HORIZONTAL FISCAL DECENTRALIZATION AND ECONOMIC GROWTH: A CANADIAN STUDY

Fiscal Federalism

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Abstract: This study analyzes the impact of horizontal fiscal decentralization on local economic growth as measured by population, employment and real income. The analysis replicates a U.S. study using Canadian data for Census Divisions. The findings show that horizontal fiscal decentralization of general purpose government units in nonmetropolitan areas have a negative effect on population, employment and income growth and no significant impact on economic growth in metropolitan areas. The results suggests that municipal reforms in the 1990s may have impacted economic growth in nonmetropolitan and metropolitan Census Divisions differently.

1. Introduction

Whereas the traditional focus of the literature on fiscal federalism is the relationship between the structure of government and economic efficiency, in recent years, the economic literature on fiscal decentralization has expanded its focus to include the impact of fiscal federalism, both vertical and horizontal, on economic growth. The impact of the structure of the public sector on economic growth may have important implications for public policy: whereas discussion of the desirability of providing public goods and services at the municipal, provincial or national level have traditionally been framed principally in terms of equity and efficiency, the notion that choices about the degree of fiscal decentralization may significantly impact overall economic growth adds an additional dimension to the policy debate.

The importance of examining a possible link between growth and horizontal fiscal decentralization is particularly significant in the Canadian context because a wave of municipal restructuring initiatives took place in the 1990s, predominantly in Nova Scotia, Ontario and Quebec. These reforms involved some form of local horizontal fiscal centralization, usually through municipal amalgamations. At the time, it was widely argued by pro-reform forces that this would increase economic efficiency, although there was far from unanimous support for this view[1]. No attention was paid, however, to what the impact of these reforms might have on economic growth.

This study seeks to understand whether greater decentralization among municipal government units in Canada promotes or reduces local economic growth. The approach taken here largely replicates the work of Hammond and Tosun (2012), who studied the impact of fiscal decentralization in the USA, but uses Canadian data. This study also sheds light on how

[1] See, for example, Kushner and Siegel (2005), Sancton (2002) and Vojnovic and Poel (2000).

horizontal decentralization of Indian settlements, Indian reserves and unorganized areas in Canada impact local economic growth. This aspect of the literature has not been captured in previous studies.

This paper is organized as follows. The second section discusses theoretical literature on fiscal decentralization and economic growth, as well as the classic works from which this literature has been derived. The third section analyzes empirical applications of decentralization and growth. The fourth section replicates Hammond and Tosun (2012) using Canadian data. The fifth and final section presents both conclusions and identifies questions for future research.

2. Theory

Fiscal decentralization is the mechanism within the theory of fiscal federalism (Musgrave, 1959) by which different tasks are allocated to different tiers of government (Oates, 1972). Consider a spectrum, or a scale, by which the degree of fiscal decentralization can vary, thereby determining the organizational structure of the public sector. On one end of the spectrum is complete centralization – one unitary central government performing all tasks of the public sector. At the other end is complete fiscal decentralization – consider a community where each neighbourhood has its own local government performing all tasks of the public sector.

In order to establish the optimal level of fiscal decentralization, Oates (1972) put forth the Decentralization Theorem, which argues that there should be a match between the government unit which provides a public good and the jurisdiction of which individuals within consume the public good evenly. However, nearly three decades later Oates (1999) hypothesized that there was also an "economic growth" case to be made, suggesting that regionally- and locally-tailored public expenditures which are aligned with local tastes and preferences may promote economic growth more effectively than centrally determined decision-making.

Recently there has been considerable attention given, and considerable progress made, to the explicit modelling of the mechanism by which fiscal decentralization might influence economic growth. As Martinez-Vazquez and McNab (2003) explain, "[o]nly quite recently have normative discussions of fiscal decentralization added economic growth to the traditional list of public finance objectives of efficiency in the allocation of resources, horizontal fiscal imbalances, and economic stabilization" (p. 1597). Some had initially interpreted Oates' (1999) conjecture of the effects of decentralization on economic growth to be derived from the classic objective of economically efficient provision of public goods and services argument (Martinez-Vazquez and McNab, 2003). While efficiency is likely in many ways linked to local economic growth, the theoretical literature has taken a different approach.

2.1 Interjurisdictional Competition

Competition among decentralized jurisdictions is engrained in the literature as the centripetal force behind the effects of horizontal fiscal decentralization on economic growth. As such, the work of public choice theorists who introduced the notion interjurisdictional interaction (Tiebout, 1956; Buchanan and Tullock, 1962) have influenced much of what follows. Similar to other objectives of fiscal decentralization, literature on decentralization and growth requires the coexistence of theories of fiscal federalism and public choice.

However, before delving into the abyss of decentralization and growth, it is necessary to preface the rest of the paper with a distinction between the two types of fiscal decentralization: vertical and horizontal. Vertical fiscal decentralization is the process of fiscal federalism by which a central, or upper-tier government relinquishes powers to lower tier government units. Horizontal fiscal decentralization, or sometimes referred to as *fragmentation*, is the dispersion of power among local government units; "it is a measure of the level of interjurisdictional

competition between local governments" (Stansel, 2005, p. 57). The horizontal aspect of fiscal decentralization is of particular interest in this paper given recent horizontal municipal reforms in Canada, and the lack of evidence and consensus regarding the impacts of these reforms. Therefore, emphasis will be placed on theoretical and empirical literature that explicitly studies horizontal fiscal decentralization.

2.2 Capital Mobility, Tax Competition and Government Motives

The first avenue on the effects of interjurisdictional tax competition is with respect to mobile capital. Economic theory posits that horizontal fiscal decentralization fosters local government units to choose competitive tax policies that attract mobile capital investment, which in turn enhance the growth rate of the local economy (Hatfield, 2013). Within this avenue, there are two strands of literature. The first strand formally models what Oates (1972) had originally articulated. That is, when capital is mobile, interjurisdictional competition will yield a "race to the bottom" effect where governments competing to attract capital will lower tax rates to a level where public goods and services are undersupplied (Zodrow & Mieskowski, 1986; Wilson, 1986; Keen & Marchand, 1996; Rom, Peterson, & Scheve, 1998). This strand of literature is largely based on the Pigouvian approach of assuming benevolent social planners.

On the other hand, Brennan and Buchanan (1980) argue that interjurisdictional competition will "tame the Leviathan," or the self-interested and rent-seeking government, from extracting excessive monopoly rents. As a result, competitive tax rates among competing jurisdictions will mitigate taxation abuse that deters capital accumulation.

One of the key differences between these two strands of tax competition literature is the assumed motive of the government: Pigouvian versus Leviathan. Edwards and Keen (1996) develop a model which allows the government to have both sorts of objectives. They show that

greater tax coordination (i.e., less competition) increases social welfare. However, neither this model, nor any of the earlier models, directly address the effects of interjurisdictional tax competition on economic growth.

In contrast, Hatfield (2013) presents a model which also includes elements of benevolence and of Leviathan-like governments, but does so explicitly in the context of economic growth[2]. Hatfield (2013) develops an endogenous growth model based on Barro (1990) where government services that are necessary for production are funded by income and capital. Hatfield's (2013) main finding is that fiscal decentralization will result in higher economic growth via interjurisdictional tax competition; "when many districts exist, competition will drive the districts to choose tax policies that maximize the private rate of return [of capital] and hence the growth rate of the economy" (p. 21)[3].

2.3 Interjurisdictional Spillovers

None of the literature above incorporates externalities, or spillovers of public goods, into the discussion. This is where the second avenue of literature on decentralization and growth begins.

As Oates (1972) had originally argued, when spillovers exist, a lower level of government will not account for benefits accruing to neighbouring jurisdictions, therefore undersupplying the optimal level of public good to the region. In this case, it is better to have a

[2] There are number of other studies which analyze how tax competition affects economic growth, including Devereux and Mansoorian (1992), Lejour and Verbon (1997), Brueckner (1999, 2006), Razin and Yuen (1999), and Koethenbuerger and Lockwood (2010), however all of them assume a benevolent government. Rauscher (2005), on the other hand, does so in the presence of a fully Leviathan-like government.

[3] Weingast (1995) and Hatfield and Padro i Miquel (2012) also present similar models where incentives for productive investments are enhanced via interjurisdictional competition.

central government provide a single level of public good across the region in order to internalize spillovers, and provide the optimal level of public good.

Besley and Coate's (2003) classic paper uses a political economy approach to model the treatment of spillovers, while also incorporating differences in tastes for public spending in the context of two local governments[4]. They present a static model of centralized versus decentralized provision of public goods, but remove the unrealistic assumption that a central government provides a uniform level of public goods across jurisdictions. Instead, they show that a centralized system creates a conflict of interest between individuals in different jurisdictions which impact the decisions made in a centralized legislature. Besley and Coate (2003) show that heterogeneity among jurisdictions increases decision making costs of having a centralized legislature, but at the same time a centralized system provides benefits through improved coordination of spillovers. They conclude that as local tastes become more heterogeneous and as spillovers become smaller the adverse effects of centralization worsen.

