review

2.1 Introduction

Regional or community job growth is a subject that has attracted the interest of researchers, because it significantly determines the overall economic success of a community. The determinants of job growth are the subjects of theoretical and empirical investigations in a wide range of sub-disciplines. Some studies emphasize the importance of human capital, others stress the role of externalities and knowledge spillovers; still other empirical studies attempt to assess the relative importance of a wide range of variables. Moreover, a number of U.S. studies have also investigated the dynamics of job growth by looking at the sub-components of employment growth, such as business births and business expansions. Canadian studies have typically been carried out at the provincial level, while U.S. studies have also been carried out at a more local level, such as cities or counties. In the remainder of this chapter we offer a review of selected studies.

2.2 Determinants of job growth

Partridge and Rickman (1996) examine differential U.S.-state employment growth by appraising the relative effects of traditional cost factors versus knowledge and technology spillovers. Their results indicate that industrial composition significantly affects employment growth. In particular, they find that industry mix employment

growth,¹ which measures if states have a mix of industries that are fast-growing at the national level, is significantly and positively associated with state-level employment growth. Moreover, they find that higher levels of taxes, as a percent of personal income, affect job growth negatively. Regarding the demographic variables, their results suggest that employment growth is positively associated with female labour force participation rates and negatively associated with the share of population under the age of 15. However, their results do not reveal a positive relationship between higher educational attainment and employment growth. What they found, though, is that states with a higher share of college graduates are associated with higher paying jobs rather than higher job growth.

Partridge (2001) examines the factors that influence the Canadian and U.S. unemployment and non-employment rates, by using state- and provincial-level data. This study is similar to the present one, in the sense that the factors that influence unemployment should be common with those that influence employment growth, with the difference that they work in the opposite direction. He finds that industry mix employment growth, which measures if a region has a favourable composition of industries, is negatively associated with unemployment rates for both the U.S. and Canada. Regarding the demographic variables, a higher population share 25 to 54 years of age (prime-age workforce) is associated with lower unemployment rate, compared to a high population share 15 to 29 or 55 to 64 years of age. Moreover, the population share with a mother tongue that is neither English nor French is positively and significantly related to provincial unemployment rates. Higher educational attainment

¹ Industry mix employment growth is defined as the difference between the hypothetical employment growth rate for a state, if each of its industries grew at their respective national employment growth rates, and the U.S. total employment growth rate.

reduces U.S.-state unemployment rates, while the opposite is true for provincial unemployment rates. Finally, for Canada, there is a positive and significant relationship between unionization and unemployment, as well as between unemployment benefits and unemployment rate.

The role of unionization can be seen in another Canadian study by Budd and Wang (2004). Using provincial data on business investment and differential labour policies (from 1967 to 1999), they empirically investigate the effect that labour policies favourable to unions have on business investment decisions. Their results indicate that the implementation of new policies that favour workers and increase union power have a negative impact on business investment, especially in building construction. At the same time, such policies do not seem to hurt investment in “machinery and equipment”. These results could imply that the strong presence of unions in a Province adversely affects employment growth, because businesses will be less willing to invest (*ceteris paribus*), and when they do make investments they will prefer to invest in capital goods (machinery) instead of human capital.

Other studies stress the importance of regional amenities in influencing job growth rates. For instance, Deller et al. (2001) examine the role of amenities and quality of life attributes in rural economic growth in the United States, at the county level. They find that developed recreational infrastructure (such as parks, tennis courts and amusement places), land amenities (e.g. mountains, forests) and winter amenities (such as downhill and cross-country skiing) are strongly and positively associated with job growth. Furthermore, they find a negative relationship between employment growth and the percent of population under 17 or above 65 years of age.

2.3 Spillovers and externalities

Endogenous growth models emphasize the importance of externalities and spillovers on regional growth. Endogenous growth theories identify two types of externalities; within-industry and across industries. The theories of Marshall-Arrow-Romer (MAR) (Romer, 1986) and Porter focus on within-industry spillovers and support that knowledge spillovers in specialized, geographically concentrated industries contribute to growth. Such spillovers are commonly referred as localization economies. In contrast, Jacobs' theory proposes that the most important spillovers occur among firms of different industries that are located in close proximity and for this reason, industrial variety and diversification is more important for city growth. Those are also commonly referred as urbanization economies (Henderson, 1997; Partridge and Rickman, 1999).

In their study "Growth in cities", Glaeser et al. (1992) assess the effects of knowledge spillovers and externalities on employment growth. In particular, they test the predictions of the main theories of knowledge spillovers and growth, by looking at city-industry employment growth.² Glaeser et al.'s (1992) main findings favour Jacobs' theory. Specifically, they find that employment in a city-industry grows faster when the entire city-economy is more diversified. Moreover, employment grows slower in industries that are relatively overrepresented in a city, which is in contrast with the prediction of the MAR model.

In a similar study, Henderson et al. (1995) examine the relative importance of MAR externalities (localization economies) and Jacobs externalities (urbanization

² Their dataset consists of the six largest two-digit industries in each of the 170 large U.S. cities that were examined. Examples of city-industries are: New York apparel and textiles; and Philadelphia electrical equipment.

economies) on employment growth. Specifically, they try to reveal what type of dynamic externalities influenced employment growth in eight two-digit manufacturing industries, in 224 U.S. Metropolitan Areas, between 1970 and 1987. Unlike Glaeser et al. (1992), they find evidence that MAR externalities have a positive and significant impact on employment growth for traditional manufacturing industries, while there is no indication of Jacobs' effects. For new high-tech industries, however, they find that the presence of Jacobs' externalities is important; higher diversity in manufacturing industries improves the city's ability to attract employment in high-tech industries.

2.4 Human Capital

Several other studies emphasize the importance of education and human capital externalities in effecting regional economic and employment growth. Acs and Armington (2004) investigate the impact of differences in local human capital resources on local differences in firm birth rates,³ for 394 U.S. labour market areas (LMAs).⁴ The time period under investigation is 1990 through 1998, which is further divided into three sub-periods (1990-92, 1993-95, 1996-98) and then 3-year average firm birth rates are calculated for each LMA. The major hypothesis in their study is that the new firm formation rates are positively related to the level of human capital in a region. The level of human capital is approximated by two measures of educational attainment in each region: the share of the adult population holding a college degree and the percent of adult population without a high-school degree. The results reveal a positive and significant relationship between both educational attainment variables and new firm

³ Firm birth rates (or firm formation rates) are calculated as the number of new firms per thousand members of the labour force in the Labour Market Area in the prior year.

⁴ Labour Market Areas are aggregations of all the U.S. counties into 394 geographical regions, based on predominant commuting patterns.

start-ups. The empirical study also includes some regional control variables, from which they found that regions with higher levels of agglomeration (population) have higher firm formation rates.

Even though the positive coefficient on high-school dropout rates is in contrast to their expectations, they offer the following explanation. They suggest that after controlling for the share of adults with college degrees, the additional effect of a higher share of less educated workers is to assist the start-up process by serving as a cheap labour force for the new firms. Hence, the relationship between educational attainment and firm births can be U-shaped with both high and low levels of education favourable to firm formation and growth. If this interpretation is correct, then a U-shaped relationship may exist between educational attainment and total job growth as well. In fact, this is in agreement with what was found by Glaeser et al. (1995) in their study “economic growth in a cross section of cities.” There they find that a high percentage of uneducated people (less than 5 years of schooling) is associated with higher city population and employment growth, while the same is true for the percentage of people with 12-15 years of schooling.

Another study that emphasizes the importance of human capital in influencing employment growth is that by Simon (1997). He examines the relationship between U.S. metropolitan employment growth and human capital, over the 1940-86 time period. The main hypothesis which is being tested is that cities with higher average levels of human capital experience faster employment growth. Similar to other studies, educational attainment has been used to approximate the level of human capital, specifically the percent of population (25 years and over) with a high school degree and the percent of

population with a college degree or better. Other explanatory variables include the employment shares in manufacturing and services and (the natural log of) median family income; 10-year growth regressions of employment growth were run.

The empirical results in Simon (1997) support the theoretical expectations for human capital, since the coefficients on education variables were positive and significant in all the regressions. Moreover, the results indicate that metropolitan employment growth was more strongly related to the presence of college graduates than to high school graduates. This finding, however, contradicts Glaeser et al. (1995) who, in a similar study, found that the percentage of population with high school degree is more important for long-run city growth than the percentage of population with a college degree and above.

In addition, Simon's study tries to find out whether employment growth at the city level is related to human capital not only within the city proper, but in the remainder of the Metropolitan Area as well. The empirical results indicate that city employment growth is positively related to the level of human capital outside of the city proper. This finding suggests that, even when examining city employment growth, it may be preferable to use metropolitan-level human capital as an explanatory factor. This would capture the possibility that labour force members from nearby areas commute to the city for employment. Further, it may be the case that population re-locates from the city centre to suburbs or surrounding rural areas and commute to city centre jobs.

2.5 Decomposition of job growth

Hotchkiss et al. (2003) look at employment dynamics in the state of Georgia over the 1990-2002 time period. In order to obtain a more complete picture of

employment changes, they decompose net job growth into its four dynamic components, namely jobs created by business births, jobs created by expansions, jobs destroyed by contractions and jobs destroyed by deaths. One interesting finding is that variation in employment is affected by expansions and contractions more than it is affected by firm births and deaths. Thus, firm expansions and contractions contribute more to the overall employment picture. Concerning the establishment size, they find that large establishments (more than 100 employees) are more likely to contract than expand, while the opposite holds for small establishments (less than 5 employees). In addition, small establishments are more likely to shut-down than the large ones.

Finally, Davis and Haltiwanger (1992) carry out a study on establishment-level employment changes (job creation and destruction) in the U.S. manufacturing sector, over the 1972-1986 time period. One finding is that job growth is negatively associated with plant age. Young plants grow rapidly on average, while old plants shrink on average. In addition, the job reallocation rate⁵ is considerably higher for younger plants than for older ones. Moreover, although they fail to find a relationship between establishment size and net job growth rate, they find a strong and negative relationship between establishment size and job reallocation rate. Their results suggest that smaller firms experience higher rates of simultaneous job creation and job destruction. Furthermore, and perhaps more importantly, their paper reveals that annual job reallocation in the manufacturing sector is large in magnitude and that every two-digit manufacturing industry experienced significant simultaneous job creation and destruction. The above findings, taken together, could imply a creative destruction process, where new firms or more efficient/productive firms replace jobs that are being

⁵ The job reallocation rate is the sum of job creation and job destruction rates.

lost from the less efficient/productive older firms that are either contracting or exiting the market.

2.6 Chapter summary

Several studies have investigated the determinants of regional employment growth. Partridge and Rickman (1996) find that industry mix employment growth is positively associated with U.S. state-level employment growth. Other studies emphasize on the importance of knowledge spillovers and externalities, as suggested by the endogenous growth theories. Glaeser et al. (1992) found evidence of Jacobs' externalities (urbanization economies) when looking at large U.S. cities, while Henderson et al. (1995) find evidence of MAR externalities (localization economies) when examining traditional manufacturing industries in U.S. metropolitan areas.

Several studies have evaluated the influence of human capital on job growth. Acs and Armington (2004) and Glaeser et al. (1995) find a U-shaped relationship between education and job growth. Simon (1997) also finds a positive relationship between high educational attainment and employment growth. In addition, he reveals that city employment growth is positively related to the level of human capital outside of the city proper as well (i.e. the remainder of the metropolitan area).

Other studies have examined the dynamics of regional job growth by looking at certain groups of firms, rather than overall employment growth. Hotchkiss et al. (2003) found that the variation in employment in the State of Georgia is affected by expansions and contractions more than it is affected by firm births and deaths. Finally, Davis and Haltiwanger (1992) reveal a high job reallocation rate in the US manufacturing sector, which implies a process of simultaneous job creation and destruction.

Chapter 3: Theoretical Framework

3.1 Introduction

The purpose of this thesis is to develop a regional employment growth model and to empirically examine differences in employment growth rates across Canadian regions/communities. For a more comprehensive analysis of regional employment growth this study examines two different types of regions. Specifically, the first part of the study is carried out at the CMA/CA/Town⁶ level, which means that it uses local communities as the unit of analysis. The second part of the study examines employment growth at the provincial level and aims to assess the common factors that influence job growth at a more aggregate level. The theoretical framework for employment growth at both the community and provincial levels must thus reflect location-specific considerations.

Before setting up the theoretical framework that will allow us to explain differences in regional growth rates, we must first give the definition of employment

⁶ A Census Metropolitan Area (CMA) and Census Agglomeration (CA) are areas consisting of one or more adjacent municipalities (census subdivisions) situated around a major urban core. To form a Census Metropolitan Area, the urban core must have a population of at least 100,000. To form a Census Agglomeration, the urban core must have a population of at least 10,000. Census subdivisions (CSDs) adjacent to the urban core are included in a CMA or CA if they meet at least one of the following rules: at least 50% of the employed labour force living in the CSD works in the urban core and/or at least 25% of the employed labour force working in the CSD resides in the urban core. Rural and Small Town (RST) refers to the population living outside the commuting zone of Census Metropolitan Areas and Census Agglomerations. RST areas have a population of 1 - 9,999 (Statistics Canada, 2003).

growth rate. Thus, the annual net employment growth rate in region r , in period t ($EMPGR_{rt}$) is defined as:

$$EMPGR_{rt} = (EMP_{rt} - EMP_{rt-1}) / EMP_{rt-1} \quad (3.1)$$

where EMP_{rt} stands for the number of persons that are employed in region r , in period t . From Equation (3.1), employment growth is influenced by the factors that determine the level of employment in a given region at two consecutive periods. Total employment in a region in each time period is the outcome of the interaction between labour supply and labour demand.

3.2 Determinants of Equilibrium Employment and Employment Growth

3.2.1 Labour Demand

Regional labour demand is directly and positively associated with firm profitability and labour productivity. Higher firm profits/productivity will lead to business expansions; will attract new businesses in the region. This, of course, is based on the assumption that businesses will choose their location to maximize their profits. Hence, factors that favour regional firm profitability lead to higher labour demand and therefore to a higher level of employment in equilibrium in the region. The related regional economics literature and the endogenous growth models have identified several factors that influence firm profitability and thus regional labour demand. Those factors, which are briefly mentioned here and discussed later on Section 4.1, include:

- i) the price of output (p) and traditional cost factors, such as wages (w), taxes (GOVT) and unionization (UNION);
- ii) Human capital (HC) and demographics (DEMOG) and industry mix / industry composition (IND), as proposed by the endogenous growth models; and

iii) Regional characteristics/regional effects (REG), such as distance to a large urban center.

