The Fiscal Impact of Urban Growth on Municipalities

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Abstract
In this paper, panel regression analysis is used to examine the fiscal impact of urban growth on per-capita or per-household expenditures of providing municipal services in the province of Ontario, Canada. Three variables are used to measure growth: households, population and assessment. Using a panel data set for 68 municipalities, we find that for the most part, urban growth has no effect on per-capita or per-household expenditures. The policy implications of these results are discussed.

Keywords: Urban economics, municipal finance, taxes, urban growth, municipal expenditures

Résumé
Dans ce papier nous utilisons les techniques de regressions avec données de panel afin d'analyser l'impact fiscal de la croissance urbaine sur les dépenses, par personne ou par famille, attribuées à la provision de services municipaux dans la province de l'Ontario au Canada. Nous utilisons trois variables afin de mesurer la croissance: les familles, la population et l'évaluation. Avec les données de panel sur 68 municipalités, nous trouvons, en grande partie, que la croissance urbaine n'a pas d'effet sur les dépenses. Les implications sur les politiques sont aussi discutées.

Mots clés: Economie urbaine, finance municipale, taxe, expansion

Introduction

Local municipal officials, be they elected or staff, tend to be growth-oriented based on the belief that urban growth results in incremental revenues that exceed incremental costs that then allows the municipality to either decrease taxes or to make investments in new capital projects. A common refrain by elected officials is that in the past, because of growth, taxes were kept low and now, if there is little growth, taxes will have to increase. For example, with the 2009 recession, some of Ontario's fastest growing municipalities such as York Region were finding the debt cost to finance the past growth to be problematic and asked the Province to raise its borrowing limit in order to provide the infrastructure needed for the development. Critics of growth, such as Tim Gray of Environmental Defence, cite such examples as evidence of the non-sustainability of growth. However, other fast-growing regions, such as Mississauga, did not face the same problems because they required developers to

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pay the infrastructure costs up front. The higher costs therefore were due to the method of financing and not growth itself. [1]

The above-mentioned municipalities are somewhat typical of the approach used by various municipalities to finance capital infrastructure. Where a capital asset has a long lifespan, debt financing is commonly used to apportion costs to future generations who are the beneficiaries of the capital asset. However, in cases where benefits accrue to new developments, be they residential or non-residential, development charges and front end cost-sharing agreements are commonly used. In some cases, municipalities use a mix of revenue sources such as a self-imposed percentage of the capital cost financed through operating costs. The approach taken is often dependent on whether the development is an infill or on the urban periphery. When there are positive spillovers to adjacent communities, municipalities will cost share with the neighbouring municipality or apply for funding from upper-level governments. It should be noted that other variables, such as infilling versus green development and housing density, also affect the fiscal impact of growth.

Regardless of the method of financing capital assets, municipalities must also consider their aging infrastructure, especially given the shortfall in maintaining that infrastructure. The Federation of Canadian Municipalities identified the municipal infrastructure deficit as $123 billion in 2006 and predicted the shortfall to exponentially increase if not properly managed to close to $2 trillion in 2067 (Mirza 2007). The estimates are consistent with estimates by other groups such as the Canada West Foundation and the National Research Council of Canada.

Although there has been much research on the effect of high density versus urban sprawl development on the cost of providing municipal services, the literature on the fiscal impact of overall urban growth is limited.[2] In a non-empirical paper, Kushner (1992) demonstrated that the effect of urban growth in the short-run was dependent on whether the municipality had excess capacity and in the long-run on the municipality's size relative to optimal size. Thus, a municipality could very well have 'tax positive' growth, for which incremental tax revenues exceed growth costs in the short-run but 'tax negative' growth in the long-run, if that municipality grows beyond optimal size.

The question of optimal size is of course an empirical question. Canadian studies such as Desbiens (1996), Sancton (1996), Kushner, Masse, Peters and Soroka (1996), Vojnovic (1997), Slack (2002) and Kushner and Siegel (2005) found that larger cities tend not to have lower per-capita expenditures indicating that economies of scale are not important in the delivery of municipal services. Holcombe and Williams' (2009) study of U.S. municipalities, likewise concluded that municipal expenditures are characterized by constant returns to scale and that amalgamations or secessions would have very little impact on per-capita expenditures. Derksen's (1988) study of municipal amalgamations in European countries and Boyne's (1992) study of amalgamations in the U.S. came to the same conclusion. These results are consistent with studies estimating scale effects for individual services such as environmental services (Jerrett, Eyles and Dufournaud 2002), police and fire services (Found 2012; McDavid 2002; Southwick 2005), general government (Southwick 2012) and garbage collection (Hamilton 2013; Slack and Bird 2013) that also found little evidence of economies of scale. [3]

In terms of growth studies, the research is rather limited. Ladd (1994), using data for 248 large U.S. counties, found that fast-growing areas not only experienced higher tax burdens but may have also experienced reductions in service quality. Danielson and Wolpert (1992), in their examination of 365 municipalities in northern New Jersey, also found that population growth was detrimental, as did studies of municipalities in the Greater Chicago Metropolitan Area by the DuPage County Development Department (1991) and by Oakland and Testa (1995). In a limited impact study, Glaeser and Gyourko (2005) examined the effect of urban decline on housing markets and levels of income concluding that the urban decline does not mirror urban growth. In their examination of the impact of annexation on spending, Edwards and Xiao (2009) conclude that if annexation is accompanied by higher density, then per-capita spending is reduced and, conversely, is increased if density is reduced. Their results may explain the inconsistent results from various studies.