Chu and Yang (2012) build on both Edwards and Keen (1996) and Besley and Coate (2003) by integrating both approaches into a single comprehensive model that unifies the two theoretical avenues of fiscal decentralization and economic growth. Chu and Yang (2012) depart from Edwards and Keen (1996) in that they consider growth effects in addition to welfare effects; they consider varying degrees of capital mobility instead of assuming perfect mobility; and they include spillovers in their model. They also incorporate Besley and Coate's (2003) model almost directly, but with one departure. Instead of explicitly modeling a political process, they opt for the inclusion of an exogenous parameter that captures a varying degree of which a government is rent-seeking.

[4] Also see Lockwood (2002) for a similar treatment.

Chu and Yang's (2012) model reveals several important findings. First, fiscal decentralization dominates fiscal centralization in terms of economic growth. When there is greater tax competition among jurisdictions, the result is lower taxation on capital, inducing greater economic growth. Second, the objectives of economic growth and social welfare may be conflicting. Since higher capital mobility induces greater tax competition, there is an optimal level of tax competition where too much of it will result in a sub-optimal level of provision relative to centralization, therefore lowering social welfare. Lastly, in terms of interjurisdictional spillovers of public goods, there exists a threshold, where when above this threshold, centralization dominates decentralization. Conversely, when spillovers are not significant then the degree of capital mobility and tax competition comes into play for relative social welfare outcomes between centralization and decentralization.

Chu and Yang's (2012) model serves as the most recent and most robust conceptual framework for understanding how fiscal decentralization affects both economic growth and social welfare via tax competition in the dynamic context of varying degrees of government motives, capital mobility and spillovers. It will certainly be used as a benchmark for any theoretical or empirical study of fiscal decentralization and economic growth and social welfare moving forward.

2.4 Summary

Within the theory of fiscal decentralization there are several important mechanism at work that may drive the magnitude of local economic growth. These mechanism are with respect to: (i) capital mobility (ii) government motives, (iii) type of public good, and (iv) level of spillover.

First and foremost, if capital is immobile there is no benefit with interjurisdictional competition through horizontal fiscal decentralization as there is no incentive for a jurisdiction to lower tax rates. This case is very unlikely, but so is the polar opposite of perfect capital mobility. When capital is imperfectly mobile, some jurisdictions may continue to attract investment despite having higher tax rates: although the investment decisions of some capital owners may be particularly sensitive to tax rates, others may be attracted to specific jurisdictions because of other exogenous factors, such as relative distance to family members. Thus, it can be predicted that the degree of capital mobility will influence the extent to which fiscal decentralization is positively correlated with economic growth.

Second, as Wilson (2005) states, assuming a benevolent government "clearly stacks the deck against tax competition" (p. 2), and thus fiscal decentralization. On the other hand, assuming a fully Leviathan-like government favours the opposite in order to stimulate growth. Chu and Yang (2012) and Hatfield (2013) both assume a plausible model where government is partly benevolent but also partly rent-seeking. As Hatfield (2013) explains, "[e]conomic policy is not decided by benevolent social planners, but by government officials, usually with at least one eye to their reelection prospects" (p. 1). Therefore, it can be predicted that the degree that social planners are Leviathan-like will impact the extent to which interjurisdictional competition will drive economic growth.

Third, consumption-type and production-type public goods impact growth. For example, Rauscher (2005), who assumes a productive-type public goods, presents contrasting results to some of Chu and Yang's (2012) findings who use consumption-type good. Also, Hatfield (2013) assumes a productive public good in his model and finds a strong association between decentralization and growth, however when assuming a consumption-type public good Hatfield

(2013) finds similar results to the opposing "race to the bottom" literature (Zodrow & Mieskowski, 1986; Wilson, 1986). It can be predicted that a jurisdiction which relies heavily on consumption-type public goods as opposed to production-type public goods will experience larger economic growth under a centralized government structure, and vice versa.

In terms of interjurisdictional spillovers, greater levels of fiscal decentralization may have a negative impact on growth. It can be predicted that economic growth resulting from fiscal decentralization may be offset by the level of spillovers between jurisdictions. In addition, as the prevalence of a particular public good that is prone to spilling over increases, one can expect an adverse effect on economic growth.

3. Empirical Literature

The following section discusses empirical literature revolving around fiscal decentralization and economic growth. Sub-sections are ordered in terms of least to most relevant to the purposes of this paper. First, cross-country studies are discussed briefly, followed by a summary of single-country studies. The final sub-section places particular attention on single country studies that focus specifically on the horizontal nature of decentralization while also using a local unit of analysis for measuring growth.

3.1 Cross-country Studies

The empirical literature can be divided into two groups: (i) cross-country and (ii) single country studies. The majority of cross-country studies measure fiscal decentralization as the portion of total government expenditures or revenues allocated to sub-central governments. In other words, these studies are tests of the level of vertical fiscal decentralization, rather than horizontal. One of the acknowledged weaknesses of this literature is that few studies control for

the magnitude and type (discretionary versus non-discretionary) of transfer from central governments to local governments, yielding a weak measure of fiscal decentralization, especially given the variance across countries in terms of inter-governmental relations (Ebel and Yilmaz, 2002; Treisman, 2002; Rodden, 2004; Stegarescu, 2005). It likely for this reason, and other substantive problems highlighted by Salmon (2013), that empirical results on vertical decentralization and economic growth are mixed[5].

3.2 Single Country Studies

The second line of inquiry measures the effects of decentralization on growth in a single country. The studies below address, to varying degrees, both vertical and horizontal aspects of fiscal decentralization. Figure 1 (in Appendix) provides a summary of single country empirical studies, and is restricted to papers which deal with developed countries, as these are the most germane to the focus of this paper[6]. There have been a dozen formal studies on fiscal decentralization and economic growth since the early 90s. Roughly half of them have addressed the horizontal, or fragmented, nature of fiscal decentralization. Overall, these studies tend to lean towards finding a positive or mixed relationship between horizontal fiscal decentralization and economic growth, especially in the last decade. The same can be said for tests of vertical fiscal decentralization.

[5] Some studies find a negative relationship (Davoodi and Zou, 1998; Rodriquez-Pose and Ezcurra, 2011; Baskaran and Feld, 2013), some find a positive relationship (Yilmaz, 2000; Ebel & Yilmaz, 2002; Thiessen, 2003; Thiessen, 2003a; Eller, 2004; Meloche, Vaillancourt & Yilmaz,2004; Iimi, 2005), and other studies find no relationship or an ambiguous relationship (Kim, 1995; Huther & Shah, 1998; Woller & Phillipps, 1998; Martinez-Vazquez & McNab, 2006; Enikolopov & Zhuravskaya, 2007; Rodriquez-pose & Kroijer, 2009; Bodman, 2011; Gemmell, Kneller & Sanz, 2013). For a full inventory and critical review of these studies see Baskaran, Feld and Schnellenbach (2014).

[6] For single country empirical studies on developing nations, see for example Zhang and Zou (1997), Zhang and Zou (1998), Lin and Lou (2000), Zhang and Zou (2001), Naumets (2003), Feltenstein and Iwata (2005), Jin and Zou (2005), Desai, Freinkman and Goldberg (2005), Jin, Qian and Weingast (2005), and Qiao, Martinez-Vazquez and Yu (2008).

Foster (1993) and Nelson and Foster (1999) were among the first researchers to examine the impact of fiscal decentralization using data from a single, developed country, and to this end drew on a cross-section of data for metropolitan areas in the United States. The former uses population as a measure of economic growth from 1962 to 1982 and finds mixed results, while the latter uses income per capita to measure growth from 1976 to 1996 and also finds mixed results. Both of these studies use the level of urbanization as a measure of decentralization. This is not necessarily an accurate definition of *fiscal* decentralization, and is one reason why their results may be mixed. The reason for this is due to the ambiguity in interpreting the sign on estimated coefficients of urbanization measures. Additionally, as Stansel (2005) explains, the two aforementioned studies even contradict each other in the way that they interpret their urbanization coefficients[7].

Furthermore, as Stansel (2005) explains, Foster's (1993) estimates are likely to be biased given that the only variables controlled for are population density, metropolitan area age, and four regional dummy variables. On the other hand, Nelson and Foster (1999) may suffer from over-specifying their model given that 40 control variables were used.

Six subsequent studies test the relationship between vertical fiscal decentralization and economic growth; three use American data (Xie, Zou & Davoodi, 1999; Akai & Sakata, 2002; Akai, Nishimura & Sakata, 2007), one focusses on Germany (Behnisch, Buttner & Stagarescu, 2002) and two on Spain (Gil-Serrate & Lopez-Laborda, 2006; Carrion-i-Silvestre, Espasa & Mora, 2008). All of these analyses use expenditure and/or revenues shares as the measure of vertical fiscal decentralization.

[7] For a more detailed argument of the contradictions between Foster's (1993) and Nelson and Foster's (1999) interpretations of the same variables, see page 58 of Stansel (2005).