Businesses choose to locate/relocate into the region r , where they will maximize their profits. Given the above, the indirect profit function of a representative firm $f(\Pi_r^f)$, which is the difference between total revenues (TR) and total costs (TC), can be expressed as:

$$\Pi_r^f = TR_r^f(p, \mathbf{HC}, \mathbf{IND}, \mathbf{REG}) - TC_r^f(w, \mathbf{GOVT}, \mathbf{UNION}, \mathbf{REG}). \quad (3.2)$$

We consider businesses to be mobile, which means that they will relocate in another area if they can achieve higher profits there. This distinguishes employment growth at the country level from the one at the regional level, with the latter being the interest of this study. This means that at the national level there may not be significant changes in employment, while at the same time communities experience significant variation in employment.

Long-run equilibrium dictates equalization of profits across regions and same levels of growth. In the short-run, however, regions with higher profits for the representative firm (relative to the national average) will attract new firms and experience expansion of existing ones (Partridge and Rickman, 2003). Moreover, short-run regional shocks will alter the relative profit levels across regions and thus relocation of firms will occur. As a result we will have differences in the growth rates across regions/communities. Adjustments to equilibrium are not assumed to be instantaneous; businesses may relocate with a considerable lag. Firm relocations and/or decisions for expansions/contraction can be a continuous process, as long as regional shocks occur and the markets move towards new equilibrium levels.

The factors that influence (regional) firm profitability also affect regional demand for labour. Therefore, the region's r labour demand function can be expressed as:

$$L^D_{rt} = f(p_{r,t-1}, w_{r,t-1}, \mathbf{GOVT}_{r,t-1}, \mathbf{UNION}_{r,t-1}, \mathbf{HC}_{r,t-1}, \mathbf{IND}_{r,t-1}, \mathbf{REG}_r). \quad (3.3)$$

The function specification with $(t-1)$ on the right side of the equation and t on the left side implies that initial conditions affect future job growth, which is what this study aims to investigate.

3.2.2 Labour Supply

Regarding the supply side, labour supply is directly related to the region's population and is a function of the demographic characteristics of the population (DEMOG). Furthermore, people (employees) are assumed to locate in the region where they can maximize their utility. Therefore regional labour supply is determined by those arguments that contribute to utility. That is the region's labour force size is strongly influenced by the level of wages in a region (w), government policies (GOVT), such as taxation, and regional amenities (REG) and quality of life attributes (AMEN). For example, higher regional wages or favourable government policies will not only keep the existing people in the region, but will also attract new migrants. Thus, labour supply in region r can be expressed by the following equation:

$$L^S_{rt} = g(w_{r,t-1}, \mathbf{GOVT}_{r,t-1}, \mathbf{DEMOG}_r, \mathbf{AMEN}_{r,t-1}, \mathbf{REG}_r). \quad (3.4)$$

Long-run equilibrium is characterized by equalization of expected utility across regions, through household mobility. In other words, households will have moved until the expected utility, net of moving costs, will be the same in each region. In the short run, however, spatial divergences in utility may exist. Moreover, discreet or continuing

shocks will result in population movements to the region with a higher expected utility. Those movements will directly affect regional labour supply.

3.2.3 Equilibrium Employment

Since the level of employment in a region is the result of the interaction between labour demand and supply, we can state that the factors that influence regional labour supply or labour demand, will also affect the equilibrium level of employment. Hence, from the above equations, by incorporating the structural labour supply elements of Equation (3.4) into Equation (3.3) we can derive the following reduced form expression for total employment in region r at period t :

$$EMP_{rt} = h(p_{r,t-1}, w_{r,t-1}, \mathbf{IND}_{r,t-1}, \mathbf{HC}_{r,t-1}, \mathbf{DEMOG}_r, \mathbf{GOVT}_{r,t-1}, \mathbf{AMEN}_{r,t-1}, \mathbf{REG}_r). \quad (3.5)$$

It is assumed that conditions in period $(t-1)$ determine equilibrium employment in period t . Possible shocks, either from the demand or the supply side, will force regional labour markets away from equilibrium in the short run. This will lead to household and firm movements across regions, until labour markets reach another point of equilibrium.

3.2.4 Determinants of Employment Growth

From equation (3.1) we have that employment growth is the percentage difference in the total level of employment between two consecutive time periods. Equation (3.5) informs us about the factors that determine the level of employment in a region. Therefore, by taking those two equations together, we can see that the factors that have been identified to influence annual employment levels, are also expected to influence employment growth rates. In other words, regional differences in year-to-year

employment changes should be explained by the factors that determine the total employment levels in a region across time. Significant differences in these factors across regions should translate to different employment growth rates, until business and household movements lead to long-run equilibrium.

For example, a change in the local human capital in region r will have an effect (positive or negative) on the equilibrium employment in the next time period and thus will affect the rate to which the employment in the community grows. Hence, communities that have significant differences in the human capital are expected to experience different job growth rates, until regional markets reach the long-run equilibrium. Therefore, the factors that have been identified above are theoretically expected to be associated with employment growth, either positively or negatively. Those are further discussed in the next chapter (Methodology) and they constitute the hypotheses that are going to be tested in this thesis.

3.3 Decomposition of Employment Growth

Apart from examining the factors that influence the overall employment growth, this study also seeks to investigate the dynamics of job growth and the sources of employment change. This is done by decomposing total employment growth into four elements: business start-ups; business expansions; business downsizing; and business shutdowns. In this fashion, employment growth is defined as the following identity:

$$\begin{aligned} \textit{Empl. Growth} = & \textit{Empl. Growth from New Firms} + \textit{Empl. Growth from Existing Firms} \\ & - \textit{Empl. Loss from Downsized Firms} - \textit{Empl. Loss from Exiting Firms} \end{aligned}$$

The reason for this decomposition is that businesses that belong to different groups have their unique characteristics. Businesses have different concerns, depending

on the stage of their life-cycle that they are in. Thus, it is entirely possible that the factors that we have identified above have a different effect on firms that belong in different groups. For example, unions may not be a concern for new firms, but may be a significant factor for existing (mature) businesses. Corporate taxes may primarily hurt businesses that are faring well (and are wishing to expand), while for businesses in decline they may not be the important determining factor. Another example is education; for new firms the existence of highly educated workforce may be of great importance, while mature businesses can rely on the experience of their existing employees.

Another possibility is that significant job creation and job destruction are taking place simultaneously, when there are some firms that exit the market, while at the same time new firms are being born and some existing ones are expanding. In this case job destruction is not necessarily bad, if the jobs that are being lost from closing firms are being replaced by jobs created from new firms or from more productive/efficient expanding firms. Hence, the decomposition of total employment growth can reveal this creative destruction process, something that would be very hard to detect in a standard framework.

While the basic determinants of regional employment change, as expressed in equation (4) above, are expected to be influential for all four categories of firms, their level of significance and perhaps even sign may vary. Disaggregating firms into the four categories thus allows us to capture variation in the employment change factors across these groups.

Chapter 4: Methodology

4.1 Determinants of job growth

In the previous sections we have identified several factors that are theoretically expected to be associated with employment growth, either positively or negatively. Those are further discussed here and they constitute the hypotheses that are going to be tested in this thesis.

4.1.1 Industrial composition / Industry mix

Regions with a concentration of high-productivity industries are expected to have higher economic and employment growth than regions with a low-productivity industry composition. This is because the higher productivity in the former areas will increase firms' profitability, something that will lead to firms expanding and will attract new firms to the region. Employment growth will be particularly enhanced in regions with a concentration of high labour-productivity industries. Moreover, concentrations of knowledge-intensive high-tech⁷ industries in an area can have a positive influence in employment growth, due to research and development (R&D) and knowledge spillovers from high-tech firms to neighbouring firms (Partridge and Rickman, 1996).

⁷ High-technology industries can be defined as knowledge-intensive industries that devote significant resources for research and development. According to OECD's "classification of manufacturing industries based on technology," high-technology manufacturing industries are those that have high R&D intensities; where R&D intensity is defined as direct R&D expenditures as a percentage of production (gross output).

Drawing on the empirical work of Partridge (2001), there are several variables that are used in the empirical model to capture the effect of the industrial composition. The first one is industry-mix employment growth (IMGR), which measures whether a region has a mix of fast-growing or slow-growing industries (at the national level). IMGR is the hypothetical employment growth rate for a region, if each of its industries grew at their respective national employment growth rates. It is defined as: $IMGR_{rt} = \sum S_{rt-1}^i * CANGR_t^i$, where S_{rt-1}^i is the share of employment in industry i in region r , and $CANGR_t^i$ is the national growth rate of industry i in year t . Industry mix can be perceived as a proxy variable for labour demand, in the sense that it captures exogenous (to the region) demand shifts resulting from having a mix of fast- or slow-growing industries at the national level. Hence, the relative IMGR coefficient captures multiplier effects from demand shifts as well as the relative advantages of targeting growth on industries faring well at the national level (Partridge and Rickman, 1996). It is entirely possible that having a favourable industry composition induces relatively more business creation, while at the same time leading to more business deaths in communities as they attempt to reallocate resources. Such a creative destruction process would be hard to detect in a standard framework. As a rule, however, we expect a positive effect of IMGR on employment growth.

The second variable is the Herfindahl Index (HI) and it is calculated as the sum of squared shares of employment by industry. A higher value for HI indicates more concentration in the dominant industry or, in other words, greater specialization, while a smaller value indicates industrial diversification. Herfindahl Index is used to assess whether a high concentration of industries in a region results in within-industry

knowledge spillovers (MAR externalities), or whether industrial diversification is more important for regional growth, as suggested by Jacobs theory (Glaeser et al., 1992). The HI has a more practical meaning in a smaller centre or town, as it will capture the effect of a large employer or an emerging cluster of activities within the same industry grouping. For smaller communities the coefficient of HI will directly test whether clusters induce business start-ups/expansions. At the broader regional (provincial) level the influence of HI may have a slightly different interpretation. Heavy reliance on a particular industry may result in benefits of specialization for the region, but the lack of diversification may make it particularly vulnerable to both external demand shocks as well as the negative effects of heavy dependence on a declining sector.

Finally, several industry shares are being used in order to control for interrelationships between industries, including to account for each sectors influence as suppliers of inputs to other industries and as demanders of inputs to other industries. Moreover, it is possible that there exist spillovers between industries, and in particular R&D and knowledge spillovers from high-tech firms (complex manufacturing) to other neighbouring firms. Hence, the inclusion of complex manufacturing share tests whether a concentration of R&D intensive firms induces employment growth in a region. Furthermore, the labour-intensive traditional manufacturing sector is expected to have a positive effect on employment growth. The same is expected for producer services sector, since producer services can help other industries increase their productivity and grow more. Finally, we expect a negative impact from agriculture and other primary industries, as they are declining in labour intensity (they are also associated with rural

areas that are experiencing an economic decline). Labour-saving technologies long adopted in primary sectors have made them labour-shedding.

4.1.2 Human capital – Demographics

The human capital of the workforce is another factor that can influence employment growth, because it directly affects regional productivity, as emphasized by the endogenous growth models. One variable that is widely used in the related literature to approximate the human capital is the level of education. It is expected that average education attainment in a region will have a positive influence on job growth. However, some previous empirical studies have found that employment growth rates are positively associated with both high and low levels of education (Glaeser et al., 1995 and Acs and Armington, 2004). Hence, a U-shaped relationship between education and employment growth can also be expected. The level of education is being represented by the proportion of the workforce holding a University degree or other post-secondary certificate. This reflects our main focus on the effect of highly educated workforce on employment growth.

The age of the workforce is another variable that is included in the model because of its influence on labour supply. A higher share of population that is 25-54 years old, which can be referred as “prime-age” workforce, affects labour supply positively and thus higher employment growth is expected. Moreover, female share in employment is used to control for female labour-force participation and the share of First Nation/Aboriginal population and share of immigrant population controls for possible demographic and cultural differences as well as the effect of systemic discrimination.

4.1.3 Spatial Variables

When the communities under examination are small towns, their degree of rurality does not depend only on their population or population density, but also on their distance to an urban centre (CMA). This distance approximates their remoteness from, or access to, agglomeration economies in larger centres. Improved access (shorter distance) is expected to exert a positive influence on employment growth, as the smaller community firms will be able to avail themselves of the higher order goods and services in the larger centres. In addition to this, access to inputs and proximity to agglomeration economies also improves market access for local production.

In the same way, for Census Agglomerations it matters whether they are situated close to or far away from a large urban centre. For this reason, a spatial variable that is being used in the sub-provincial empirical model is the distance to a large urban centre, i.e., a CMA with population above 500,000. The hypothesis is that, *ceteris paribus*, the farther away a community is situated from a “mega” CMA, the lower its employment growth rate. This is consistent with Partridge et al. (2007) who, in their study on Canadian cities, where they found a strong inverse relationship between distance of a non-major urban centre or rural town to nearest major urban centre and 1981–2001 population growth in those communities (i.e. small urban centres and rural towns).

Another set of variables that we use in our sub-provincial study, are dummy variables that distinguish whether a community is a CMA, a CA or a small town (with small towns being the omitted category in the regressions). This is to test whether there are systemic differences between towns and CMAs, and CAs, regarding the job growth

that they can achieve. Moreover, this variable captures differences between urban and rural amenities and the effect that they can have on community growth.

4.1.4 Government policies

Government policies, such as taxes, affect employment growth in a region, because they set an overall business climate and directly affect business costs, so they can significantly influence business location (and expansion) decisions. For example, firms may perceive lower provincial business taxes as a provincial government's commitment to the business community. The variable that is being used in the empirical model to approximate the tax burden on businesses is the provincial corporate taxes (as percent of personal income). Moreover, provincial income or sales taxes can influence people's location decisions and migration, thus affecting labour supply. For this reason, provincial indirect taxes (as percent of personal income) are also used as an employment determinant in the empirical study.

Higher tax burden can drive businesses and people away from a region, having a negative influence on job growth. On the other side, however, taxes can be used to provide infrastructure or services in the region, making it a more attractive place to live in or do business. In this case higher taxation can have a positive effect on job growth. Therefore, the coefficients on the tax variables will reveal the net effect of taxation on employment growth, indicating which effect is the stronger.

4.1.5 Unionization

Unionization, as measured by the percent of workers that are union members, is another factor that can affect employment growth. Partridge (2001) found that higher

provincial union rates contribute to provincial unemployment which indicates that unionization hurts job growth. The reason for this is that unions may use their power to achieve higher wages and improve working conditions for their existing members, something that results in higher labour costs for businesses and lowers labour demand. Hence, the unionization rate should also be included in the empirical model to test for the hypothesis that higher union rates are associated with lower employment growth.