Xie, Zou & Davoodi (1999) used the portion of state and local expenditure shares as a measure of decentralization, while using national GDP per capita for measuring growth over a 1948-1994 time series. Their results shows a humped shaped relationship where the existing level of decentralization has maximized growth, suggesting that any additional level of decentralization would be harmful for growth. Akai and Sakata (2002) and Akai, Nishimura & Sakata (2007) both use a panel of state-level data using GDP per capita as a measure of growth over the period of 1992-1996 and 1992-1997, respectively. The former finds a strong positive relationship where decentralizing expenditures by 10 percent would increase the growth of GDP per capita by 1.6-3.2 percent. The latter also finds a positive, but hump-shaped relationship, where further decentralization will increase economic growth.

Behnisch, Buttner & Stagarescu (2002) test for growth at the national level using an indicator for factor productivity growth[8] as a measure of economic growth across the time series of 1950 to 1990. They find a positive relationship between centralization and growth. All of the aforementioned studies, excluding Foster (1993) and Nelson and Foster (1999), are not only analyses of vertical decentralization, but their focus is either at the national- or state-level, rather than the local level. This is important distinction given that the empirical analysis conducted in this paper focusses on local impacts on economic growth.

Both of the Spanish studies analyze growth of at the regional level by using private sector investment (Gil-Serrate & Lopez-Laborda, 2006) and GDP per capita (Carrion-i-Silvestre & Mora, 2008) as measures of economic growth. Both use revenue share as a measure of

[8] Productivity growth is measured by the "residual difference between the rate of change in real output (net national product at factor costs) and a weighted average of the growth rates of the total volume of worked hours as well as of capital input, where the weights are the income shares of labor and capital" (Behnisch, Buttner & Stagarescu, 2002, p. 28).

decentralization and find a positive effect on growth, while the latter also uses expenditure share as a measure of decentralization and finds a negative effect on growth from 1965-2000.

3.3 Horizontal Fiscal Decentralization Studies

The remaining four single developed country empirical studies are all studies of horizontal fiscal decentralization. These analyses are the most closely related to the focus of this paper given that they all use fragmentation as a measure of decentralization and they all use a cross-section of sub-state level data.

Feld, Kirchgässner & Schaltegger (2004, 2005) study how three measures of decentralization (fragmentation, tax competition and grants) impact GDP per capita in the 26 cantons in Switzerland from 1980 to 1998. Using a neoclassical growth model (Mankiw, Romer, Weil, 1992) they show that fragmentation, measured by the number of municipalities in a canton, does not impact growth. They interpret this as refutable evidence that economies of scale can be reaped through municipal consolidation. Additionally, they show that tax competition, as measured by the difference between a cantons tax rate and the average of its neighbours' tax rate, is positively related to economic growth, while matching grants have a strong negative relationship with economic growth in a canton.

Stansel (2005) builds an endogenous growth model derived from Glaeser, Scheinkman, and Shleifer (1995), who had originally applied Barro's (1990, 1991) model to the local level. While Glaeser et al. (1995) do not analyze the impact of decentralization on growth, their model has been influential for modelling city-level economic growth. Glaeser et al. (1995) use population, employment and income as measures of economic growth. They show that education, unemployment, and exposure to manufacturing are particularly important

determinants of growth. All of these explanatory variables had positive effects, and of nearly the same magnitude, on each of the dependent variables.

Studying a cross-section of 314 US metropolitan areas, Stansel (2005) uses population and income as a measure of economic growth from 1960 to 1990. He notes however that a measure such as a per capita income is somewhat less appropriate than a measure like GDP to gauge economic growth, given that a worker does not necessarily have to live with they work. This is especially true at the local level.

Stansel measures the level of fragmentation using the number of general-purpose governments, which include county, municipal and township governments, as well as the number of public school systems, in a given metro area. Like Foster (1993) and Nelson and Foster (1999), Stansel also uses urbanization (measured as the central-city population as a portion of total metro area population) as a second measure of decentralization. He finds that the number of county governments is associated with an increase in population growth rate and the per capita income growth rate, therefore supporting the hypothesis that horizontal fiscal decentralization is associated with economic growth. The effect of the number of municipal governments, township governments and public school systems were not significant. The results of the central-city share of metro area population on both population and income also supported that decentralization enhances growth. However, as Stansel (2005) had critiqued Foster (1993) and Nelson and Foster (1999), he concedes that there are caveats when using urbanization as a measure of horizontal decentralization.

Hammond and Tosun (2011) make an important contribution to the literature by using a sample of all counties in the lower 48 US states from 1970-2000. This is the lowest geographical level from which a study has been conducted to date, allowing the authors to differentiate

between the effects of decentralization on growth in metropolitan versus nonmetropolitan areas. Additionally, the jurisdictional boundaries of counties conform to government jurisdictions, unlike, for example, metropolitan statistical areas which are used in all other sub-state or sub-regional level studies. As such, Hammond and Tosun (2011) sheds light on community-level growth which is particularly interesting for the purposes of this paper.

Hammond and Tosun (2011) follow the empirical specifications of Glaeser et al. (1995) and Stansel (2005), while using a cross-section of 629 metropolitan counties and 2,443 nonmetropolitan counties. They measure fragmentation in terms of general- and special-purpose governments per capita/square mile, while economic growth is measured as population, employment and income in both metropolitan and non-metropolitan counties. Their results show that decentralizing single purpose government in metropolitan areas impact population and employment growth, but find no significant effect on nonmetropolitan counties. However, on the other hand, they also find that horizontal decentralization of general-purpose governments per capita have a negative impact on employment and population growth in nonmetropolitan counties.

Some have questioned the causal relationship, suggesting that economic growth could drive greater fiscal decentralization (Bahl and Linn, 1992; Oates, 1993; Panizza, 1999). Since government action is endogenous by nature (Hammond and Tosun, 2011), it is possible that local government reacts to economic growth by adjusting its structure given increasing or decreasing growth. However, the most recent empirical study on fiscal decentralization and economic growth sets out to overcome this issue. Using a sample of 223 metropolitan areas in the US from 1969-2006, Hatfield and Kosec (2013) implement a Hoxby-inspired (2000) but Rothstein-corrected (2007) instrumental variable for the number of county governments. They use total

miles of small streams in a metropolitan area as they are not directly a function of growth, but act as natural "break points" that had influenced the boundaries of counties during their founding. Simply, more streams was a proxy for more boundaries, which meant more interjurisdictional competition.

Hatfield and Kosec (2013) measure of economic growth using the growth rate of earnings, income and GDP per employee. They show that doubling the number of country governments in a metropolitan area leads to a 17 percent increase in the average annual growth rate of earnings per employee over 1969-2006, and a 10 percent increase in 2006 income per employee. Lastly, they show that increasing interjurisdictional competition by doubling the number of county governments will increase municipal GDP per employee by 10 percent.

Taking it a step further, Hatfield and Kosec (2013) analyze the mechanisms at work behind the finding that greater inter-jurisdictional competition promotes greater economic growth. They show that greater economic growth is the result of attracting more productive workers, inducing workers to work longer hours, and an increase in hourly wages.

The rigour used in Hatfield and Kosec's (2013) analysis is certain to take the subject of fiscal decentralization and economic growth to new levels. They have shown how fiscal decentralization impacts growth while simultaneously addressing the reverse causality issue.

3.3 Summary

There are a few important conclusions that can be drawn from the previous empirical literature. First, Tosun and Hammond (2011) and Hatfield and Kosec (2013) are important studies that should be follow closely in any future empirical exercise testing the effects of horizontal fiscal decentralization on economic growth via interjurisdictional competition. While Hatfield and Kosec (2013) use a rigorous IV approach to address identification issues, Tosun and

Hammond (2011) present a model that is based on community-level growth. These studies (as well as the majority of cross-country and developing country studies) specify their model using an endogenous growth model as derived from Barro (1990, 1991) and Glaeser et al. (1995). It would be appropriate to follow this approach in future empirical studies.

Additionally, while evidence appears to be mixed for single country studies of horizontal decentralization, some of the variation can be explained by the nuances within each study. Table 1 indicates that the more recent and robust studies which involve tests for horizontal decentralization through fragmentation find a positive relationship between decentralization and growth in larger metropolitan areas only. However, when looking at non-metropolitan areas, the effects of decentralizing general purpose governments are negatively related to growth (Hammond and Tosun, 2011). Since the next section conducts an empirical analysis to shed light on the effects of horizontal fiscal decentralization on economic growth in sub-samples of both Canadian metropolitan and nonmetropolitan areas, it is appropriate to assume that results will not be the same across samples.

4. Empirical Analysis

The empirical analysis conducted below investigates the effects of local horizontal fiscal decentralization on local economic growth using data from Census Divisions in Canada. The methods and model closely follow the work of Hammond and Tosun (2011), which is based on earlier work by Barro (1990, 1991), Glaeser et al., (1995) and Stansel (2005).

This exercise attempts to replicate Hammond and Tosun (2011) using Canadian data, however due to the variation in data collection between Canada and the US there are inevitably slight departures from exact replication. Nevertheless, the analysis, interpretations and

implications are directly comparable. This section outlines the methods, model and data used in the analysis, and is followed by a discussion of the results.

4.1 Methods and Model

The empirical specification is directly inspired by Hammond and Tosun (2011), which was derived from Glaeser et al. (1995) and Stansel (2005). The empirical specification is presented in the following linear estimation equations:

$$\mathbf{y_{nm} = FD_{nm}b^{FD}_{nm} + X_{nm}b^{X}_{nm} + e_{nm},} \quad (1)$$

$$\mathbf{y_{m} = FD_{m}b^{FD}_{m} + X_{m}b^{X}_{m} + e_{m},} \quad (2)$$

where **nm** and **m** subscripts denote nonmetropolitan and metropolitan sub-samples, respectively. Let **y** be an *N* x 1 vector for *N* observed Census Divisions on the dependent variables, which include population, employment or real income growth rates. Let **FD** be an *N* x *K* matrices for *N* observations on *K* measures of horizontal fiscal decentralization, which include general purpose governments per capita and per square kilometer and municipal equivalents per capita and per square kilometer. The $\mathbf{b^{FD}}$ vectors contain the estimated coefficients for the fiscal decentralization variables. Let **X** be *N* x *K* matrices for *N* observations on *K* control variables, which include lagged growth, initial level of the dependent variable, human capital, industry employment shares, labour market performance, and province-fixed effects. The $\mathbf{b^{X}}$ vectors contain the estimated coefficients for respective control variables. The **e** term denotes an *N* x 1 vector of residuals.

As per Glaeser et al. (1995), Stansel (2005) and Hammond and Tosun (2011), dependent variables are expressed as the percentage growth in the natural logarithms from 2001-2011. This model uses population, employment and income as separate dependent variables. The income variable uses average income adjusted for inflation based on 2002 dollars. Since Census data was

used, the income values technically represent the year prior, which was also the case in all previous studies using Census income data. Lagged growth and initial level of the dependent variable controls were also converted into natural logarithms.

Following Hammond and Tosun (2011), a number of additional control variables are used. In addition to lagged growth and the initial level of the dependent variable, local human capital, industry employment shares, labour market performance and province-fixed effects are also controlled for. The only control variables that Hammond and Tosun (2011) use that were not included are natural amenities and spatial relationship, which were not included due to the limitations of the data available. Importantly, however, provincial-fixed effects are included to help account for any omitted variable bias. Ordinary Least Squares (OLS) is used to estimate equations (1) and (2). This technique is the most appropriate because under the conditions that regressors are exogenous, there is no perfect multicollinearity and errors are homoskedastic and normally distributed, the OLS estimators are consistent and unbiased.

As discussed in Section 3.3, it is possible, that the regressors are not exogenous. In order to control for possible endogeneity and reverse causality problems between measures of fiscal decentralization and economic growth, the model includes reference period (i.e., 2001) values for dependent growth variables and all other right-hand side variables, as well as controls for growth that occurred a decade earlier. Since it is possible that existing growth caused the structure of local government in 2001, lagged growth from a decade earlier is included as a regressor, therefore controlling for any endogenous growth that may have impacted local government structure. This technique was also used by Glaeser et al (1995), Stansel (2005) and Hammond and Tosun (2011). Intuitively, however, economic growth has never been an objective of the provincial governments in Canada who were responsible for implementing forced municipal

consolidations during the 1990s as a cost-savings exercise. There is good reason to believe that for this reason local economic growth could not have caused local government structure in 2001, since reforms had been a function of political motives at the provincial level.

To determine whether or not there is any concern with multicollinearity, variance inflation factors are analyzed for all regressors (Figure 2 and 3 in Appendix). There does not appear to be much concern for issues of multicollinearity in both non-metropolitan and metropolitan sample regressions.

To test for heteroskedasticity Breusch-Pagan tests are used. In almost all regressions the null hypothesis for homoskedasticity is rejected at the 1 percent significance level, meaning that the variance of the residuals increases as a function of one or more of right-hand side variables[9]. To correct for this, all regression are ran using White robust standards errors. Finally, a plot of residuals against fitted values indicate that the estimated residuals are normally distributed for all regressions (see Figure 4 and 5 in Appendix).

4.2 Data

The analysis is based on a sample of 247 Canadian Census Districts (CDs) from 2001 to 2011. This time period is chosen for one important reason. Most municipal reforms in Canada had been completed on or before January 1st 2001, making 2001 the earliest date to measure growth from without compromising the integrity of the analysis. Recognizing that it would be more ideal to analyze a longer time period for growth to unfold, this simply was not feasible given the recent reforms in Canada. Since Hammond and Tosun (2011) used a 30 year period from 1970-2000 as a measure of long-run growth, the 10 year period use in this paper can be

[9] The only regressions that did not reject the null hypothesis for homoskedasticity was metropolitan employment and income growth, thus White robust standard errors were not used in these cases.

better understood as short-run growth. Indeed, this study should continue to be revisited as new census data is released.

It is notable that there were some additional municipal reforms in Canada after 2001. This can be problematic if not accounted for properly. Since 2001 is used as the reference year for measuring growth 10 years later, it must be assumed that the number of general purpose government units does change throughout this period. This study attempts to retain the integrity of this assumption by dropping all CDs that had underwent municipal reform after 2001. In total, 35 CDs were dropped, the majority of which were from Quebec and British Columbia. Hammond and Tosun (2011) do not state how or if they controlled for the change of local government structure from 1970-2000.

This paper measures local horizontal fiscal decentralization using the number of Census Subdivisions (CSD). A CSD "is a municipality or an area that is deemed to be equivalent to a municipality for statistical reporting purposes" (Statistics Canada, 2012). In other words, CSDs can either be a *municipality* or a *municipal equivalent*. A municipality in Canada is by definition "a city, town, or district having local government," or equivalently, "the governing body of this area" (Barber, 1998). In other words, all CSDs are both a local government unit, and the boundary thereof, except for municipal equivalents which are simply a jurisdiction that has not been incorporated as a municipality by its respective province. They include Indian reserves, Indian settlements or unorganized areas.

Census Divisions (CDs) are the primary unit of analysis in this exercise. A CD is defined by Statistics Canada (2012) as a "group of neighbouring municipalities joined together for the purposes of regional planning and managing common services (such as police or ambulance

services).” Therefore, this study calculates the number of municipalities (i.e., CSDs less municipal equivalents) within a CD to obtain the number of general purpose governments.

This approach is nearly identical to Hammond and Tosun (2011) in that the number of local general purpose governments is used as a measure of decentralization, while a larger geographical area (i.e., CDs in Canada and “counties” in the US) is used as the unit of analysis for measuring growth. Using CDs as the unit of analysis is particularly useful since these are the jurisdictions in Canada which have the ability to centralize and decentralize horizontally. Hammond and Tosun (2011), being the first to conduct such a study at the US county-level, offer the same reasoning for the applicability of using such a local unit of analysis.

This study expresses local general purpose governments on a per capita and per area basis. As per Hammond and Tosun (2011), decentralization per capita is interpreted as “the relative influence of economies of scale and spillovers versus the ability to meet local preferences,” while decentralization per area reflects “the interjurisdictional competitiveness across space” (p. 51).

The method in this paper differs slightly from that of Hammond and Tosun (2011), as well as other US studies, since there exists no formal Census of Government in Canada as there is in the US. The Census of Government counts the number of general purpose governments in the US every five years, while also counting the number of single purpose governments broken down by school and special districts. Unfortunately, Canada does not have formal mechanisms in place for tracking local government structure like the US, and therefore this study is limited to tediously counting the number of municipalities in order to obtain the number of general purpose governments in Canada.

However, in addition, this study is also able to account for the number of municipal equivalents (i.e., Indian reserves, Indian settlements and unorganized territories) per CD. In doing so, this strategy primarily controls for any bias that may result from counting municipal equivalents as identical to a municipality, but it also captures a new dimension of decentralization that has not been seen in previous literature: how the number of unincorporated jurisdictions impacts economic growth in CDs.

Finally, an important feature of Hammond and Tosun (2011) is that they ran two separate models for metropolitan and nonmetropolitan counties. They show that single-purpose governments per square mile have a positive impact on metropolitan growth, but no significant impact in nonmetropolitan counties. In contrast, they also find that local horizontal decentralization per capita has a negative impact on nonmetropolitan population and employment growth, and no significant impact on metropolitan counties.

In the US, the Office of Management and Budget (2013) defines metropolitan counties as a core county with a densely-settled urban entity with 50,000 or more people, as well as any outlying county that it is economically tied to the core county. Statistics Canada (2012), on the other hand, does not formally define CDs as metropolitan or nonmetropolitan. However, for the sake of consistency and comparability to the US, this study defines a metropolitan CD as a jurisdiction with a population of at least 50,000. Nonmetropolitan CDs are defined by having of a populace of less than 50,000.