4.2 Econometric Model

4.2.1 Estimated equation

Having identified the factors that we expect to influence employment growth, we estimate the following equation in order to test our hypotheses:

$$\begin{aligned} \text{EMPGR}_{rt} = & a + b_1 \mathbf{IND}_{r,t-1} + b_2 \mathbf{HC}_{r,t-1} + b_3 \mathbf{DEMOG}_{r,t-1} + b_4 \mathbf{REG}_{r,t-1} + b_5 \mathbf{GOVT}_{r,t-1} \\ & + b_6 \mathbf{UNION}_{r,t-1} + e_{rt} \end{aligned} \quad (4.1)$$

where EMPGR_{rt} is the employment growth rate in region/community r , in period t ;

\mathbf{IND} is a vector of Industrial variables;

\mathbf{HC} is a vector of human capital variables;

\mathbf{DEMOG} is a vector of demographic variables;

\mathbf{REG} is a vector of regional – spatial variables;

\mathbf{GOVT} is a vector of governmental policies variables;

\mathbf{UNION} denotes unionization; and

e_{rt} represents the error term.

Our dependent variable (job growth rate) is evaluated at period t , relative to $t-1$, while the independent variables are evaluated at the initial year of the period, $t-1$. For the sub-provincial study, 4 periods have been identified, namely 1983-1986, 1986-1989,

1989-1992 and 1992-1996. Therefore, when the observation for the dependent variable is employment growth at community r_1 for the period 1983-1986, for example, the independent variables are being evaluated at year 1983. Regarding the Provincial study, the dependent variable is the 2-year moving average employment growth, for the years 1983-1999. In other words, it is the average growth between $t-2$ and t . The independent variables here are being evaluated at the initial year, $t-2$.

4.2.2 Decomposition of Employment Growth

Apart from examining the factors that influence total (net) employment growth in a region, this study goes a step further and aims to investigate the dynamics of job formation and the sources of employment change. This is being done by decomposing total employment growth into its four dynamic elements, namely business start-ups; business expansions; business downsizing; and business shutdowns. In this fashion, employment growth is defined as the following identity:

$$\begin{aligned} \text{Empl. Growth} = & \text{Empl. Growth from New Firms} + \text{Empl. Growth from expanding Firms} \\ & - \text{Empl. Loss from Downsizing Firms} - \text{Empl. Loss from Exiting Firms} \end{aligned} \quad (4.2)$$

Employment growth for each of the four components is defined as the percentage change in employment from time $(t-1)$ to t attributed to the said component, divided by total employment in initial year $t-1$. For example, the employment growth rate for expanding firms, in region r , is defined as:

$$\text{EMLGR}_{\text{expanding firms, } r, t} = \Delta \text{EMP}_{\text{expanding firms, } (t-1)-t} / \text{Total EMPL}_{r, (t-1)} * 100 \quad (4.3)$$

Consequently, equation (4.1) is estimated for each of the four employment growth components separately. By decomposing job growth in this manner and examining each element separately this study aims to reveal the contribution and the

relative importance of each factor on the four types of employment change (start-ups, exits, expansion, contraction). For example, one factor (education) may be important in attracting new firms in the region, but has no significant influence on employment change among existing firms. Another possibility is that significant job creation and job destruction are taking place simultaneously. Hence, the decomposition of total employment growth aims at revealing this creative destruction process, something that could not be achieved by solely examining overall employment growth.

4.2.3 Econometric method of estimation

Our provincial and sub-provincial datasets consist of observations on several regions/communities, for a number of years (time periods). Therefore they are described as panel datasets, where cross-sectional and time series data are being combined.

Therefore, we empirically estimate fixed-effects and random-effects regressions, using STATA software. These regression techniques are appropriate due to the nature of our dataset. One alternative is simple pooled-OLS regression, but the disadvantage with this is that OLS treats all observations as independent from each other and does not take into consideration the fact that we have time series observations for several sections (regions). Moreover, the estimates of coefficients derived from pooled-OLS regressions may be subject to omitted variable bias. Panel regressions deal with this issue. Fixed effects regressions control for omitted variables that differ between sections but are constant over time, while random effects regressions control for omitted variables that vary either across sections or over time.

Fixed effects regressions (FE) are widely used for this kind of dataset and they have the advantage of producing consistent estimations and eliminating unobserved

heterogeneity. However, FE capture only the within variation (i.e. the variation within a given region/community across time), which can lead to inefficient results. For our study this is a limitation, particularly in the sub-provincial study where we have only four time periods and most of the variation is cross-sectional (across regions). In this case, fixed-effects may not produce the appropriate results due to limited variability in our sample. For this reason, we estimate random effects regressions and focus on the results that we obtain from this econometric specification.

Random effects (RE) take advantage of both the within and between variation in our variables, which lead to efficient estimations. The random effects estimator is a weighted average of “between” (between communities/regions at each point in time) and “within” (within a community/region, across time) estimators, so it takes full advantage of our datasets. As we will see in the next chapter this is being confirmed by the empirical results we obtain, since random effects regression produce more significant coefficients and have much higher explanatory power (R-square) than fixed effects. Another advantage of RE is that it can deal with regressors that are fixed within a region, such as “distance from closest CMA” in our sub-provincial study. A disadvantage of random effects, however, is that it relies on the assumption that there is no correlation between the error term and the independent variables. If this assumption is violated then random effects estimator can produce inconsistent results. Even in this case, however, the random effects results are still efficient.

4.3 Data sources and data extraction

4.3.1 Sub-Provincial data

For the first part of the study that is carried out at the CMA/CA/RST level, annual data on employment for different Census Metropolitan Areas, Census Agglomerations, towns and rural areas are required, in order to form the dependent variable. Those data are derived from Statistics Canada “Sub-Provincial Employment Dynamics Database” (Statistics Canada, 2000). The database uses longitudinal data derived from enterprise surveys to produce year-to-year changes in the number of employer businesses (one or more employees) and employees in Canada. The changes are shown by business life status which includes entry, growth, decline and exit. The 'entry' group (newly identified firms) consists of those businesses that were present in the comparison year and not in the base (initial) year. The 'exit' group (no longer identified firms) consists of businesses that were present in the initial year, but not in the comparison year. Firms that were present (having employees) in two consecutive years are broken down according to whether they grew (increased their employees) or declined (decreasing employment).

The data are available 1983-1996 period on the 1980-SIC⁸ and they are presented by total SIC (all industries) for sub-provincial regions (CMA/CA/town/rural). The dataset covers a total of 202 Canadian centres for the period 1983-89 and 216 regions for the period 1989-96, as 14 places were added. Specifically, it covers all CMAs and the vast majority of CAs, as well as a significant number of towns (60 for the 1983-89 period and 72 for the 1989-96 period). Towns are defined as places that are neither

⁸ Standard Industrial Classification

CMAAs nor CAs, but where there is a significant economic activity taking place there, i.e. there are more than 2,000 employees.

In our empirical model the dependent variable is 3 or 4-year regional average growth rate (only the last time period, 1992-96, contains four years in order to make use of all the years that we have observations for). The growth rate is calculated by taking the difference in employment between the starting and ending period, dividing by total employment in the starting period and then dividing the result by three (or four).

Concerning the independent variables, data for the demographic and human capital variables are available from the 1981, 1986, 1991 and 1996 Census of Population. One of these variables is education. In particular the number of persons that fall into the following education groups is reported: less than grade 9, high-school diploma, some post-secondary education and university degree. Using those absolute values, we calculated the percent of population that falls into each of those groups. Another variable is the age of the population and in particular the number of people who fall into the 25-54 age group, who are considered to be the “prime-age” workforce. Again, the percent of population that falls into an age group has been calculated and used in the empirical model.

In the same fashion, the following variables were extracted from the Census:

- percent of First Nations population;
- percent of population that immigrated into the CSD over the last 5 years;
- percent of young population (20-34 yrs) that moved into the CSD over the last 5 years;
- female share in employment, for people 25 or more years old; and

- employment/population ratio, for people 15 or more years old.

Since the Census happens once every five years, data for the above explanatory variables are not available annually. In order to obtain annual estimates for these variables, the following interpolation technique was applied: for each variable, its values for the years that were not covered by the census were estimated by using weighted percentages from the preceding and the succeeding censuses. For example, the employment/population ratio in a community for the year 1989 will be estimated by using 40% of 1986 employment/population ratio and 60% of 1991 employment/population ratio.

In addition to the above demographic variables, the Census of population is the source for variables that are included in the **IND** vector. Specifically, the Census provides data on total employment in a community for the following industry groups: Agricultural and Related Industries, Other Primary, Traditional Manufacturing, Complex Manufacturing and Producer Services. Another variable that is derived from the above data is the Herfindahl Index, which is defined as the sum of squared industry-employment shares. As explained in section 4.1.1, the Herfindahl index indicates whether a community has a high concentration of a few industries (high HI value) or there is high industry diversification (low HI value).

Moreover, an industry mix variable was computed to represent the influence of the national growth rates of particular industries. This variable shows what the local (CA/CMA/town) employment growth would be if each local industry grew at its respective national rate. IMGR thus serves as a way of standardizing the community's potential for growth, given its industrial mix; the more favourable the industrial mix

(high IMGR), the higher the potential for the community to grow in terms of employments.

Finally, a variable that is used in the empirical model is the distance of a CMA, CA or Town from the closest CMA with a total population of 500,000 people or more. This variable was calculated by using GIS technologies from the C-RERL Lab. For CMAs with their own population of 500,000 or more, the distance has a value of zero.

For the dependent variable, data were always available at the CA/CMA or town level. However, the Census data were available at the CCS level. The majority of CMAs and several CAs are composed of more than one CCS. Alternatively, a CCS may contain a town but also additional rural space, or other smaller towns/villages. In the former case the data were aggregated to the CMA/CA level. In the latter, the town was simply approximated by the entire CCS. Moreover, in some cases two towns are inside the same CCS. In this case, the towns were aggregated. Finally, if a town is located inside a CMA or CA, then the town is dropped from the sample and incorporated into the CMA/CA.

For the sub-provincial part of the study there are not sufficient data available for the tax variable and the union rate. Thus, the effect of these factors, as well as the effect of other unmeasured factors, will be captured in the regional fixed effects.

4.3.2 Provincial data

To capture the effect of unions and taxes, which were not available at the sub-provincial level, a second part of the study was carried out at the provincial level. For the provincial study, data for more variables are available, something that allows a more complete study. For the provincial study, employment data are derived from Statistics

Canada “Employment Dynamics Database” (EDD) (Statistics Canada, 2002). The database contains statistical tables on the number of employed persons and number of businesses with employees for Canada and the Provinces, for the years 1983-1999. For every two successive years, net year-to-year changes in total employment and by industry groupings are broken down according to: job gains from new firms, job gains from expanding firms, job losses from downsized firms and job losses from exiting firms.

Hence, EDD serves in providing data for several variables of the regression model at the provincial level. The first one is employment growth rates, which represent the dependent variables. Two sets of employment growth rates are calculated. One is the annual employment growth rate and the second is a two-year “moving average” employment growth rate. The latter has been calculated as follows:

$$\text{EMPGR}_{t,t+2} = (\text{EMPGR}_{t,t+1} + \text{EMPGR}_{t+1,t+2}) / 2. \quad (4.4)$$

The moving average job growth is used in the empirical study, in order to take out the effect of annual shocks that may have affected some regions. As mentioned above, a vector of dependent variables is created, which contains: employment growth, all firms; job growth from expanding businesses; growth from declining firms (negative values); job growth from business start-ups; and growth from business shut-downs (negative values).

EDD is also the source for three of the independent variables in our models, namely Industry shares, Herfindahl Index and the industry mix growth rate (IMGR). Industry i 's share is defined as the number of employed persons in industry i at year t divided by total provincial employment for this year. Ten industry groups were

identified, using 2-digit SIC data (see appendix C). Some observations had to be interpolated due to missing values. We used the following interpolation technique: a missing value on industry i at year t was estimated by taking the average of the values at year $t-1$ and $t+1$ for this particular industry. Moreover, knowing the values for most of other industries and the values for total employment, helped in getting a very close approximation for the missing values.

For the calculation of the Herfindahl Index, which is defined as the sum of squared shares of employment by industry, SIC-C level data (19 Industry groups; A00-R00, Y00) have been used. Finally, EDD served as a source for the estimation of “Industry Mix Growth Rate”, which is defined as: $IMGR_{rt} = \sum S_{rt-1}^i * CANGR_t^i$, where S_{rt-1}^i is the share of employment in industry i in region r , and $CANGR_t^i$ is the national growth rate of industry i in year t . Again, 1-digit industry shares have been used.

Regarding the demographic and human capital variables (**DEMOG**), most of the data come from CANSIM⁹ datasets. Specifically, data on education is from CANSIM Table 282-0004, which reports the number of persons in the labour force with an education of less than grade 9, no high school graduation, high school graduation diploma, some post secondary education and university degree, amongst others. For the purpose of this study, we calculated the % of labour force that falls into each of those groups. CANSIM Table 051-0001 reports provincial population by age groups, so it was used as a source for the calculation of percent of prime-age workforce (persons 25-54 years old) and other age related variables.

Data on crime is from CANSIM Table 252-0013. The variable that was identified here is total number of crimes in a Province (excluding traffic) per 100,000

⁹ Canadian Socio-Economic Information Management System

population. Moreover, for the provincial study it is important to control for the degree of urbanization in a province. This is being approximated by the share of population that lives in Census Metropolitan Areas. Here we have two datasets from CANSIM; one that reports the CMA population for the years 1981-1986 using 1981 boundaries and one that reports the CMA population for the years 1986-1999, using 1996 boundaries. In order to have homogeneous boundaries across time, the 1981-1985 values were converted to 1996 boundaries.¹⁰

Regarding the tax variable, Statistics Canada publishes annual data for Canada and the Provinces on the total amount of direct and several indirect taxes paid to the federal, provincial and local governments. In addition, data for personal income are also published annually at the provincial level. Those data are found on CANSIM Tables 384-0007 and 384-0013 and are a part of Provincial Economic Accounts. For the purpose of this thesis, the following variables were created: Total Provincial Indirect Taxes as a % of (lagged) Total Personal Income, Total Provincial Income Taxes as a % of (lagged) Personal Income and Provincial Corporate Taxes as a % of (lagged) Total Personal Income.

Finally, for this part of the study, data for unionization (UNION) are also available from Statistics Canada. Specifically, for the years 1982-1995 Statistics Canada estimated provincial union rates using the CALURA firm survey. For the years 1997 and 1998 the data are available from the Labour Force Survey. Union densities are not available for 1996, so for this year the average of 1995 and 1997 is used.

¹⁰ The following technique was applied: for 1986 we have values according to both 1981 and 1996 boundaries. A 'coefficient' was calculated, that shows the % difference in CMA population in each Province between 1981 and 1996 boundaries. Then, this coefficient was multiplied by the 1981-1985 values, in order to get an estimation for 1981-1985 values projected to 1996 boundaries.

4.4 Variable selection

The variables that are presented above constitute the ones that were used in our final empirical estimations. However, our full dataset consisted of several more variables. For example, we had observations for more industry groups, more age groups, level of education and taxes. Several preliminary regressions were estimated, in order to identify the variables that have the most significant effect on employment growth and to decide on which variables to choose for our final specifications, given our theoretical model and potential multicollinearity. One problem that arose when using many explanatory variables was collinearity between the independent variables. In order to deal with this issue, some of these variables had to be eliminated from the final specifications.