Table 2 provides summary statistics for all data used in this study. All data was retrieved from Statistics Canada, most of which was obtained from the Census and required some form of manipulation in order to replicate the techniques of Hammond and Tosun (2011) and others before. There was a total of 247 observed CDs, 151 of which had a population of less than

50,000 (i.e., non-metropolitan) and the remaining 96 were metropolitan CDs. In 2001, nonmetropolitan CDs across Canada had an average population of about 25,000, while roughly 10,750 were employed. Average population in 2001 in metropolitan CDs was about nearly 242,000, with roughly 118,500 employed. In 2000, the average income (2002 dollars) in non-metropolitan and metropolitan CDs was $24,599 and $29,478, respectively.

From 2001-2011, average population growth rates were 0.60 percent in nonmetropolitan CDs versus 9.45 percent in metropolitan areas. In terms of employment growth rates during the same period, nonmetropolitan CDs experienced an average of 6.70 percent while metropolitan areas grew by nearly 13 percent. On the other hand, from 2001-2011 nonmetropolitan average income had an average growth rate of over 16.11 percent, while metropolitan CDs experienced a growth rate of about 12 percent.

Both non-metropolitan and metropolitan CDs had an average of roughly 15 general purpose governments within them. In nonmetropolitan areas this translated into nearly 64 governments units per 100,000 residents and 0.0037 per square kilometer. In metropolitan areas, there were roughly 20.6 general purpose governments per 100,000 residents and 0.0052 per square kilometer.

In 2001, nonmetropolitan CDs had considerably higher shares of employment in agriculture and other resource-based industries, while metropolitan CDs generally had larger shares of employment in business services, finance and real estate, and wholesale and retail trade industries. In terms of human capital, nonmetropolitan CDs had a larger share of individuals aged 20-64 with a trades certificate or diploma, while metropolitan areas had a larger share of individuals aged 20-64 with college and university certificates.

Table 2: Summary Statistics for Census Divisions in Canada

Variable	Sources	Mean Values		
		All	Non-metro	Metro
Total observed CDs, 2001	Census	247	151	96
Population growth, 2001-2011 (%)	Census	4.0410	0.6041	9.4469
Employment growth, 2001-2011 (%)	Census	9.1214	6.6952	12.9376
Real average income growth, 2000-2010 (%)	Census, CANSIM Table 326-0022, Author calculations	14.4999	16.1052	11.9749
Population growth, 1991-2001 (%)	Census	3.3182	-0.2580	8.9434
Employment growth, 1991-2001 (%)	Census	5.1372	1.5462	10.7856
Real average income growth, 1990-2000 (%)	Census, CANSIM Table 326-0022, Author calculations	7.4310	4.2647	12.3784
Total local general purpose governments, 2001	Census, Author calculations	3712	2244	1468
Per 100,000 residents		44.8083	63.9055	20.5919
Per square kilometer		0.0042	0.0037	0.0052
Per CD		15.0283	14.8609	15.2917
Total local municipal equivalents, 2001	Census, Author calculations	1120	638	482
Per 100,000 residents		13.3496	18.1356	5.8218
Per square kilometer		0.0004	0.0004	0.0005
Per CD		4.5344	4.2252	5.0208
Population, 2001	Census	109,258.83	25,025.83	241,750.32
Employment, 2001	Census	52,613.88	10,751.07	118,460.59
Real average income, 2000 (2002 dollars)	Census	26,495.81	24,599.27	29,478.91
Unemployment rate, 2001	Census	10.3036	11.9682	7.6854
Agriculture and other resource-based industries share, 2001	Census, Author calculations	12.9651	16.2755	7.6474
Business services share, 2001	Census, Author calculations	12.6867	11.0986	15.1846
Finance and real estate share, 2001	Census, Author calculations	3.6694	3.1189	4.5353
Health and education share, 2001	Census, Author calculations	16.9191	16.9967	16.7972
Manufacturing and construction industries share, 2001	Census, Author calculations	19.7058	19.2734	20.3859
Other services share, 2001	Census, Author calculations	19.7529	19.7074	19.8243
Wholesale and retail trade share, 2001	Census, Author calculations	14.3117	13.5380	15.5286
Population aged 20-64 with a trades certificate or diploma, 2001 (%)	Census, Author calculations	46.1093	48.6397	42.1292
Population aged 20-64 with a college certificate or diploma, 2001 (%)	Census, Author calculations	50.5494	46.7503	56.5250
Population aged 20-64 with a university certificate, diploma or degree, 2001 (%)	Census, Author calculations	40.3603	34.5649	49.4760

4.3 Results

In this section, results are reported for nonmetropolitan and metropolitan sub-samples; estimation equations 1 and 2 in the Section 4.2, respectively. In each case, results are interpreted and compared directly to the results of Hammond and Tosun (2011).

Spatial Chow tests are conducted on the full sample of CDs to test the null hypothesis that all coefficients are the same across metropolitan and nonmetropolitan CDs for population, employment and income regressions[10]. Since the null hypothesis is rejected at the 1 percent level for all dependent variables, separate regressions were ran for the metropolitan and nonmetropolitan sub-samples.

4.4.1 Nonmetropolitan Sample

Table 3 presents the regression results for the sample of nonmetropolitan CDs. It is evident that the number of general purpose governments per capita in 2001 is negatively correlated with population growth at the 5 percent significance level and employment growth at the 1 percent significance level. In other words, in nonmetropolitan Census Divisions, a 10 percent increase in the number of general purpose governments per 100,000 residents will (i) decrease the growth rate of population in the following decade by 0.63 percent and (ii) decrease the growth rate of employment in the following decade by 0.51 percent.

Interestingly, Hammond and Tosun (2011) found that in nonmetropolitan counties in the US, a 10 percent increase in the number of general purpose governments per 100,000 residents would (i) decrease the growth rate of population in the following three decades by 0.36 percent

[10] Results of the Chow tests are as follows:

i. Pooled population regression: Chi^2 (27) = 110.91 with p-value of 0.0000.
ii. Pooled employment regression: Chi^2 (27) = 134.99 with p-value of 0.0000.
iii. Pooled income regression: Chi^2 (27) = 73.70 with p-value of 0.0000.

and (ii) decrease the growth rate of employment in the following three decades by 0.23 percent. These results are strikingly similar.

It appears that in both Canada and the US, local horizontal fiscal decentralization in nonmetropolitan areas will have a negative impact on local population and employment growth, with the adverse effect on population being larger in both countries. The variation of coefficients between this study and Hammond and Tosun's (2011) are likely explained by some missing control variables, different definitions for metropolitan CDs versus metropolitan counties, and different time periods for which growth was measured.

When looking at the magnitude of change of municipalities in nonmetropolitan districts in Ontario the results appear to be significant. For example, during the wave of municipal reforms from 1996 to 2002, of the nonmetropolitan districts that had underwent reforms, the number of municipalities had declined by about 50 percent. This represents an estimated 3.1 percent increase in population growth and a 2.6 percent increase in employment growth over the subsequent decade in these districts only. Evidently, the consolidation of municipalities within districts with a population below 50,000 may have generated significant growth in these regions.

This model also predicts a positive effect of horizontal decentralization of municipal equivalents (i.e., Indian reserves, Indian settlements and unorganized areas) on employment growth. A 10 percent increase in the number of municipal equivalents per square kilometer will increase the growth rate of employment in the following decade by 0.55 percent. It is not clear why this result is occurring given trends of high unemployment rates in Indian reserves and settlements in Canada.

Finally, the number of general purpose governments per square kilometer is negatively correlated with the growth of average incomes at the 1 percent significance level in

nonmetropolitan CDs. This model predicts that a 10 percent increase in the number of general purpose governments per capita in 2001 will decrease the short-run growth of average income by 0.28 percent in nonmetropolitan CDs. Hammond and Tosun (2011) find no significant effect of decentralization on income growth in nonmetropolitan counties.

In Table 3, it is evident that many control variables are not significant in all three regressions. In the population regression, unemployment has the expected negative sign but is not significant, while it positive and significant for the employment regression. In Hammond and Tosun (2011) for both population and employment regression, they had positive and significant coefficients. In this case, perhaps the strength of the labour market would be better gauged by measures of participation or full-time employment, rather than unemployment rates. In both regressions, there are many non-significant coefficients for industry employment shares, which was also the case in Hammond and Tosun (2011). As Glaeser et al. (1995) had originally shown, a greater share of manufacturing is a strong indicator of lower growth, however this result was not evident in nonmetropolitan areas in both this study and in Hammond and Tosun (2011). On the other hand, the share of employment in the finance industry is evident in both Table 3 and Hammond and Tosun (2011). Finally, education levels were also not significant in many cases, which is surprising. Indeed, further investigation of other measures such as test scores or funding for educational services may serve as valuable proxies for educational attainment.

Ultimately, the adverse effect of local horizontal fiscal decentralization per capita on population and employment in nonmetropolitan CDs suggests that the relative gains from reaping economies of scale and internalizing spillovers is much higher than the gains from the ability to meet local preferences. Similar to Hammond and Tosun (2011), this model predicts no

positive relationship between local horizontal fiscal decentralization of general purpose governments and local economic growth for nonmetropolitan CDs.