The variable selection was based on the relative importance of each variable for our study. For example, out of all the tax variables in the provincial-level study, the ones that were chosen are provincial corporate taxes (appropriate to capture the direct effect of taxation for businesses) and provincial indirect taxes (to capture the effect of taxation on the labour supply side). Furthermore, for the sub-provincial study, “prime-age” workforce is correlated with employment-to-population ratio. Only the latter variable was kept in the regression model, because it serves as a better proxy for the desirability and “employability” of the workforce. In the same fashion, some industrial and education variables were dropped from the final sample. Regarding education our focus is on the effect of higher education on employment growth, while for industrial sectors we focus on primary industries, manufacturing and producer services.

In addition, we tried more specifications for the dependent variables, specifically annual employment growth rates. The reason that moving average growth rates were preferred is to reduce the possible effect of annual shocks on a local economy. For example, this is to avoid the misleading effect that a closure of a large business on a town would have, especially if this shut-down was caused from external factors. In the same fashion, moving average employment growth for the provincial study eliminates the effect of an annual shock on the Canadian economy.

4.5 Chapter Summary

This chapter has outlined the methodology that was employed for the estimation of employment growth determinants. First, we identified the factors that are expected to influence job growth, according to our theoretical framework and past studies. An econometric model was build to evaluate the determinants of job growth. We identified four types of employment change and decomposed employment growth into its four components. Each of the four components, as well as total employment growth, is examined by using random effects and fixed effects regressions. The study is carried out at two levels, provincial and sub-provincial, due to more data availability in the provincial level and in order to have a more complete picture on the dynamics of job growth. Final selection of variables was informed by both the theoretical model and by econometric considerations, such as multicollinearity.

Chapter 5: Empirical results

5.1 Introduction

In this chapter of the thesis we are turning to the regression results that were obtained from the empirical estimation of our models. In order to use our rich datasets in the most suitable way, we run several regressions which include different sets of variables. In this way we could check the robustness of our results and see which variables are most important in explaining provincial employment growth. Moreover, an issue that had to be handled was the correlation between the independent variables. This problem was solved by identifying the variables that were collinear and dropping some of them from the final regressions. The variable selection was made based on the expected importance of each of them on employment growth, according to the theoretical framework.

Our dataset is composed of panel data, meaning that we have cross-sectional observations for several time periods. Due to the nature of our dataset we run panel regressions, using the specifications of both random effects and fixed effects estimations. Those techniques have the advantage of dealing with omitted variables bias. Fixed effects control for omitted variables that differ between sections (regions), but are constant overtime, while random effects control for omitted variables that vary either between sections or over time. As it has been described earlier, employment growth has been decomposed into four elements. Thus, we have estimated regressions for total

employment growth as well as for each of its elements separately, in order to reveal the differences between firms that are expanding, firms that are declining, businesses that are starting up and businesses that are shutting down.

This chapter is organized as follows: first we present the results that are obtained from the sub-Provincial study as well as their interpretation. Random effects regressions are presented first, followed by the fixed effects results. In the second part of the chapter we turn to the Provincial study and the results that we obtained there.

5.2 Sub-Provincial Regressions

The dependent variable here is 3-year or 4-year average employment growth,¹¹ across sub-provincial regions (CMAs, CAs, and towns). The explanatory variables are being evaluated at the initial year of each period.

5.2.1 Random Effects

First we are going to present and discuss the results from the random effects model. As it has been discussed in section 4.2.3, random effects models have a significant advantage for our study, compared to fixed effects: RE utilize both the variation (on our variables) within a panel (i.e. community), overtime; and the variation between panels. Fixed effects utilize only the former. As we expect the main part of the variation on our variables to be cross sectional, random effects is our primary specification. As we will see later (see section 5.2.2.1), this is confirmed by our empirical results, because random effects produce more significant estimators compared to fixed effects and the explanatory power of the former model is much higher.

¹¹ As discussed earlier, we have calculated average employment growth for the following time-periods: 1983-1986, 1986-1989, 1989-1992, 1992-1996

5.2.1.1 All Businesses

As we can see from Table 5.1 (2nd column), an important driver of community employment growth is the industrial mix. IMGR coefficient is positive and significant at 1% level, which shows that having a high presence of industries that are faring well at the national level, helps the community achieve higher employment growth. This result is consistent with previous studies (e.g. Partridge and Rickman, 1996) as well as our theoretical expectations. This means that a city or town will achieve higher growth if it has attracted more businesses of fast-growing sectors.

One particular industry that boosts employment growth is Producer Services. The higher the share of this industry in total employment, the higher the job growth. This result is expected, since producer services is a sector that can assist the growth of the other industries. Moreover, producer services is one of the most rapidly growing sectors in developed countries. The growth of this sector is indicative of the increasing importance of services sector on economic growth as well as the fact that this sector remains relatively labour-intensive, often requiring face-to-face contact and frequent communication.

Another result that is consistent with our expectations is the positive and significant coefficient of employment-to-population ratio. This ratio shows the size of the employed labour force relative to total population (more than 15 years old). A higher ratio indicates a higher participation rate as well as a high degree of “employability” of the labour force. It also serves as a measure of how active the labour force is. Therefore, this variable is used as a proxy for the quality and “desirability” of the labour supply. A high ratio suggests that the workforce is skilled enough to be able to find jobs on a

Table 5.1: Sub-Provincial Regressions; Random Effects Models.
(Dependent Variables: 3-4-year Average Employment Growth Rates)

Variable	All firms	Increasing ALUs	Decreasing ALUs	Newly Identified Firms	Exiting Firms
Constant	-11.934*** (0.003)	-0.6793 (0.793)	-11.268*** (0.000)	12.382*** (0.000)	-14.481*** (0.000)
Industry Mix Growth Rate	0.5946*** (0.010)	0.2823** (0.040)	0.2794*** (0.006)	-0.2184 (0.109)	0.2234* (0.058)
Agriculture share	0.0560 (0.228)	0.0919*** (0.002)	-0.0672*** (0.008)	0.0922*** (0.007)	-0.0600** (0.038)
Other Primary Industries share	0.0064 (0.832)	0.0417** (0.032)	-0.0294* (0.074)	-0.0273 (0.219)	0.0268 (0.157)
Traditional Manufacturing share	0.0437 (0.162)	-0.0052 (0.797)	0.0478** (0.005)	-0.0565** (0.013)	0.0619*** (0.001)
Complex Manufacturing share	0.0322 (0.256)	0.0085 (0.642)	0.0173 (0.266)	-0.0216 (0.303)	0.0316* (0.076)
Producer Services share	0.1796** (0.045)	0.1775*** (0.002)	0.0111 (0.814)	-0.0014 (0.983)	0.0242 (0.657)
Herfindahl Concentration Index	-1.7506 (0.729)	-9.2892*** (0.004)	9.9723*** (0.000)	-15.994*** (0.000)	15.373*** (0.000)
Employment/population ratio, age 15+	0.0724** (0.032)	0.0389* (0.072)	0.0502*** (0.005)	-0.0488** (0.045)	0.0439** (0.035)
% Aboriginal population	0.0067 (0.789)	0.0203 (0.213)	-0.0105 (0.458)	0.0317* (0.096)	-0.0282* (0.081)
Female share in employment	0.0503 (0.409)	0.1334*** (0.001)	-0.0614* (0.055)	-0.0239 (0.581)	0.0354 (0.338)
% some post-secondary education	0.0992** (0.029)	0.0305 (0.298)	0.0208 (0.399)	0.0720** (0.031)	-0.0205 (0.470)
% University degree	-0.0629 (0.426)	-0.1535*** (0.003)	0.0559 (0.194)	-0.1265** (0.030)	0.1244** (0.012)
% Young pop (20-34) moved in CSD recently	-0.0114 (0.564)	-0.0065 (0.607)	-0.0120 (0.258)	0.0301** (0.035)	-0.0344*** (0.005)
% Immigrants moved in CSD last 5 years	-0.2064 (0.215)	-0.0244 (0.818)	-0.2383*** (0.007)	-0.1188 (0.316)	0.0888 (0.380)
Closest CMA (500,000 pop) in kms	-0.0020** (0.026)	-0.0004 (0.515)	-0.0013** (0.012)	-0.0019*** (0.006)	0.0012** (0.039)
CMA dummy variable	-0.2287 (0.675)	-0.4074 (0.252)	0.3138 (0.310)	-1.9734*** (0.000)	1.7993*** (0.000)
CA dummy variable	0.0678 (0.811)	-0.1613 (0.382)	-0.0610 (0.705)	-0.8178*** (0.000)	1.0239*** (0.000)
Year (period) dummies	Yes	yes	yes	yes	yes
Provincial dummies	Yes	yes	yes	yes	yes
# of observations	757	757	757	757	757
R-sq: within	0.4337	0.2648	0.2494	0.0422	0.1820

R-sq: between	0.3838	0.4939	0.4989	0.5833	0.6614
R-sq: overall	0.4157	0.3810	0.3977	0.4035	0.4856
*, ** and *** denote statistical significance at the 10%, 5% and 1% z-statistic p-values are reported in parenthesis					

continuous basis, which in turn boosts employment growth, something that is being confirmed by our results.

Turning to other human capital variables, as expected, a higher percent of population that has received some post-secondary education has a positive effect on job growth (significant at 5% level). However, the effect of the other human capital variables is not significant (i.e. insignificant coefficients for “university degree” and our demographic variables). While we expect “university degree” to have a positive influence, it is possible that the effect of this group on job growth has already been captured by the industry mix growth rate or industry shares.

Finally, another factor that turns out important in determining employment growth is the community’s distance from the closest large central metropolitan area, defined to be a CMA of greater than 500,000 population. The coefficient of this spatial variable is negative and significant at 5% level, which shows that being away from a large CMA adversely affects employment growth in a community. As hypothesized, the farther away a community is from areas with very high economic activity, the lower its chances to attract new businesses and/or achieve growth from existing businesses. This is because such a community has reduced access to agglomeration economies in large centers, such as between-industries spillovers, and its businesses have higher transportation costs for acquiring inputs and processing outputs. On the contrary, communities that are located close to large urban centers benefit from proximity to

agglomeration economies and offer improved market access for their businesses.

Therefore, the latter communities have an advantage into achieving higher employment growth rates.

5.2.1.2 Expanding firms

Employment growth from expanding businesses is defined as the change in employment from firms that are increasing their employee base, divided by total employment at the beginning of each time period.

Moving to the regression results where those businesses are being examined, we see that several variables that are included in the **IND** vector are significant. As in the all-firms case, a favourable industry mix and a high share of producer services industry, helps existing businesses expand. Moreover, agriculture and other primary industries also have a positive and significant effect on job growth here, which is something that contradicts our theoretical expectations. One possible explanation is that the declining labour requirements of the primary sectors may have been partially captured in the industry mix variable. Concerning the effect of industrial concentration/diversification, as measured by the Herfindahl index, we find that diversification is preferable and that high concentration in a few industries limits the scope for growth of existing firms.

Regarding the human capital variables, again the employment/population ratio has a positive and significant effect on job growth. For existing firms their ability to expand is enhanced by the presence of an active, highly “employable” labour force. Moreover, the higher the female share of employment is, the more the existing businesses grow. This result appears to be strongly significant (1% level). As expected, a higher female participation in labour force brings businesses in front of a bigger and

more diverse pool of workers, which makes the labour market more favourable to them and, therefore, helps them grow. This is also consistent with a relatively large service sector, where females have a greater share than in primary production, for example. This result may also be indicative of the positive effects that the absence of social and institutional barriers to female participation in labour force has.

A puzzling and unexpected result, however, is the negative and very significant coefficient of “% of workforce holding a University Degree”. In an attempt to explain this result, we suggest that once a business is established and has a “base” human capital, it opts to grow its employment through hiring less educated, therefore less expensive, personnel. Labour- intensive growth is more likely to be based on relatively low-skilled, less educated workforce, rather than highly educated workers, due to the higher cost of labour in the latter case. It is also possible that part of the effect of education has been captured by the IMGR variable, if high education is one of the reasons that some industries are growing fast at the national level.

5.2.1.3 Declining firms

Employment growth (or more accurately employment loss) from declining businesses is defined as the change in employment from firms that are reducing their employee base, divided by total employment at the beginning of each time period.

Attempting to assess the factors that are associated with decreasing employment in existing firms, we see that several industry variables play an important role. A high employment share in agriculture and other primary industries has a negative effect on employment when declining firms are examined. This result is consistent with our

expectations, but contradicts the findings from the previous section (i.e. job growth from expanding firms).

Another way to look at the present section is to identify the factors that mitigate lay-offs, that is factors that reduce the rate of decline. As we can see from Table 5.1 (4th column), a favourable industry mix (higher IMGR) reduces employment loss in declining businesses. The same is true about industry concentration; a higher Herfindahl index (that is, employment is concentrated in a few industries) is associated with lower job decline from existing businesses. Combining this finding with the one from section 5.2.1.2, we can say that industrial diversification is associated with more rapid employment changes, both increases and declines. High diversification across industries helps some of the existing businesses grow, but it also speeds the decline in those businesses that are downsizing.

Regarding the demographic variables, we see that a higher percentage of immigrants coming into the community over the last five years has a negative effect on existing businesses' employment, for declining firms. This is the only case where this variable is significant, suggesting that immigration has a negative effect on employment growth. A higher female share in employment is also associated higher employment decline, which contradicts the findings from the previous section. Clearly, this variable influences employment differently in declining than in growing firms. Nevertheless, when the two results are taken together, we see that the positive effect of this variable in job growth from existing and expanding firms is higher in magnitude and more significant than its negative effect on declining firms.

Finally, two results that are once more consistent with our expectations are the positive coefficient for employment/population ratio and the negative coefficient for our spatial variable, distance to closest large CMA. Both results are highly significant.

5.2.1.4 Newly Identified firms

New firms are defined as those that had zero employment at the beginning of a time period and hired employees in the years after that. Therefore, job growth from business start-ups is calculated as the number of workers that were hired by businesses starting their activities, divided by total employment at the beginning of each time period.

Trying to investigate the factors that influence business start-ups, we see that, as in the case of expanding firms, a high Herfindahl index has a negative impact. In other words, areas with high industrial diversification are more likely to attract new businesses. Regarding human capital variables, we see that the effect of education is inconclusive. Some post-secondary education has a positive effect, while university education has a negative effect. Again, this may have to do with increased labour costs from hiring highly educated employees, as we discussed on section 5.2.1.2.

Another puzzling result is the negative and significant coefficient of employment-to-population ratio. This is the only case where this variable has the opposite effect than we expected. Trying to offer an explanation for this finding, we suggest that a tight labour market has a dampening effect on business start-ups. A high employment/population ratio indicates that the biggest part of the workforce is already employed, leaving potential businesses with fewer options from the labour market.

Moreover, the fact that the workforce is employed suggests high competition in the market, which makes business start-ups less favourable.

Another result that is worth mentioning is the positive contribution of young migrants to the community. Communities that welcomed a lot of young people over the previous 5 years (prior to the examined periods), have experienced higher employment growth from new businesses. Finally, distance from a large CMA also plays a role; communities that are farther away from economic centers have a problem in attracting new firms, as expected. Judging by the magnitude and significance of the relevant coefficients, we can say that distance from large CMAs has the most negative impact on creation of new firms, compared to already existing firms.

5.2.1.5 Exiting firms

Examining now the “other side of the coin”, i.e. firms that are shutting down their employment,¹² we see that agriculture share has a negative effect, while manufacturing (both traditional and complex) has a positive impact. High industrial concentration also has a positive effect (i.e. less employment loss), just like in the case of shrinking businesses. Looking at the effect of industrial concentration/diversification on the four components of job growth, we can conclude that diversification helps existing businesses expand and attracts new firms, but it is industrial concentration that prevents layoffs and shut-downs. This implies that a more dynamic industrial environment (i.e. high diversification) is associated with a higher job turnover. Those

¹² Consistently with the previous sections, Employment Growth (decline) from exiting businesses is defined as the loss in employment from firms that are shutting down, divided by total employment at the beginning of each time period.

findings also indicate that Jacobs externalities (urbanization economies) are important in assisting employment growth at the community level.

In contrast to the finding of the previous section (new firms), recent migration of young workers to the city/town leads to more employment loss due to businesses exiting the market. Those two results may suggest an entrepreneurship effect; young entrepreneurs are starting their own businesses, increasing the competition in the market and causing some of the existing businesses to exit the market. Concerning our other human capital variable, the presence of highly educated workforce (university degree) seems to reduce firm exits.

Regarding our spatial variables, we find that communities that are situated far away from large CMAs experience fewer employment losses due to business shut-downs. This result seems surprising at first, but it may reveal the market inflexibility in these communities and protection from the lack of competition. In other words, “isolated” communities may have problems attracting new businesses or growing the existing ones, but they also experience a lower rate of exiting firms due to lower competition from CMAs and due to the fact that the presence of those businesses is needed to the community. Finally, we find that towns experience a higher rate of exiting firms compared to CMAs and CAs, as suggested by the positive and significant (at 1% level) coefficients for our CMA and CA dummy variables (with “town” being the omitted dummy variable).

5.2.2 Fixed Effects

5.2.2.1 *All Businesses*

Moving now to the empirical results that we obtain from the fixed effects (FE) regressions, one thing that is important to note is the low overall explanatory power of the models. When “all-firms” are examined, the overall R-square is 0.02 (Table 5.2), when the respective R-square from the random effects regression is 0.41. The “within R-square”, however, is quite high (0.49), which is expected since the fixed effects regressions capture the variation within a group (i.e. community), across time. The high “within R-square” combined with very low “between R-sq” and “overall R-sq” indicates that the main part of the variation in our variables is cross sectional. This kind of variation is captured in the random effects regressions, which were discussed above, and this is the reason why random effects have a much better overall explanatory power. Despite of this limitation of the fixed effects, however, we follow this specification (together with random effects) in order to have a more complete study and see if the results from the two specifications are consistent.

Comparing the estimated coefficients from the two specifications, we can say that the results are quite consistent, with a few notable differences, however. Starting from the industrial variables, IMGR has a positive and significant effect on job growth in the FE model, just like it was found from the RE regression. Traditional and complex manufacturing also have a positive effect; in addition, these results are statistically significant, unlike the random effects specification. Herfindahl concentration index also becomes statistically significant, with the negative sign indicating that industrial diversification boosts community employment growth.

Table 5.2: Sub-Provincial Regressions; Fixed Effects Models.
(Dependent Variables: 3-4-year Average Employment Growth Rates)

Variable	All firms	Increasing ALUs	Decreasing ALUs	Newly Identified Firms	Exiting Firms
Constant	9.6085 (0.310)	9.6126* (0.088)	-3.7302 (0.374)	13.6571** (0.016)	-15.344*** (0.002)
Industry Mix Growth Rate	0.4776** (0.036)	0.2323* (0.087)	0.2667*** (0.008)	-0.2662* (0.052)	0.2175* (0.068)
Agriculture share	-0.1806 (0.407)	-0.0736 (0.570)	-0.3646*** (0.000)	0.0449 (0.731)	0.2183* (0.055)
Other Primary Industries share	-0.0695 (0.535)	0.1153** (0.084)	-0.1167** (0.019)	-0.0862 (0.199)	0.0375 (0.522)
Traditional Manufacturing share	0.2771*** (0.004)	0.0896 (0.119)	0.1377*** (0.001)	0.0020 (0.973)	0.0608 (0.227)
Complex Manufacturing share	0.1639* (0.086)	0.0958* (0.091)	0.0154 (0.715)	-0.0684 (0.231)	0.1151** (0.021)
Producer Services share	-0.0896 (0.661)	-0.0710 (0.559)	0.0517 (0.568)	-0.0387 (0.752)	-0.0043 (0.968)
Herfindahl Concentration Index	-35.2170** (0.024)	-12.2687 (0.186)	-12.7190* (0.066)	-5.4235 (0.561)	0.6273 (0.939)
Employment/population ratio, age 15+	-0.1129 (0.233)	-0.1134** (0.045)	0.0133 (0.752)	-0.0100 (0.861)	0.0052 (0.916)
% Aboriginal population	0.5543*** (0.000)	0.2138*** (0.008)	0.0473 (0.433)	0.2860*** (0.000)	-0.0066 (0.926)
Female share in employment	0.1712 (0.189)	0.2503*** (0.001)	-0.0382 (0.509)	-0.0947 (0.226)	0.1258* (0.065)
% some post-secondary education	-0.1392 (0.268)	-0.0649 (0.385)	-0.0214 (0.701)	0.0107 (0.888)	-0.0415 (0.527)
% University degree	-0.3259 (0.189)	-0.2372 (0.108)	-0.1711 (0.120)	-0.1956 (0.188)	0.2777** (0.032)
% Young pop (20-34) moved in CSD recently	-0.0565 (0.215)	-0.0452* (0.096)	-0.0006 (0.975)	-0.0008 (0.978)	-0.0191 (0.421)
% Immigrants moved in CSD last 5 years	-0.2611 (0.458)	-0.2312 (0.270)	-0.1767 (0.258)	-0.0897 (0.671)	0.2427 (0.187)
Year (period) dummies	yes	yes	yes	yes	yes
Province dummies	no	no	no	no	no
# of observations	757	757	757	757	757
R-sq: within	0.4986	0.3366	0.3032	0.0852	0.2157
R-sq: between	0.0109	0.0003	0.0274	0.0299	0.0283
R-sq: overall	0.0224	0.0166	0.0433	0.0278	0.0602
*, ** and *** denote statistical significance at the 10%, 5% and 1% z-statistic p-values are reported in parenthesis					

Turning to demographic and human capital variables, we note that they appear to have limited influence on job growth. “employment/population ratio” and “some post-secondary education” coefficients are insignificant, while they were positive and significant in the random effects regression. The only demographic variable that turns out to be significant is the Aboriginal population, which has a positive effect on job growth. This finding contradicts the hypothesis that there is discrimination against First Nation people in the labour market.

As a general observation we can say that, according to the fixed effects results, job growth is influenced primarily by the industrial environment (industry composition/mix), while demographic and human capital factors are not as important. In contrast, the random effects regressions revealed that each set of explanatory variables had their own influence on employment growth. These findings imply that, for a given community, its time trajectory is most influenced by the industry composition. However, across communities, variations in other community characteristics are likely to also affect their growth prospects. Moreover, having in mind that the FE estimator mainly estimates short-run effects, we can say that in the short-run employment change is primarily influenced by the industrial environment. At the long-run, however, which is better explained by the random effects estimator, demographics and human capital also play an important role in determining employment changes.

5.2.2.2 Expanding firms

Regarding the regression results when only employment change attributable to expanding businesses is being examined, we see that the signs of the estimated coefficients are consistent with the ones obtained from the “all-firms” regression. The

difference, however, is that the human capital variables appear more significant, while industry composition variables become less significant.

The coefficients of “industry mix growth rate” and “complex manufacturing share” are again positive and significant. This shows that having a favourable mix of industries and the presence of high-tech firms assists the growth of businesses in a community. The majority of the remaining industry coefficients carry the expected sign, but they are insignificant, with the exception of “other primary sector” where we obtain a positive and significant coefficient. The latter result is consistent with the respective one from random effects regression.

Several human capital variables appear to have a significant effect on job growth here, but not all of them have the expected effect. For example, we get a negative coefficient for “employment/population ratio” (significant at 5%). This result contradicts our hypothesis and is also in contrast to the results that we obtained from the random effects regressions. Another unexpected finding is that young migrants adversely affect the growth of existing businesses. On the other hand, a higher female share in employment has a positive effect on growth, a result that is consistent with our expectations as well as the finding from random effects.

Finally, it should be noted that the overall explanatory power of our model is very low, which means that the results should be approached with caution. The same is true for the remaining random effects regressions. As we will see on section 5.2.2.6, this is a major limitation of our fixed effects models.

5.2.2.3 *Declining Firms*

As we switch our focus to employment change due to businesses that downsize their employment, we see that several Industrial variables appear to have a significant impact. Specifically, a higher share of agriculture and other primary industries is associated with more layoffs, while a higher share of traditional manufacturing sector is associated with lower employment decline. Having a favourable mix of industries (high IMGR) also decreases the extent to which declining businesses decrease their employment. The aforementioned results are consistent with the ones obtained from the random effects regression.

However, when looking at the Herfindahl concentration index, we see that the sign of the estimated coefficient is the opposite to the one from the respective random effects regression. The random effects model suggests that high industrial concentration mitigates employment losses in declining firms, while the fixed effects model suggests that it is industrial diversification that reduces employment downsizing among declining businesses. If we are to judge by the significance of those two coefficients and/or the explanatory power of the models, we can say that the random effects result is more trustworthy.

Regarding the demographic and human capital variables, none of them appear to have a significant influence on our dependent variable. As in the “all-firms” case, the fixed effects model suggest that job growth (or decline) is primarily affected by the industrial environment.

5.2.2.4 Newly Identified Firms

The explanatory power of our model becomes even smaller when employment change due to business start-ups is being examined. As we can see from column (5) on Table 5.2, apart from the constant, only two variables appear to be significant. The first one is IMGR, which has the opposite effect to what we expected. Moreover, this is the only time where IMGR coefficient is negative and significant. The second significant variable is Aboriginal population, which has a positive effect on growth (consistent with the previous random effects regressions).

Looking at the R-squares from this regression, we see why our results are not significant. Not only are the overall and between R-squares very low, but also the within R-square is low. As we will see on section 5.2.2.6, this is probably due to limited variability of our independent variables within a region, overtime. The low explanatory power of our model suggests that fixed effects are inefficient, hence we can not draw reliable conclusions.

5.2.2.5 Exiting Firms

Moving to the last component of employment change, i.e. the one that is generated by firms that are shutting down, we notice that the explanatory power of our model is a bit higher than before and the results we obtain are satisfactorily consistent with our expectations. Starting from the industry variables, a higher IMGR is associated with lower employment losses from exiting firms. That is, a community which has a favourable mix of industries experiences less employment loss resulting from business shutdowns. This is more likely due to fewer firms exiting the market. The same is true

for communities with a strong presence of agriculture and complex manufacturing industries.

Concerning the human capital variables, we find that the higher the share of population holding a University degree, the lower the job losses from exiting firms. Moreover, a higher female share in employment is also associated with lower employment losses due to business shutdowns. If we combine the latter result with the respective one from section 5.2.2.2 (expanding firms) we can say that a high female participation in labour force assists existing businesses grow as well as prevents businesses from exiting the market. In this case, the fixed effects results are consistent with the ones obtained from the random effects.

5.2.3 Sub- Provincial Results Summary

Random effects and fixed effects regressions were estimated at the sub-provincial level, examining total employment growth as well as job growth from four groups of firms (i.e. expanding, declining, new firms and exiting firms). While fixed effects may be of interest if we are particularly interested in the time path of particular communities, the random effects is our primary specification, because they utilize both cross-sectional and time series variation. Moreover, RE can have more long-run implication.

One finding that is consistent with our theoretical expectations is that IMGR has a positive effect on employment growth. Industrial concentration/diversification is also an important determinant of job growth, even though it works differently depending on the group of firms that we examine. Specifically, we find that industrial diversification

helps existing businesses expand and attracts new firms into the community, which gives weight to the importance of the presence of Jacobs' externalities. In other words, inter-industry spillovers, which are present in a diversified industrial environment, assist community employment growth as suggested by Jacobs' theory. Industrial concentration, on the other side, reduces layoffs and business shut-downs, which indicates that MAR externalities are also important. One industrial sector of interest is producer services, which we find that it boosts employment growth, especially assisting the growth of expanding firms. A community's distance from large urban centers is negatively associated with job growth, which is in agreement with our expectations.

Regarding human capital, we find that a higher share of population holding a university degree has a negative influence on job growth from expanding and new firms and mitigates employment losses from exiting firms. Expanding firms may rely on the experience of their workers as a substitute of high education, while the result for new firms is not easily explainable. Moreover, as hypothesized, employment-to-population ratio has a positive and significant effect on employment growth (with the exception of new firms, however).

An important conclusion that we can draw by taking all the regression results together is that the four sub-groups of businesses are quite different. For example, several variables (such as HI, agriculture share and university degree) have the opposite effect on new firms, compared to exiting firms or on expanding businesses compared to declining businesses. Therefore, when we simply examine overall employment growth we are masking very different determinants of employment change among the four components of job growth. Hence, the major advantage of this study is that it can unveil

these differences and provide a more detailed examination of the dynamics of employment change.

5.3 Provincial Regressions

As discussed in chapter 4, some of the expected primary determinants of employment growth could not be included in the sub-provincial analysis due to data limitations. For this reason a provincial analysis is also undertaken in order to obtain a clearer picture of the determinants of job growth. Specifically, data on unionization and taxes are added in our dataset and it is possible to examine the influence that those two factors have on employment growth. Further, strategies for employment growth may be different at the community level than at the provincial level.

The dependent variable in the provincial study is 2-year ‘moving’ average employment growth. In other words, it is the average growth between years t and $t+2$. The independent variables are evaluated at year t , to avoid potential endogeneity problems. As in the sub-provincial study, we estimated regressions using both random and fixed effects specifications. The random effects results are discussed first, followed by discussion of the fixed effects results.