Table 3: Regressions for Non-metropolitan Census Divisions

	Growth in log of population, 2001-2011		Growth in the log of employment, 2001-2011		Growth in the log of average income, 2001-2011	
	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.
Fiscal Decentralization						
General purpose governments per 100,000 residents, 2001	-0.0019**	0.0010	-0.0060***	0.0017	-0.0001	0.0015
Municipal equivalents per 100,000 residents, 2001	-0.0004	0.0014	-0.0018	0.0028	-0.0015	0.0018
General purpose governments per sq km, 2001	7.7551	5.4348	-3.1722	9.5062	-17.012***	5.1761
Municipal equivalents per sq km, 2001	73.0286	59.4566	238.261**	97.0735	11.8776	67.9055
Control Variables						
ln population, 2001	0.1529***	0.0522	-	-	-0.0870	0.0705
ln employment, 2001	-	-	0.1120	0.0918	-	-
ln income, 2000	0.7333*	0.3883	0.8107	0.5399	-0.2864	0.4728
Growth in log of pop., 1991-2001	0.5370***	0.0666	-	-	-	-
Growth in log of empl., 1991-2001	-	-	0.1712*	0.0882	-	-
Growth in log of inc., 1990-2000	-	-	-	-	0.0099	0.0491
Unemployment rate, 2001	-0.0100	0.0070	0.0317***	0.0109	0.0035	0.0068
Agri. and primary share, 2001	-0.0071	0.0102	-0.0061	0.0162	0.0040	0.0077
Business share, 2001	0.0030	0.0142	0.0315	0.0217	-0.0121	0.0136
Finance share, 2001	0.0703	0.0446	0.2023***	0.0630	0.1034**	0.0431
Health and educ. share 2001	-0.0012	0.0117	-0.0032	0.0210	-0.0184**	0.0095
Manu. and Con. share, 2001	-0.0083	0.0077	-0.0108	0.0114	-0.0014	0.0062
Trade share, 2001	-0.0154	0.0152	-0.0297	0.0201	-0.0059	0.0143
Trades certificate, 2001	0.0004	0.0053	-0.0008	0.0079	0.0110**	0.0056
College certificate, 2001	-0.0034	0.0032	-0.0111*	0.0060	-0.0016	0.0039
University certificate, 2001	-0.0058	0.0038	-0.0066	0.0074	0.0091	0.0043
Constant	-8.2498*	4.5634	-8.5293	6.1449	4.5779	4.7312
Province-fixed effects	YES		Yes		Yes	
Obs.	151		151		151	
R-squared	0.7576		0.6352		0.6355	

* Two-tailed statistical significance at 90% confidence
** Idem., 95%
*** Idem., 99%

4.4.2 Metropolitan Sample

Table 4 presents the regression results for the sample of metropolitan Census Divisions. Evidently, both measures of fiscal decentralization for the number of general purpose governments have no significant impact on short-run population, employment and income growth. Interestingly, this is also what Hammond and Tosun (2011) found for general purpose governments. This insignificant results suggests that in metropolitan CDs there is neither a case to be made for decentralization or centralization of general purpose governments. As such, municipal amalgamations that were pervasive across metropolitan areas beginning in the 1990s likely did not have a significant impact on economic growth for better or worse.

Hammond and Tosun (2011) were fortunate enough to have data on the number of special purpose governments, which yielded several important findings for metropolitan areas. They show that the number of special purpose governments per capita has a positive effect on population, but per square mile they have a proportionately larger negative effect on population. They interpret this as evidence that the population losses from not reaping economies of scale and not internalizing spillovers are larger than the gains from interjurisdictional competition. Additionally, they show that greater interjurisdictional competition through decentralization of special purpose governments will also have a positive effect on local long-run employment growth in metropolitan areas. Unfortunately, verification of these results were not possible given the lack of available data on the number of special purpose governments units in Canada. This will be an important extension should this data be retrievable in the future.

The regressions for metropolitan CDs in Table 4 also present important findings for municipal equivalents. The model predicts that the number of municipal equivalents per capita in 2001 is negatively correlated with population growth at the 5 percent significance level and employment growth at the 1 percent significance level. Specifically a 10 increase in the number

of municipal equivalents will (i) decrease the short-run growth of population by 0.26 percent and (ii) decrease the short-run growth of employment by 0.53 percent.

Table 4: Regressions for Metropolitan Census Divisions

	Growth in log of population, 2001-2011		Growth in the log of employment, 2001-2011		Growth in the log of average income, 2001-2011	
	Coef.	Robust Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Fiscal Decentralization						
General purpose governments per 100,000 residents, 2001	-0.0019	0.0022	-0.0013	0.0035	-0.0008	0.0029
Municipal equivalents per 100,000 residents, 2001	-0.0027**	0.0013	-0.0048***	0.0019	-0.0012	0.0015
General purpose governments per sq km, 2001	-0.7225	2.8394	-2.0126	5.0709	6.2308	4.1821
Reserves, settlements, unorganized areas per sq km, 2001	13.9086	17.6590	8.7235	25.9199	-20.8919	21.2178
Control Variables						
ln population, 2001	-0.0495	0.0469	-	-	-0.0357	0.0509
ln employment, 2001	-	-	-0.0956	0.0637	-	-
ln income, 2000	0.3621	0.4759	0.2056	0.4807	-0.6876	0.4224
Growth in log of pop., 1991-2001	0.5791***	0.0821	-	-	-	-
Growth in log of empl., 1991-2001	-	-	0.4443***	0.0828	-	-
Growth in log of inc., 1990-2000	-	-	-	-	0.0000	0.0399
Unemployment rate, 2001	-0.0235**	0.0095	-0.0016	0.0150	-0.0185	0.0120
Agri. and primary share, 2001	0.0017	0.0073	-0.0051	0.0112	0.0053	0.0088
Business share, 2001	0.0022	0.0116	0.0263	0.0168	0.0055	0.0135
Finance share, 2001	-0.0032	0.0246	0.0170	0.0320	0.0216	0.0264
Health and educ. share 2001	0.0022	0.0096	0.0234	0.0205	-0.0011	0.0163
Manu. and Con. share, 2001	-0.0036	0.0053	-0.0121	0.0091	-0.0274	0.0074
Trade share, 2001	0.0407***	0.0147	0.0559***	0.0206	-0.0221	0.0167
Trades certificate, 2001	0.0023	0.0047	0.0125	0.0082	0.0207***	0.0067
College certificate, 2001	-0.0026	0.0043	-0.0068	0.0056	-0.0003	0.0046
University certificate, 2001	0.0020	0.0024	0.0014	0.0042	0.0007	0.0034
Constant	-0.0235	0.0095	-2.2941	4.9523	8.3507*	4.3992
Province-fixed effects	Yes		Yes		Yes	
Obs.	96		96		96	
Adj R-squared	-		0.6713		0.8399	
R-squared	0.8514		0.7612		0.7796	

* Two-tailed statistical significance at 90% confidence
** Idem., 95%
*** Idem., 99%

5. Conclusion

It is evident that horizontal fiscal decentralization does impact economic growth. To my knowledge, this paper is the second study to analyze the impacts of horizontal fiscal decentralization on local, community-level economic growth, and the first to do so using Canadian data. Using Census Divisions as the fundamental unit of analysis, this study replicates Hammond and Tosun's (2011) work on US counties in order to shed light on both nonmetropolitan and metropolitan jurisdictions. This paper, to a significant extent, verifies Hammond and Tosun's (2011) findings.

This paper shows that increasing number of general purpose governments in nonmetropolitan areas has a negative impact on population, employment and income growth in the following decade. On the other hand, in metropolitan Census Divisions, no significant impact of decentralization of general purpose governments on local economic growth is predicted. Both of these findings are consistent with the findings in Hammond and Tosun (2011). With respect to the municipal reforms that took place throughout Canada beginning in the 1990s, it is estimated that the consolidation of general purpose governments had a positive effect on local economic growth in nonmetropolitan areas (i.e., Census Divisions with less than 50,000 people), and no significant effect on growth in metropolitan Census Divisions.

However, it is also the case that many previous empirical studies in the literature find a positive effect of horizontal fiscal decentralization on economic growth in metropolitan areas. Specifically, Hammond and Tosun (2011) show that this is true, but only if single-purpose government units are fragmented across counties, rather than general purpose government units. This finding has important policy implications, and should be verified in Canada. Unfortunately, due to the lack of data availability this paper was not able to test the impact of single-purpose

governments on economic growth. Nevertheless, the answer to this questions remains fruitful for future research.

Another aspect that this paper sheds light on that has not been seen in previous literature is fragmentation of local jurisdictions that are not incorporated as municipalities by a province (i.e., Indian reserves, Indian settlements and unorganized areas). Specifically, it is predicted that increasing the number of these jurisdictions has a significant negative effect on population and employment in metropolitan areas. If economic growth is an objective of these jurisdictions then there is a strong case to be made for greater fiscal coordination among municipalities and municipal equivalents. This does not necessarily mean municipal consolidation, especially given the cultural and legal limitations for doing so, but merely creating stronger relationships between municipalities and municipal equivalents.

More fundamentally, however, this paper has shown that horizontal fiscal decentralization is related to economic growth in different ways, but has not provided evidence of the mechanisms behind these relationships as identified in the Section 2. Indeed, there remains many fruitful avenues for further research on this front.

First and foremost, does the level of capital mobility play a large role in determining economic growth as conceptualized in theoretical models? As was discussed earlier, if capital is immobile there is no benefit with interjurisdictional competition through horizontal fiscal decentralization as there is no incentive for a jurisdiction to lower tax rates. Whether or not this may be occurring in nonmetropolitan areas in Canada remains an important question to answer.

Second, government motives have important consequences for growth. For example, modelling the degree of government benevolence in a jurisdiction and testing how it impacts local economic growth is an important question. Static models that assume a fully benevolent

government show that fiscal decentralization can lead to lower (Koethenbuerger and Lockwood, 2010), ambiguous (Devereux & Mansoorian, 1992), or higher (Brueckner, 2006) economic growth, depending on other parameters and assumptions included. On the other hand, Leviathan-like governments generally favours tax competition through decentralization (Brennan and Buchanan, 1980). For this reason it is crucial to be aware of the political process when conducting empirical studies on fiscal decentralization and economic growth, and even explicitly modelling such processes as many political economists have been doing (Lockwood, 2006). For example, it may be plausible that nonmetropolitan local governments are more prone to having benevolent social-planners than metropolitan areas.

The second mechanism that may be at work behind fiscal decentralization and economic growth prospects is the type of public good that decentralized units are providing. For example Hatfield concludes that "[f]or a consumptive public good, it is best to have it provided at the national level, otherwise competitive pressures for capital will drive its provision to zero … [f]or a productive public good however, restraining the state via federalism will lead to higher economic growth (p. 22). Thus, the question of whether particular public goods are being provided at the right level to maximize economic growth, or whether additional tiers are being properly utilized to obtain "the best of both worlds", remains to be tested. There is necessarily a case to be made for strategically dividing consumptive- and productive-type public goods among different tiers. This is likely in many ways linked to the first question posed regarding the decentralization of single-purpose government units.

Also closely related to the above, is the aspect of capturing how spillovers are impacting growth when government units are decentralized. Spillovers are difficult to capture tangibly in any empirical analysis, making it a tricky variable to control for. However, there may be some

merit in utilizing the work of Vojnovic (2000) on identifying interjurisdictional externality generating public goods and services in order to control for goods and services that are more (or less) prone to spilling over.

Another area fruitful for future research is the effects of fiscal decentralization on social welfare. It is not necessarily the case that economic growth and social welfare are moving in the same direction. In fact, it may mean just the opposite. Chu and Yang (2012) have shown in their conceptual model that particular levels of public good provision that adversely affect growth may be utility enhancing. This questions remains to be tested empirically.

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Appendix

Author(s)	Sample	Period	Method	Type of Decentralization	Measure of Decentralization	Dependent Variable	Main Result (Impact of decentralization on growth)
Foster (1993)	Regional level - 129 of the largest metropolitan areas, US	1962-1982	OLS, cross-section	Horizontal	- Urbanization measures	- Population	(+/-) Mixed results.
Nelson & Foster (1999)	Regional level - 287 of the largest metropolitan areas, US	1976-1996	OLS, cross-section	Horizontal	- Urbanization measures	- Income per capita	(-) Mixed results.
Xie, Zou & Davoodi (1999)	National level - 1 country, US	1948-1994	OLS, time series	Vertical	Expenditure share, (state + local)/federal	- GDP per capita	(+/-) Humped shaped relationship where the existing level of decentralization has maximized growth, thus additional decentralization will be harmful for growth.
Akai & Sakata (2002)	State level - 50 states, US	1992-1996	OLS, fixed effects panel	Vertical	Expenditure share, local/(state + local)	- GDP per capita	(+) Decentralizing expenditures by 10% increases growth of GDP per capita by 1.6-3.2%.
Behnisch, Buttner & Stagarescu (2002)	National level - 1 country, Germany	1950-1990	OLS, time series analysis	Vertical	Expenditure share, federal/total	- Indicator representing productivity growth	(-) Centralizing expenditures have a positive effect on productivity growth.
Feld, Kirchgässner & Schaltegger (2004, 2005)	Regional level - 26 cantons, Switzerland	1980-1998	OLS, 2SLS, fixed effects panel model, neoclassical growth model (Mankiw, Romer, Weil, 1992)	Horizontal	- Grants - Tax competition - Fragmentation	- GDP per capita	(+) Matching grants have a negative impact on GDP, tax competition improves GDP, and fragmentation of cantons does not affect real GDP per capita indicating that the economies of scale argument is not a good justification for amalgamation.
Stansel (2005)	Regional level - 314 metropolitan areas, US	1960-1990	OLS, cross-section, endogenous growth model (Barro, 1990)	Horizontal	- Fragmentation - Urbanization	- Population - Income	(+) Both fragmentation and urbanization is positively correlated with population and income, suggesting that decentralization enhances growth.
Gil-Serrate & Lopez-Laborda (2006)	Regional level - 17 autonomous communities, Spain	1984-1995	Fixed and random effects panel	Vertical	- Revenue share	- Private sector investment	(+) Decentralizing revenues has a positive effect on economic growth.
Akai, Nishimura & Sakata (2007)	State level - 50 states, US	1992-1997	Panel model, endogenous growth model (Barro, 1990)	Vertical	- Expenditure share - Revenue share	- GDP per capita	(+/-) Hump-shaped relationship where further decentralization will increase economic growth.
Carrion-i-Silvestre & Mora (2008)	Regional level - 17 autonomous communities, Spain	1965-2000	OLS, time series	Vertical	- Expenditure share - Revenue share	- GDP per capita	(+/-) Negative effect of expenditure decentralization and positive effect of revenue decentralization.
Hammond and Tosun (2011)	County level - All counties in the lower 48 states, US	1970-2000	OLS, cross section, endogenous growth model (Barro, 1990)	Horizontal	- Fragmentation	- Population - Employment - Income	(+/-) Fragmentation of single-purpose governments have a positive impact on metropolitan population and employment growth, but no significant impact on nonmetropolitan counties. In contrast, fragmentation of general-purpose governments have a negative

							impact on population and employment growth in nonmetropolitan counties.
Hatfield and Kosec (2013)	Regional level - 223 metropolitan areas, US	1969-2006	OLS with IV	Horizontal	- Fragmentation (using number of small stream as IV for county governments)	- Earnings per employee - Income per employee - GDP per employee	(+) Doubling the number of country governments in a metropolitan area leads to a 17% increase in the average annual growth rate of earnings per employee over 1969-2006, and a 10% increase in 2006 income per employee.

Figure 1 – Single and developed country empirical studies on the effects of fiscal decentralization on economic growth

Figure 2. Variance inflation factors for nonmetropolitan (>50,000 population) regressions

Population Regression			Employment Regression			Income Regression		
Variable	**VIF**	**1/VIF**	**Variable**	**VIF**	**1/VIF**	**Variable**	**VIF**	**1/VIF**
_IProvince_9	13	0.076895	_IProvince_9	12.46	0.080257	_IProvince_9	12.1	0.082647
PRIM01	9.1	0.109845	PRIM01	8.83	0.113285	PRIM01	8.02	0.12465
_IProvince_5	6.23	0.160483	_IProvince_5	5.93	0.168534	_IProvince_5	6	0.166672
_IProvince_6	5.8	0.172323	UR01	5.82	0.171876	MAN_CON01	5.62	0.177885
COMM_CAP01	5.64	0.177166	_IProvince_6	5.61	0.17827	_IProvince_6	5.38	0.185735
MAN_CON01	5.55	0.180278	_IProvince_10	5.5	0.181703	COMM_CAP01	5.24	0.19067
_IProvince10	5.43	0.18407	MAN_CON01	5.46	0.183024	_IProvince_10	5.04	0.198533
UR01	5.03	0.198997	COMM_CAP01	5.42	0.184574	_IProvince_3	4.81	0.207888
_IProvince_3	4.95	0.202095	_IProvince_3	5.03	0.198764	LN_INC00	4.69	0.213292
LN_INC00	4.37	0.228988	LN_INC00	4.6	0.217491	UR01	4.67	0.214077
_IProvince_4	4.25	0.235412	_IProvince_7	4.06	0.246175	_IProvince_4	4.11	0.2436
_IProvince_7	4.09	0.244618	_IProvince_4	4.03	0.248342	_IProvince_2	3.95	0.253062
_IProvince_2	4.04	0.247439	_IProvince_2	3.96	0.25256	_IProvince_7	3.89	0.257399
BUS01	3.45	0.289914	UNI01	3.42	0.292052	BUS01	3.59	0.27836
UNI01	3.41	0.292989	BUS01	3.4	0.294212	H_ED01	3.17	0.315682
H_ED01	3.35	0.29849	H_ED01	3.19	0.313538	FIN01	3.16	0.316094
POP9101	3.33	0.300561	EQUIV_CAP01	3.19	0.313545	UNI01	3.1	0.322689
EQUIV_CAP01	3.23	0.309158	FIN01	3.11	0.321619	EQUIV_CAP01	2.97	0.336796
FIN01	3.11	0.321437	TRADE01	2.94	0.33977	TRADE01	2.93	0.340958
TRADE01	2.99	0.334717	EMPL9101	2.73	0.365913	COLL01	2.62	0.381009
COLL01	2.66	0.376091	COLL01	2.66	0.376466	_IProvince_8	2.14	0.467188
_IProvince_8	2.14	0.467232	LN_EMPL01	2.58	0.387627	LN_POP01	2.09	0.478993
LN_POP01	2.08	0.480138	_IProvince_8	2.15	0.465805	TRADES01	2.07	0.482602
TRADES01	2.04	0.489527	TRADES01	2.05	0.486705	COMM_SQKM0	2.01	0.49854
COMM_SQKM0	2	0.498961	COMM_SQKM0	2	0.499605	EQUIV_SQKM0	1.69	0.592272
EQUIV_SQKM0	1.72	0.582712	EQUIV_SQKM0	1.73	0.578782	INC9000	1.58	0.63134
Mean VIF	4.35		Mean VIF	4.3		Mean VIF	4.1	