5.3.1 Random Effects

5.3.1.1 All Businesses

The policy variables that have been added in our model, indirect and business taxes, carry the expected negative sign, but the results are not statistically significant (Table 5.3). Unionization also seems to be negatively related to job growth, as hypothesized; however, this result is also statistically insignificant. The following

Table 5.3: Provincial Regressions; Random Effects Models.
(Dependent Variables: 2-year Moving Average Employment Growth Rates)

Variable	All firms	Increasing ALUs	Decreasing ALUs	Newly Identified Firms	Exiting Firms
Constant	8.6991 (0.345)	-6.8390 (0.360)	20.346*** (0.000)	-9.8423*** (0.000)	5.2135** (0.030)
Moving Aver. Industry Mix Growth Rate	0.3246 (0.575)	-0.5489 (0.243)	0.4900 (0.182)	0.0163 (0.923)	0.3440** (0.023)
Agriculture share	0.2407 (0.372)	1.0223*** (0.000)	-0.9706*** (0.000)	0.6153*** (0.000)	-0.4223*** (0.000)
Other Primary Industries share	0.7025** (0.016)	0.9187*** (0.000)	-0.2151 (0.246)	0.2383*** (0.005)	-0.2391*** (0.002)
Traditional Manufacturing share	0.5583*** (0.000)	0.0362 (0.758)	0.4887*** (0.000)	-0.0889** (0.035)	0.1216*** (0.001)
Complex Manufacturing share	0.3325*** (0.007)	0.3208*** (0.001)	0.0319 (0.683)	-0.0573 (0.110)	0.0406 (0.205)
Herfindahl Concentration Index	-43.0390 (0.358)	-17.8306 (0.639)	-49.8539* (0.094)	33.5260** (0.014)	-10.1756 (0.404)
% some post-secondary education	0.2658* (0.100)	0.1314 (0.317)	0.0897 (0.382)	0.1134** (0.016)	-0.0768* (0.068)
% University degree	-0.3287** (0.024)	-0.1864 (0.114)	-0.1488 (0.107)	0.0863** (0.042)	-0.0810** (0.032)
% age 25-54	-0.2118 (0.167)	0.2706** (0.030)	-0.4843*** (0.000)	0.1362*** (0.002)	-0.1333*** (0.001)
Crime rate (total criminal code excl traffic)	0.0001 (0.598)	0.0001 (0.288)	-0.0001 (0.235)	0.0000 (0.568)	0.0001** (0.021)
% Unionised	-0.0340 (0.459)	0.0642* (0.085)	-0.0744** (0.011)	0.0284** (0.034)	-0.0510*** (0.000)
Provincial Indirect Tax (% of personal Income)	-0.0850 (0.689)	0.2742 (0.112)	-0.4361*** (0.001)	0.1856*** (0.003)	-0.1093** (0.048)
Provincial Corporate Tax (% of personal Income)	-0.3415 (0.690)	-2.2134*** (0.001)	2.1923*** (0.000)	-0.2248 (0.367)	-0.1208 (0.587)
Year dummies	yes	yes	yes	yes	yes
Provincial dummies	no	no	no	no	no
# of observations	150	150	150	150	150
R-sq: within	0.6763	0.5125	0.6056	0.4653	0.3875
R-sq: between	0.9431	0.9294	0.9628	0.9824	0.9834
R-sq: overall	0.6897	0.6050	0.6838	0.7464	0.7102
*, ** and *** denote statistical significance at the 10%, 5% and 1% z-statistic p-values are reported in parenthesis					

sections explore whether these “insignificant” results at the aggregate level mask offsetting influences among job growth component groups.

Concerning the industry variables, a higher share in both traditional and complex manufacturing, as well as other primary sector, has a positive and significant effect on job growth. Traditional manufacturing has a bigger and more significant effect than complex manufacturing, which suggests that these (usually) labour-intensive industries are a driver of job growth. Higher industry concentration (HI) seems to adversely affect employment growth, however this result is not statistically significant.

Regarding the human capital variables, the share of population with some post-secondary education is positively related to employment growth (significant at 10% level), while the share of population having a university degree is negatively related, as was the case at the sub-provincial level. The latter result contradicts our theoretical expectations, as it was assumed that higher educated workforce helps businesses grow through knowledge spillovers.

5.3.1.2 Expanding firms

Turning now to the regression results examining the firms that are growing in terms of employment, we see that the effect of industry variables is quite consistent with that from the previous regression. One difference, however, is that agriculture share now becomes highly significant (carrying a positive sign), while traditional manufacturing becomes insignificant. The education variables also carry the same signs as before, but the significance of those results is limited. Apart from education, a variable that is being used to approximate human capital is the “prime-age workforce”, i.e. the percent of population that falls into the 25-54 age group. The regression results suggest that a high

share of prime-age workforce help existing businesses grow, which is consistent with our expectations.

Regarding the effect of taxes, high corporate taxes are very negatively related to job growth from expanding firms, a result that is highly significant. In other words, corporate taxes may dampen the growth of expanding firms, something that is in agreement with our theoretical expectations. An unexpected result, however, is the positive and significant coefficient for unionization, implying that a higher degree of unionization enhances the growth of firms.

5.3.1.3 Declining firms

Regarding the businesses that are downsizing their employment, there are two industries of particular interest; agriculture and traditional manufacturing. A higher share of employment in agriculture is associated with greater employment decline in existing businesses, a result that is consistent with our findings from the sub-provincial study. This result may be due to the long term labour-shedding characteristic of agriculture. On the contrary, a higher presence of traditional manufacturing industries mitigates job losses from declining firms. Industrial concentration also seems to play a role; as we can see from Table 5.3 (4th column), higher industrial diversification lessens the magnitude of employment decline. This result suggests the possibility of local (provincial) inter-industry linkages supporting some of the employment, thus preventing firms from further decline.

Moving to the human capital variables, both education variables appear to be insignificant, while the coefficient of “prime-age workforce” turns out negative and highly significant. The latter result contradicts our theoretical expectations, as our

hypothesis is that a higher proportion of this high quality labour force helps businesses grow, rather than decline. A possible explanation for this is that the prime-age workforce is primarily engaged in firms that are faring well. This workforce may also be mobile, so they live when firms begin to decline, thus accelerating their decline. On section 5.3.1.5 we further attempt to explain for this finding.

Regarding the tax variables, a surprising result is that higher corporate taxes are associated with lower employment decline. Provincial indirect taxes, on the other hand, have the expected negative impact on employment growth. Finally, unionization is a driver of employment decline, a result that is consistent with our expectations. Unions try to achieve the best for their members, something that includes higher wages.

Moreover, the stronger the union (i.e. the more members it has) the higher its chances to achieve its goals. Higher wages, however, translate to increased marginal costs for the business, while the marginal benefit (from labour) remains the same. It is, therefore, expected that the firm will reduce their personnel up to the point where the marginal product of labour will equal marginal (average) cost of labour.

5.3.1.4 Newly Identified firms

Focusing now on job growth that comes from new firms, we see that the effect of all the human capital variables is consistent with our expectations. A higher share of population holding a university degree or with other post-secondary education has a positive influence on business start-ups. The same is true for provinces that have a higher share of “prime-age” workforce. New start-ups thus seem particularly sensitive to an educated, prime-age workforce. This is consistent with the general pattern of increasing skill requirements over time. Existing businesses may be able to rely on

experience as a substitute for formal education, but new firms will access “skills” by selecting more highly educated labour force members.

Regarding the industrial variables, we find that, surprisingly, agriculture and other primary industries have a positive effect, while that of complex manufacturing is negative. Concerning the issue of industrial diversification vs concentration, the regression results suggest that provinces that specialize in a few industries are faring better in attracting new businesses. Comparing this result with the one from the sub-provincial study, we find that at the community level it is industrial diversification that attracts new businesses, while at the provincial level the opposite is true. Those two results are not necessarily contradictory, since specialization at the provincial level may allow for sub-provincial diversification. At the provincial level specialization may also be the result of capitalizing on a particular strength.

The effect of unionization on job growth from new firms seems to be positive, which is in not in agreement with our expectations. Trying to offer possible explanations, we suggest that new firms may be too small for unions to be an issue. Moreover, it is expected that unions are not strong enough if the business is very “young” or they may even be non-existent. In addition, new firms start up for reasons that are unrelated to unions, therefore unionization is not necessarily expected to be negatively related with employment growth from new firms. Finally, corporate taxes have a negative effect, as expected, but this result is not statistically significant.

5.3.1.5 Exiting firms

Shifting our attention to job losses from exiting firms, a general observation is that the picture is totally opposite to the one from the previous section. Provinces with

high share of agriculture and other primary industries experience a higher rate of business shutdowns, while traditional manufacturing has the opposite effect. Provincial indirect taxes are associated with more layoffs due to exiting firms, while corporate taxes do not have a significant effect. The latter result may be due to the fact that businesses are exiting the market because they are not making enough profits. Limited profits translate to low corporate taxes that the firm has to pay; therefore taxation is not a major issue for them.

One thing that seems to be an issue, however, is unionization. As we see on the last column of Table 5.3, a higher degree of unionization in the province is associated with more employment loss due to business shut-downs. This is expected if strong unions are considered undesirable by the businesses, perhaps resulting in a decision to relocate to a province where unionization is weaker.

Finally, concerning the effect of human capital variables, we find that higher education and higher presence of “prime-age” workforce has a negative effect. This result looks surprising, but we can offer an explanation if we take it together with the relevant results of the previous sections (esp. job growth from new firms). It is possible that high quality labour force is associated with higher job mobility and increases the competition in the labour market. Businesses that are not very competitive are shrinking or exiting the market, while more efficient firms are expanding. In addition, new firms are locating in the province, as they try to get advantage of the presence of highly skilled workforce. We may also have an entrepreneurship effect, as the ones that are starting up businesses are the more educated ones and/or the ones that fall into the “prime-age” group.

5.3.2 Fixed Effects

5.3.2.1 All Businesses

When we applied the fixed effects model in our sub-provincial study, we noted that the explanatory power of our model was limited. In the provincial study, however, when the full sample of businesses is being examined, the R-square from the regression is much higher (0.25 overall R-sq), compared to the sub-provincial study. It is very likely that this is due to the fact that in the latter study we have many more time periods (15 instead of sub-provincial's 4), therefore we have many more observations "within" a panel (i.e. province).

Despite the more satisfactory R-square, only a few of the results that we obtain are statistically significant. Nevertheless, the coefficients we obtain for taxes and unionization are consistent with our theoretical expectations. As mentioned earlier, those are the key variables in the provincial study, as we were not able to evaluate their contribution to employment growth in the sub-provincial study, due to lack of relevant data. As we can see on Table 5.4 (second column), corporate taxes have a negative influence on job growth, a result which is statistically significant at 10% level. As expected, higher provincial corporate taxes increase business costs and make investments less favourable. Moreover, businesses may decide to relocate to a place with a more favourable tax environment (i.e. lower provincial corporate tax rates). Therefore, provinces with higher tax rates may be losing employment to the ones which tax their corporations lower.

Regarding unionization, we find a negative relationship between employment growth and the percent of workers that are unionized. This is also consistent with our

Table 5.4: Provincial Regressions; Fixed Effects Models.
(Dependent Variables: 2-year Moving Average Employment Growth Rates)

Variable	All firms	Increasing ALUs	Decreasing ALUs	Newly Identified Firms	Exiting Firms
Constant	7.2010 (0.712)	-4.0154 (0.798)	8.7967 (0.449)	5.3604 (0.265)	-2.2804 (0.615)
Moving Aver. Industry Mix Growth Rate	0.5067 (0.427)	-0.6205 (0.228)	0.7352* (0.055)	-0.1244 (0.429)	0.4774*** (0.002)
Agriculture share	2.9084** (0.034)	-0.6067 (0.578)	2.0715** (0.011)	1.6822*** (0.000)	-0.3592 (0.255)
Other Primary Industries share	0.9531 (0.111)	0.1239 (0.796)	0.5978* (0.094)	-0.0570 (0.697)	0.2765** (0.047)
Traditional Manufacturing share	0.6743** (0.023)	0.0838 (0.722)	0.6212*** (0.001)	-0.1870** (0.011)	0.1550** (0.024)
Complex Manufacturing share	0.3979 (0.237)	0.6731** (0.014)	-0.1856 (0.354)	0.1132 (0.173)	-0.2046*** (0.010)
Herfindahl Concentration Index	-15.9607 (0.805)	-76.7301 (0.142)	13.6753 (0.722)	37.6993** (0.019)	7.0969 (0.636)
% some post-secondary education	0.2512 (0.288)	0.2543 (0.182)	0.0242 (0.863)	-0.0008 (0.989)	-0.0362 (0.509)
% University degree	-0.3122 (0.183)	-0.1267 (0.500)	-0.1595 (0.253)	0.1376** (0.018)	-0.1716*** (0.002)
% age 25-54	-0.4016 (0.315)	0.2724 (0.397)	-0.4552* (0.057)	-0.2364** (0.017)	0.0211 (0.820)
Crime rate (total criminal code excl traffic)	0.0002 (0.443)	0.0002 (0.475)	0.0000 (0.819)	0.0000 (0.630)	0.0001* (0.080)
% Unionised	-0.1339 (0.145)	0.1185 (0.110)	-0.1808*** (0.001)	-0.0131 (0.560)	-0.0554** (0.010)
Provincial Indirect Tax (% of personal Income)	0.3462 (0.197)	0.3259 (0.132)	-0.1447 (0.365)	0.2590*** (0.000)	-0.1036* (0.098)
Provincial Corporate Tax (% of personal Income)	-3.1819* (0.057)	-3.6450*** (0.007)	1.0924 (0.270)	-0.6194 (0.131)	-0.0074 (0.985)
Year dummies	yes	Yes	yes	yes	yes
Provincial dummies	no	no	no	no	no
# of observations	150	150	150	150	150
R-sq: within	0.7039	0.5507	0.6785	0.6426	0.5411
R-sq: between	0.1621	0.0106	0.1612	0.1710	0.2031
R-sq: overall	0.2489	0.0544	0.0031	0.1689	0.0217
*, ** and *** denote statistical significance at the 10%, 5% and 1% z-statistic p-values are reported in parenthesis					

expectations, as we expect powerful unions to be able to negotiate better wages for their members, something that increases business costs and decreases the number of workers that a business is willing to employ. Concerning the third variable for which we have data only at the provincial level, i.e. crime rate, we do not find any significant relationship with job growth, as was the case in the random effects model.

As far as the other independent variables are concerned, the signs of the coefficients that we obtain are very consistent with the respective ones from the random effects regression. However, only two of those variables are statistically significant, both belonging to the Industry variables vector. Specifically, traditional manufacturing and agriculture are found to have a positive influence on employment growth, *ceteris paribus*. On the contrary, none of the demographic variables seem to have a significant effect on job growth.