Figure 3. Variance inflation factors for metropolitan (>50,000 population) regressions

Population Regression			Employment Regression			Income Regression		
Variable	**VIF**	**1/VIF**	**Variable**	**VIF**	**1/VIF**	**Variable**	**VIF**	**1/VIF**
_IProvince_7	13.9	0.07193	_IProvince_7	15.06	0.066406	UNI01	11.45	0.087349
UNI01	11.51	0.086901	UNI01	11.44	0.087418	_IProvince_7	11.37	0.08797
_IProvince_9	10.89	0.091835	_IProvince_9	10.78	0.09274	_IProvince_9	9.09	0.109962
TRADES01	8.83	0.113271	TRADES01	8.71	0.114786	TRADES01	8.74	0.114439
PRIM01	8.28	0.12078	PRIM01	8.3	0.120421	PRIM01	7.77	0.128749
BUS01	7.01	0.142616	BUS01	7.21	0.138625	LN_INC00	7.73	0.129379
LN_INC00	6.75	0.148091	LN_EMPL01	7.03	0.142304	BUS01	6.98	0.143288
LN_POP01	6.6	0.151629	LN_INC00	6.7	0.149363	LN_POP01	6.23	0.1604
MAN_CON01	5.95	0.168125	MAN_CON01	5.93	0.168554	MAN_CON01	5.9	0.169569
_IProvince_4	5.73	0.174433	_IProvince_4	5.34	0.187214	_IProvince_2	5.13	0.194829
_IProvince_2	5.18	0.193202	_IProvince_2	5.31	0.18822	_IProvince_4	5.06	0.197629
H_ED01	5.03	0.198679	H_ED01	5.19	0.192842	H_ED01	4.91	0.203834
UR01	4.73	0.211589	UR01	4.74	0.211132	FIN01	4.78	0.209081
COMM_CAP01	4.71	0.212191	FIN01	4.71	0.212427	COMM_CAP01	4.69	0.21313
FIN01	4.7	0.212629	COMM_CAP01	4.67	0.214105	UR01	4.52	0.221354
_IProvince_6	3.25	0.307614	_IProvince_6	3.38	0.296111	COMM_SQKM0	3.26	0.307164
COMM_SQKM0	3.2	0.312107	COMM_SQKM0	3.2	0.312339	COLL01	3.21	0.311942
COLL01	3.15	0.317298	COLL01	3.17	0.315451	_IProvince_6	3.05	0.327416
POP9101	2.79	0.358174	EMPL9101	2.85	0.350454	TRADE01	2.44	0.409438
TRADE01	2.62	0.381223	TRADE01	2.49	0.402151	_IProvince_8	2.26	0.44223
_Iprovince_10	2.42	0.413843	_Iprovince_10	2.43	0.410896	_Iprovince_10	2.11	0.474616
_IProvince_8	2.17	0.460528	_IProvince_8	2.13	0.468933	_IProvince_3	1.91	0.522234
_IProvince_3	2.15	0.464362	_IProvince_3	2.13	0.469853	_IProvince_5	1.88	0.532985
_IProvince_5	1.92	0.521511	_IProvince_5	1.89	0.529117	EQUIV_CAP01	1.87	0.533832
EQUIV_CAP01	1.9	0.526403	EQUIV_CAP01	1.87	0.534295	INC9000	1.72	0.581487
EQUIV_SQKM0	1.57	0.636352	EQUIV_SQKM0	1.57	0.635526	EQUIV_SQKM0	1.58	0.634406
Mean VIF	5.27		Mean VIF	5.32		Mean VIF	4.99	

Figure 4. Residuals plots for nonmetropolitan (>50,000 population) regressions

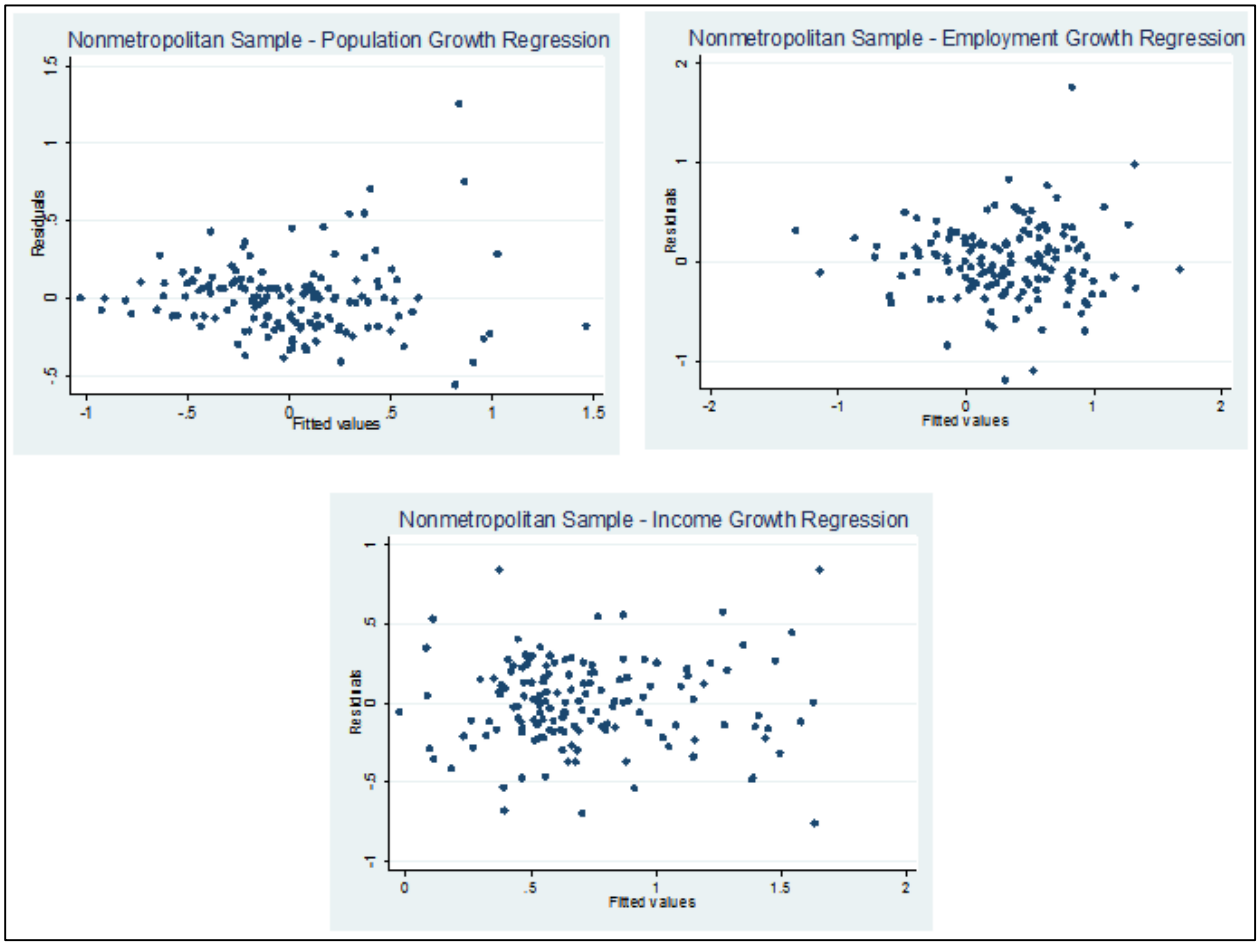

Figure 5. Residual plots for metropolitan (50,000+ population) regressions