5.3.2.2 Expanding firms

When the fixed effects model is applied to employment change due to businesses that are expanding in terms of employment, the results we obtain are consistent with those from the random effects model. The qualitative difference, however, is that only a few of the fixed effects results are statistically significant. Moreover, the explanatory power (R-square) of the fixed effects model is much lower.

Nevertheless, fixed effects offer as a very significant result; that is the negative relationship between corporate taxes and job growth. This result is significant at the 1% level, just like the one that was obtained from the random effects model. When we look at the effect of provincial corporate taxes on all four components of employment growth, we notice that expanding businesses are the ones that are more negatively

affected. One would expect that decreasing and exiting firms would be the most severely affected by corporate taxes; in other words, high taxation would lead businesses to decrease their employment or even shutdown and relocate to another province. On a second thought, however, this result is not surprising. Expanding businesses are the ones that are successful, profitable and are needing to employ more people in order to grow further. These are the businesses that are most likely to be the most affected by having to pay higher corporate taxes. Had the corporate taxes been lower, these businesses may have been able to expand employment even more. Therefore, our hypothesis that corporate taxes adversely and significantly affect job growth is not rejected.

5.3.2.3 Declining Firms

Turning the discussion to the employment loss resulting from firms that are reducing their employee base, we find that several of our variables play a significant role. Starting from the influence of unions, we find that the higher the level of unionization in a province, the more layoffs we have. In other words, one of the reasons that businesses decline in terms of employment, may be the significant presence of unions. This result is consistent with the respective one from the random effects model (Table 5.3) and it is also in agreement with our theoretical expectations.

Concerning the industrial variables, we find that IMGR plays a significant role in preventing firms from further decline. Consistent with our expectations, provinces that have a favourable mix of industries experience lower employment loss due to declining businesses. Moreover, a higher share of traditional manufacturing sector also has a positive and significant influence, a finding that is consistent with the respective one from the random effects model. In addition, a higher share of the primary sectors also

seems to mitigate employment losses from declining firms, a result, however, that is in contrast to what the random effects suggest.

5.3.2.4 Newly Identified Firms

Regarding employment change attributed to businesses that are starting up, we find that corporate taxes have a negative effect, but this result is not satisfactory statistically significant. On the contrary, provincial indirect taxes have a positive and significant effect, which is contrary to our expectations. Unionization does not seem to affect business start-ups, which suggests that new firms are either too small or too young for unions to be an issue, as discussed on section 5.3.1.4.

Moving to the human capital variables, we see that university degree has a positive and significant influence, suggesting that new firms require some highly skilled employees to start their activities and organize the business more efficiently. This result is consistent with our expectations as well with the finding from the random effects model. An inconsistent finding, however, is the negative role that a “prime-age” workforce plays. The results from the fixed and random effects are contradictory, therefore we cannot draw a strong conclusion.

Finally, regarding the industrial composition, we find that industrial concentration has a very positive and significant effect on job growth from new firms. As we discussed in the random effects model, at the provincial level, specialization may be the result of taking advantage of a particular strength. In addition, provinces are diversified enough to reap the benefits of interaction between sectors. Therefore, it may be preferable for new businesses to enter a sector where the province is specialized at,

taking advantage of the existing know-how and exploring the existing strengths of the province.

5.3.2.5 Exiting firms

Last we examine the factors that are associated with employment loss due to business shut-downs. Starting from the tax variables, we see that the results are very consistent with the ones we obtain from the random effects model. Provincial indirect taxes are associated with more layoffs due to exiting firms (significant at 10% level), while corporate taxes do not have a significant effect. Higher union rates are also associated with more employment loss due to business shut-downs, something that is in agreement with our theoretical expectations.

Concerning industrial variables, we find that IMGR plays a very significant role in preventing firms from shutting down, just like we saw that it mitigates employment losses from firms that are declining. Moreover, a higher share of traditional manufacturing is associated with lower job losses from exiting firms. This result is consistent with the one from the random effects model and is also similar to the ones we obtain when declining businesses are being examined. Therefore, we can conclude that traditional manufacturing is an established sector with strong “roots”, having businesses that survive employment declines, and assists overall job growth in a province not because it is expanding, but because it remains “immune” to employment losses. Complex manufacturing, on the other hand, is a sector that is associated with more rapid employment changes. The negative and significant coefficient that we obtain for this variable indicates that provinces with a high share of complex manufacturing experience more business shutdowns, while at the same time (as we saw on section 5.3.2.2) a higher

share of this industry is also associated with higher job growth from expanding businesses.

5.3.3 Provincial Results Summary

The provincial study has been carried out in order to evaluate the effect of variables that are not available at the sub-provincial level and also to examine whether there are differences on the determinants of job growth at the provincial and sub-provincial level. Again, FE and RE specifications have been used, with the RE results being our primary focus. As in the sub-provincial study, there are significant differences between the four components of employment growth.

Corporate taxes have a negative effect on job growth from expanding firms, while they have a positive on declining firms. This suggests that corporate taxes may dampen the growth of expanding firms (which is in agreement with our theoretical expectations), while they do not hurt declining firms, possible due to the fact that businesses that are declining are not profitable enough so taxation is not a major issue for them. A higher union rate is associated with more employment losses from downsizing and exiting firms, which confirms our theoretical expectations. However, this is not the case when expanding firms and new firms are being examined. This suggests that new firms are either too small or too young for unions to be an issue, while the result for expanding businesses is not easily explainable.

Regarding the industrial sectors, we find that traditional manufacturing is a sector with strong “roots”, having businesses that survive employment declines and shut-downs, and assists overall job growth in a province not because it is expanding, but because it remains relatively “immune” to employment losses. Complex manufacturing,

on the other hand, is a sector that is associated with more rapid employment changes, but assists overall employment growth primarily by helping existing businesses grow.

Finally, the presence of “prime-age” workforce is important in order for businesses to start up and also assists the growth of expanding businesses. On the other side it is associated with more rapid decline of decreasing firms and more employment losses due to exiting firms. Taken together those results indicate that high-quality labour force is associated with high job mobility, moving from businesses that are declining to the ones that are growing or to new firms.

Chapter 6: Summary and Conclusions

6.1 Introduction

The purpose of this chapter is to provide a summary of what has been done in this study and present the main conclusions based upon the empirical results and analysis. First, a summary of the thesis is provided, followed by the key conclusions along with the relevant policy implications that can be drawn from this research. We note some of the limitations of the study and conclude by making recommendations for further research.

6.2 Summary

The present study examines the determinants of employment growth in Canada at the provincial and at the community (i.e. CMA, CA, town) levels. The purpose of this thesis is to identify and examine the determinants of job growth and assess their role and relative importance at the community level. However, for some of the key determinants, data are available only at the provincial level and thus the analysis is also conducted at the provincial level. In addition to that, this study goes a step further and examines the dynamics of employment growth by decomposing it into four elements, i.e. employment changes from expanding, declining, exiting and new firms. There is reason to believe that factors influencing employment growth may be different among these four types of firms.

In chapter two we offer a review of the relevant literature, which informs us about the factors that are expected to be associated with job growth at the regional and community level. Past studies have found evidence that determinants of employment growth include factors such as industrial composition/mix, education and other human capital variables, taxation and unionization. Moreover, studies have investigated a creative destruction process that takes place within a community or industrial sector, by decomposing job growth as described above.

Based on those previous studies, we then developed a theoretical framework for the conduct of our research. We defined the employment growth rate as the percentage change in employment between a number of consecutive time periods.¹³ The level of employment in a region is the result of the interaction between labour demand and supply. After identifying the labour supply and labour demand equations, by incorporating the one into the other we derived the following reduced form expression for the level of total employment in a region: $EMP_{rt} = h(p_{r,t-1}, \mathbf{IND}_{r,t-1}, \mathbf{HC}_{r,t-1}, \mathbf{DEMOG}_r, \mathbf{GOVT}_{r,t-1}, \mathbf{REG}_r)$. Since the employment growth rate is defined as the change in employment between two periods, the factors that affect the equilibrium level of employment are also expected to affect job growth rates.

Having identified the factors that influence employment growth, we developed an econometric model to empirically estimate the contribution of each factor. We run random effects and fixed effects regressions, because they are more appropriate specifications for panel data. We are particularly focusing on the RE regressions, because they have higher explanatory power due to their ability to capture the variation

¹³ Our panel dataset covers the years 1983-1996 for the sub-provincial study and 1983-1996 for the provincial study.

between communities/regions. The required data for our empirical analysis are from various Statistics Canada sources, specifically from the Census of Population, CANSIM II databases and two Employment Dynamics Databases, one at the sub-provincial and one at the provincial level.

We estimated regressions for total employment growth, as well as for the four components of employment growth –new, growing, declining and exiting firms- separately. Due to data limitations and for reasons of completeness, our study is carried out at two levels: provincial and sub-provincial. The main empirical results from our research are presented below.

6.3 Conclusions and Policy Implications

One of the main conclusions that we can derive by taking the results as a whole is that there are significant differences in the determinants of employment growth among the four components of employment change. For example, we found that at the community level (CMA/CA/town) industrial concentration has a positive effect on job growth attributable to declining and exiting firms (meaning that we have fewer employment losses there), while it has a negative effect on the job growth attributable to expanding businesses and new firms. As a result, when we examine total employment growth (i.e., when we include all firms in our sample) we find that the effect of industrial concentration on job growth is insignificant. This implies that when we simply examine overall employment growth we are masking very different effects that the determinants of employment change have among the four components of job growth.

Therefore, the decomposition of employment and the individual examination of each component is a significant strength of the present study. A general implication for

policymakers here is that, before developing policies aiming at boosting employment in a community, we might first have to identify the group of firms that we are targeting the most. Communities can achieve higher employment either through recruitment of new businesses or through retention and expansion of existing ones. As suggested by our empirical results, different policies may be appropriate if the aim is to attract new firms into the region than to assist the growth of the existing ones and vice versa.

In terms of specific hypothesis testing, one conclusion is that the null hypothesis that a higher IMGR does not have a positive effect on community employment growth (hypothesis i) is rejected. Our results show that having a favourable mix of industries has a positive effect on employment growth at the sub-provincial level. This is true for overall employment growth as well as for three of the four components, while only new firms seem to be unaffected by IMGR. This finding indicates that, if a region/city is blessed with an industry mix that is consisting of fast growing industries at the national level, it will benefit from this economic base. On the contrary, if the region has the misfortune of having a composition of industries that are growing slowly or declining at the national level, it will experience slower growth or decline. This finding is consistent with the relevant literature and our theoretical expectations and is confirmed by both random effects and fixed effects models. The insignificant IMGR coefficient in the case of new firms suggests that entrepreneurship may not be sensitive to the existing mix of industries. Nevertheless, whether these new firms will survive/expand is dependent on IMGR.

In terms of the question of whether industrial concentration or diversification assists job growth (knowledge spillovers within a sector vs spillovers across industrial

sectors), we find that at the community level industrial diversification assists the growth of expanding firms and boosts employment due to the establishment of new businesses. This implies that spillovers across sectors are significant and is consistent with Jacobs' theory on urbanization economies. Communities that have high industrial concentration, however, experience lower employment losses from declining and exiting firms, which is in agreement with MAR theory on localization economies. This may be due to the fact that the businesses that are concentrated in a sector are mature (as concentration in a sector does not occur "overnight") and thus are less vulnerable to employment losses. Therefore, the null hypothesis that industrial diversification does not affect employment growth (hypothesis ii) is rejected, in favour of the significance of spillovers and externalities.

Moving now to human capital variables, we found that regions with a higher share of population that has received some post secondary education have, *ceteris paribus*, higher job growth rates. Those communities are particularly successful in attracting new firms. This result is consistent with our theoretical expectations and is being confirmed by both the provincial and sub-provincial study. When we look at university education, however, the null hypothesis that it does not have a positive effect on employment growth (hypothesis iii) cannot be rejected for most of the regression estimations. Moreover, the results that we obtain from the provincial and sub-provincial studies are contradictory. Therefore, we cannot draw a clear conclusion on the effect of university education on job growth.

Concerning another human capital, the percent of population between 25 and 54 years old ("prime age" workforce), we found that this share has a positive effect on job

growth from expanding businesses and new firms, which leads us to reject the null hypothesis iv. On the other hand, we found that it is associated with more rapid decline of decreasing firms and more employment losses due to exiting firms. This indicates that this age group is associated with high job mobility, moving from struggling businesses to the ones that are faring well. In the sub-provincial study, the variable that is being used to approximate the “desirability” of the workforce is employment-to-population ratio and the null hypothesis that it doesn’t have a positive effect on employment growth is rejected.

Another conclusion of our sub-provincial study is that the null hypothesis that a community’s distance from a large urban centre does not have a negative effect on employment growth (hypothesis v) is rejected. Specifically, we find that the farther away a community is situated from a large CMA the less employment growth it has, which is true for overall job growth as well as for growth from new firms and from declining businesses. This is consistent with the expectation that access to the benefits from agglomeration concentrated in large metropolitan areas, is beneficial to community employment growth. The implication of this finding is that employment (and population) concentrates more and more on large urban centres and the surrounding areas, leaving “isolated” places in a more disadvantageous position.

It is important to observe, however, that the latter communities also have lower employment losses from exiting firms. This implies that the decision makers in such communities should focus on assisting the establishment of new firms in order to achieve higher growth rates. A last conclusion from the sub-provincial study is that towns experience a higher creation/destruction rate, relative to the CMAs and CAs. In

other words, they have higher growth rates from new firms and higher job losses from exiting firms, compared to CMAs and CAs.

Finally, in the provincial study we tested the null hypotheses that unionization (hypothesis vi) and corporate taxes (hypothesis vii) do not adversely affect job growth. Regarding unionization, when looking at overall employment growth, our hypothesis cannot be rejected. We find, however, that a higher union rate is associated with more employment losses from downsizing and exiting firms. Concerning the provincial corporate taxes, again when we look at overall employment growth, our hypothesis is not rejected. Our findings, however, indicate that corporate taxes have a very negative and significant effect on the growth of expanding businesses. Therefore, if policymakers want to assist the growth of their “successful” businesses, they should lower the corporate tax rates.

6.4 Limitations of the Study

There are two main types of limitations in this study: data and econometric limitations. Regarding the former, we did not have access to tax and unionization data at the community level, something that would have made our sub-provincial study more complete. Moreover, there certainly exist variables that affect employment growth but have been missed from empirical study. For example it is possible that local amenities significantly influence employment levels in a community, particularly by affecting the labour supply. Those have not been incorporated into our analysis, except for crime rates. In addition, we cannot know whether our sample of towns is sufficiently representative; if it is not then our results are biased.

Moreover, there are variables that had to be dropped from our final regressions due to multicollinearity concerns. Unfortunately, we could not find a way to include all possible explanatory variables into our empirical model and at the same time avoid the negative effects that collinearity among the independent variables brings. Even after eliminating some explanatory variables, collinearity may still be an issue. For example, the contradictory and non-expected results that we obtain for our education variables may be due to the fact that the effect of education has been partially captured from another variable, such as employment-to-population ratio.

Another limitation is the low explanatory power of our sub-provincial fixed effects regressions. This is due to the limited time periods that we have. As a result, the fixed effects results are not efficient. The random effects results, on the other hand, are efficient but they may not be consistent if there is correlation between the independent variables and the error term.

6.5 Recommendations for future research

We have examined regional employment growth with our smallest observations being towns where “significant” economic activity takes place. We have not, thus, examined the factors that influence job growth at a more rural level. A study similar to this one could be carried out in order to evaluate the factors that influence employment growth in rural areas. Moreover, such study could be carried out exclusively for towns, if one has data access on a big number of small towns across Canada.

Furthermore, as we mentioned in the previous section, we have not examined the role and influence of amenities on job growth. Hence, this study can be further enhanced by incorporating local amenities into the analysis. Such amenities can include recreation

areas that a city/town has to offer, land amenities and weather amenities. Moreover, firm characteristics such as age and size could be incorporated into the analysis, if such data were available.

Finally, a more detailed examination of why the four groups of firms behave differently could be carried out. Such study could be based on micro-data analysis, where establishment-level data would be utilised. Those data include firm/establishment age and size, firm type (multinational, multi-plant, single plant), firm-specific unionization, industrial sector that the firm belongs to and so on. Alternatively, the analysis could be based on selected case studies for each of the four types of firms.

References

- Acs, Zoltan L., and Catherine Armington, 2004, "The impact of geographic differences in human capital on service firm formation rates," *Journal of Urban Economics*, 56: 244-278.
- Barkley, David L., Mark S. Henry, and Shuming Bao, 1996, "Identifying "Spread" versus "Backwash" effects in Regional Economic Areas: A Density Functions Approach," *Land Economics*, 72(3): 336-357.
- Budd, John W., and Yijiang Wang, 2004, "Labor policy and investment: Evidence from Canada," *Industrial and Labor Relations Review*, 57(3): 386-401.
- CANSIM via E-STAT, *Table 051-0001, Estimates of population, by age group and sex for July 1, Canada, provinces and territories, annual (persons unless otherwise noted) (6210 series)*.
- CANSIM via E-STAT, *Table 252-0013, Crime statistics, by detailed offences, annual (number unless otherwise noted) (32560 series)*.
- CANSIM via E-STAT, *Table 282-0004, Labour force survey estimates (LFS), by educational attainment, sex and age group, annual (persons unless otherwise noted) (26730 series)*.
- CANSIM via E-STAT, *Table 384-0007, Taxes on production and imports, provincial economic accounts, annual (dollars) (617 series)*.
- CANSIM via E-STAT, *Table 384-0013, Selected economic indicators, provincial economic accounts, annual (dollars unless otherwise noted) (165 series)*.
- Davis, Steven J., and John Haltiwanger, 1992, "Gross Job Creation, Gross Job Destruction, and Employment Reallocation," *The Quarterly Journal of Economics*, 107(3): 819-863.
- Deller, Steven D., Tsung-Hsiu (Sue) Tsai, David W. Marcouiller, and Donald B.K. English, 2001, "The Role of Amenities and Quality of Life in Rural Economic Growth," *American Journal of Agricultural Economics*, 83(2): 352-365.
- Glaeser, Edward L., Hedi D. Kallal, and Jose A. Scheinkman, 1992, "Growth in cities," *The Journal of Political Economy*, 100(6): 1126-1152.
- Glaeser, Edward L., Jose A. Scheinkman, and Andrei Shleifer, 1995, "Economic growth in a cross-section of cities," *Journal of Monetary Economics*, 36: 117-143.

- Henderson, Vernon, Ari Kuncoro, and Matthew Turner, 1995, "Industrial Development in cities," *The Journal of Political Economy*, 103(5): 1067-1090.
- Henderson, Vernon, 1997, "Externalities and Industrial Development," *Journal of Urban Economics*, 42: 449-470.
- Hotchkiss, Julie L., M. Melinda Pitts, and John C. Robertson, 2003, "The Ups and Downs of Jobs in Georgia: What Can We Learn about Employment Dynamics from State Administrative Data?" Working Paper Series, Working paper No. 2003-38, Federal Reserve Bank of Atlanta.
- Organization for Economic Cooperation and Development, 2001, "OECD Science, Technology and Industry Scoreboard 2001: Towards a Knowledge-based Economy".
- Organization for Economic Cooperation and Development, 2003, "OECD Science, Technology and Industry: Scoreboard 2003".
- Partridge, Mark D., 2001, "Exploring the Canadian-U.S. Unemployment and Nonemployment Rate Gaps: Are There Lessons for Both Countries?," *Journal of Regional Science*, 41(4): 701-734.
- _____, 1996, "The Role of Industry Structure, Costs, and Economic Spillovers in Determining State Employment Growth Rates," *The review of Regional Studies*, 26: 235-264.
- _____, 1999, "Static and dynamic externalities, industry composition, and state labour productivity: a panel study of states," *Southern Economic Journal*, 66(2): 319(1).
- Partridge, Mark D., and Dan S. Rickman, 2003, "Do We Know Economic Development When We Wee It?," *The Review of Regional Studies*, 33(1): 17-39.
- Partridge, Mark D., M. Rose Olfert and Alessandro Alasia, 2007, "Canadian Cities as regional engines of growth: agglomeration and amenities," *Canadian Journal of Economics*, 40(1): 39-68.
- Partridge, Mark D., Ray D. Bollman, M. Rose Olfert and Alessandro Alasia, 2007, "Riding the Wave of Urban Growth in the Countryside: Spread, Backwash, or Stagnation?," *Land Economics*, 83(2): 128-152.
- du Plessis, Valerie, Roland Beshiri, Ray D. Bollman and Heather Clemenson, 2002, "Definitions of Rural," Agriculture and Rural Working Paper Series, Working Paper No. 61, Statistics Canada, Agriculture Division.

Romer, Paul, 1986, "Increasing returns and long run growth," *Journal of Political Economy*, 94: 1002-37.

Simon, Curtis J., 1997, "Human Capital and Metropolitan Employment Growth," *Journal of Urban Economics*, 43: 223-243

Statistics Canada, 2000, "Sub-Provincial Employment Dynamics," (CD-ROM), Catalogue No. 61F0027XCB.

Statistics Canada, 2002, "Employment Dynamics," (CD-ROM), Catalogue No. 61F0020XCB.

Statistics Canada, 2003, "2001 Census Dictionary," Catalogue No. 92-378-XIE, *Statistics Canada, Census Operations Division*.

Appendix A: Variable Definition and Data Sources

Table A-1: Variable definition and data sources for the sub-provincial study

Variable Name	Description	Source ¹
Dependent variables		
aempgr1	3 or 4-year Average Employment Growth Rate - All firms	StatsCan: SPED
aempgr3	3 or 4-year Average Employment Growth Rate from Expanding firms	StatCan: SPED
aempgr4	3 or 4-year Average Employment Growth Rate from Declining firms [note: negative numbers, but still higher (less negative) is better]	StatCan: SPED
aempgr5	3 or 4-year Average Employm. Growth Rate from Newly identified firms	StatCan: SPED
aempgr6	3 or 4-year Average Employment Growth Rate from Closing firms [note: negative numbers, but still higher (less negative) is better]	StatCan: SPED
Industry variables		
imgr	Industry Mix Growth Rate	CoP
shempag	Share of Total Employment in Agriculture	CoP
shempop	Share of Total Employment in Other Primary	CoP
shemptm	Share of Total Employment in Traditional Manufacturing	CoP
shempcm	Share of Total Employment in Complex Manufacturing	CoP
shempprs	Share of Total Employment in Producer Services	CoP
herfcil	Herfindahl Concentration Index	CoP
Human Capital – Demographic var.		
emppop15	Employment/Population Ratio for persons more than 15 years old	CoP
perabor	Percent Aboriginal Population	CoP
fshemp25	Female share in Employment for persons 25 years of age and above	CoP
pedspse	Percent education "some post-secondary education", without university degree	CoP
pedundeg	Percent education "university degree"	CoP

pycdsd5	Percent of young pop (20-34 yrs) that moved in over the last 5 years	CoP
pimm5	Percent of population that immigrated over the last 5 years	CoP
Spatial Variables		
clcmakm	Distance to closest CMA with more than 500,000 pop	C-RERL
newfl	Dummy = 1 if community is located in Newfoundland	
pei	Dummy = 1 if community is located in Prince Edward Island	
nscotia	Dummy = 1 if community is located in Nova Scotia	
newbruns	Dummy = 1 if community is located in New Brunswick	
quebec	Dummy = 1 if community is located in Quebec	
ontario	Dummy = 1 if community is located in Ontario	
manitoba	Dummy = 1 if community is located in Manitoba	
sask	Dummy = 1 if community is located in Saskatchewan	
alberta	Dummy = 1 if community is located in Alberta	
britcol	Dummy = 1 if community is located in British Columbia omitted category-	-
cma	Dummy = 1 if community is a Census Metropolitan Area	
ca	Dummy = 1 if community is a Census Agglomeration	
town	Dummy = 1 if community is a Town category-	-omitted
Time dummy variables		
period1	Period 1: 1983 - 1986 dummy	
period2	Period 2: 1986 - 1989 dummy	
period3	Period 3: 1989 - 1992 dummy	
period4	Period 3: 1992 - 1996 dummy -omitted category-	
1. StatsCan: Statistics Canada; SPED: Sub-Provincial Employment Dynamics Database (2000); CoP: Census of population (1981, 1986, 1991, 1996); C-RERL: the Canada Rural Economy Research Lab		

Table A-2: Variable definition and data sources for the provincial study

Variable Name	Description	Source²
Dependent variables		
movavempgr1	2-year Moving Average Employment Growth Rate - All firms	StatsCan: EDD
movavempgr3	2-year Moving Average Employment Growth Rate from Expanding firms	StatsCan: EDD
movavempgr4	2-year Moving Average Empl. Growth Rate from Declining firms [note: negative numbers, but still higher (less negative) is better]	StatsCan: EDD
movavempgr5	2-year Moving Average Employment Growth Rate from Newly identified firms	StatsCan: EDD
movavempgr6	3 or 4-year Average Employment Growth Rate from Closing firms [note: negative numbers, but still higher (less negative) is better]	StatsCan: EDD
Industry variables		
movavimgr1	2-year Moving Average Industry Mix Growth Rate	StatsCan: EDD
agricsh	Share of Total Employment in Agriculture	StatsCan: EDD
oprimsh	Share of Total Employment in Other Primary	StatsCan: EDD
tramansh	Share of Total Employment in Traditional Manufacturing	StatsCan: EDD
commansh	Share of Total Employment in Complex Manufacturing	StatsCan: EDD
herfind	Herfindahl Concentration Index	StatsCan: EDD
Human Capital – Demographic var.		
edspse	Percent education "some post-secondary education", without university degree	StatsCan: CANSIM II
edundeg	Percent education "university degree"	StatsCan: CANSIM II
age2554	Percent of population 25 to 54 years old	StatsCan: CANSIM II
Policy Variables		
tprovint	Total Provincial Indirect Taxes, as a percent of (lagged) personal Income	StatsCan: CANSIM II
princtax	Provincial Income Tax, as a percent of (lagged) personal Income	StatsCan: CANSIM II
union	Percent unionized workers	StatsCan: CALURA,LFS
tccexctr	Total criminal code excluding traffic (rate per 100,000 pop)	StatsCan: CANSIM II

2. StatsCan: Statistics Canada; EDD: Employment Dynamics Database (2002); CANSIM: Canadian Socio-Economic Information Management; LFS: Labour Force Survey; Corporations and Labour Union Returns Act

Appendix B: Descriptive Statistics

Table B-1: Descriptive Statistics, sub-provincial variables

Variable	Mean	Standard Deviation
Dependent variables		
Average Empl. Growth – All firms	1.115	3.351
Average Empl. Growth from expanding firms	8.797	2.021
Average Empl. Growth from declining firms	-8.413	1.568
Average Empl. Growth from new firms	6.960	2.191
Average Empl. Growth from exiting firms	-6.232	2.018
Explanatory variables		
Industry Mix Growth Rate	1.993	2.643
Agriculture share	3.708	4.428
Other Primary Industries share	3.470	6.184
Traditional Manufacturing share	8.510	6.646
Complex Manufacturing share	7.660	6.840
Producer Services share	7.832	2.429
Herfindahl Concentration Index	0.180	0.039
Employment/population ratio, age 15+	57.501	6.190
% Aboriginal population	4.009	6.329
Female share in employment	42.065	3.641
% some post-secondary education	33.148	4.524
% University degree	6.992	2.720
% Young pop (20-34) moved in CSD recently	32.027	9.013
% Immigrants moved in CSD last 5 years	0.840	0.989
Closest CMA (500,000 pop) in kms	271.510	255.962
CMA dummy variable	0.128	0.334
CA dummy variable	0.561	0.497
Town dummy variable	0.311	0.463

Table B-2: Descriptive Statistics, provincial variables

Variable	Mean	Standard Deviation
Dependent variables		
Moving Aver. Empl. Growth – All firms	1.793	2.413
Moving Aver. Empl. Growth from expanding firm	9.509	1.737
Moving Aver. Empl. Growth from declining firms	-7.919	1.517
Moving Aver. Empl. Growth from new firms	2.973	0.779
Moving Aver. Empl. Growth from exiting firms	-2.773	0.650
Explanatory variables		
Moving Average Industry Mix Growth Rate	1.887	1.908
Agriculture share	1.220	1.019
Other Primary Industries share	1.990	1.068
Traditional Manufacturing share	6.946	2.247
Complex Manufacturing share	6.166	3.273
Producer Services share	11.446	2.334
Herfindahl Concentration Index	0.092	0.009
% some post-secondary education	9.752	1.519
% University degree	13.448	2.457
% age 25-54	42.647	2.775
Crime rate (total criminal code excl traffic)	8865.086	2474.126
% Unionised	34.601	6.820
Provincial Indirect Tax (% of personal Income)	8.260	1.897
Provincial Corporate Tax (% of personal Income)	0.263	0.291

Appendix C: Industry groups

Table C-1: Industry groups, using 2-digit SIC (1980) codes

Industrial Sector	2-digit industries included in sector
Agricultural and Related Industries	A01
Other Primary Industries	B03, C04, D06-D08
Traditional Manufacturing	E10-E27
Complex Manufacturing	E28-E39
Construction	F40-F42
Distributive Services	G45-G47, H48-H49, I50-I59, J60-65, J69
Producer Services	A02, C05, D09, F44, K70-K74, L75-L76, M77
Social Services	N81-N84, O85, P86
Personal Services	Q91-Q92, R96-R99
Unclassified	Y00