Although there is a paucity of empirical research on the effect of overall growth on expenditures, there is a substantial amount of research on the impact of specific developments on expenditures, normally referred to as fiscal impact analysis. In general, these case studies find that the revenues from residential developments do not cover their costs to the municipalities. Burchell, Listokin and Dolphin (1994), in their review of the fiscal impact analysis studies, report a hierarchy where industrial and commercial development are most advantageous and single family housing the most disadvantageous.

As indicated above, with the exception of studies on urban sprawl and specific developments, there is very little empirical work on the overall impact that urban growth has on taxes or on the cost of providing local services. The purpose of this paper is to fill this void by measuring the impact of urban growth on per-capita or per-household expenditures for providing local services for municipalities in the Province of Ontario. To measure growth, we use three variables: household growth, population growth and assessment growth. To the best of our knowledge, our study is the first to do so. The results should be of assistance to municipal officials in determining their approach to urban growth.

Data

Our sample consists of municipalities in Ontario and uses data for two years, 1996 and 2006. The data were obtained from the Ontario Ministry of Municipal Affairs' *Municipal Financial Information Returns* (FIRs). The financial information from the municipalities contained in the FIRs must correspond directly to both the financial records and the audited financial statements of the municipality. Similarly, the assessment data in the FIRs is required to match exactly with the assessment data received from the Municipal Property Assessment Corporation (MPAC). A ten-year period was selected to allow for lags between revenues and the provision of additional services. Ladd (1994) and Oakland and Testa (1995) used a seven-year and a ten-year period respectively.[4]

Comparing taxes between municipalities is complicated by variations within and between the various assessment classes of property such as single-residential, multi-residential, commercial and industrial. Even within a class such as single-residential, there is significant variance between the types of households, ranging from a small bungalow to the so-called three-story 'monster' home. In the past, comparisons were usually made in terms of a standard three-bedroom bungalow but the three-bedroom bungalow is not as commonplace now as it has been in the past. Furthermore, the Province does not make a distinction between the type of single-residential dwelling in its reporting requirements; only three residential tax classes are used: residential, multi-residential and new multi-residential. In this paper, we avoid these problems by using expenditure per-capita that is commonly used in other studies. Expenditures can be financed by taxes, user fees, borrowing, intergovernmental transfers, and other revenue sources such as parking fines. Taxes are by far the biggest revenue source accounting for over eighty percent of revenues. Thus, if we find a relationship between growth and expenditures, we would expect a similar relationship between taxes and growth.

Expenditure per-household is not without problems because many functions, such as health, are related to servicing people while others, such as roads, are related to servicing property. Although expenditure per-household is commonly used, we also use expenditure per-capita. For individual services, expenditure per-household is more relevant to the property-related services whereas expenditure per-capita is more relevant to the people services. Using both allows us to test for robustness of the results.

Another difficulty with comparing municipalities in Ontario is that some municipalities are single tier and do not belong to a region/county whereas other municipalities are two tiered whereby they belong to regions/counties in which case they are referred to as lower tier and the region/county the upper tier. All municipalities within a Region must by provincial legislation belong to the Region. The lower tier is usually responsible for fire protection, local roads, parks and recreation, and local planning whereas the upper tier is usually responsible for arterial roads, transit, policing, solid waste collection and disposal, and sewer and water systems. Cities and towns located within counties may or may not be part of the county system depending on the legislation. In the case where municipalities belong to a county, the lower tier provides the majority of services with the county usually being responsible for arterial roads, health and social services. As in regions, the lower tier collects taxes on behalf of the upper tier. Municipalities that do not belong to the county or region are referred to as single tier and are responsible for the provision of all municipal services. [5]

There are two methods of dealing with this non-comparability problem. One is to aggregate up to the regional or county level. The alternative approach is to disaggregate the upper tier expenditures and allocate them to lower tier municipalities according to population. However, to do so becomes difficult and arbitrary and, therefore, like Kushner et al. (1996), we use the aggregative approach that results in a sample size of 68 municipalities.

In addition to comparing the impact of urban growth on total expenditures, we repeat the analysis for the major categories of total expenditures such as general government, protection services, transportation services,

environmental services, health services, social and family services, social housing, recreation and culture services, and planning and development.

General government includes governance and corporate management costs. Protection includes fire, police and animal services. Transportation includes roadways, winter control, transit and parking. Environmental includes sanitary sewer and storm sewer systems, waterworks, waste collection and disposal and recycling. Health services include public health, hospitals, ambulances and cemeteries. Social and family services include general assistance, assistance to aged persons and child care. Recreation and cultural services include parks, recreation programs, recreation facilities, libraries and cultural services. Planning and development includes planning and zoning, residential, commercial and industrial development, agriculture and reforestation/drainage shoreline assistance.

Methodology

In this section, we examine the fiscal impact of the different types of growth a municipality may encounter, be it residential or assessment growth. Residential growth can be measured either by the number of households or by population. The two could differ depending on changes to the number of individuals per-household. For example, the City of St. Catharines, like many other communities in Ontario, experienced household growth but not population growth in the 1980s when the average household size decreased from 3.2 to 2.7.[6] Assessment growth can be measured by total assessment growth that includes residential as well as non-residential (i.e., commercial and industrial) assessment.

In most cases, population is greater than the number of households since the average household has more than one occupant. However, for some municipalities in cottage country, the number of households is greater than population because of a large presence of summer homes whose inhabitants are not included in the population numbers.

Panel Regression Specification

We use panel regression analysis to estimate the separate influences of the various factors that affect a municipality's total per-capita or per-household expenditures. Unlike other studies, we include all costs including debt charges to finance capital assets.[7] The analysis is then repeated for the major components of total costs, specifically operating, maintenance and administration.[8] We base our empirical analysis on balanced panels for 68 municipalities each observed over two years (1966 and 2006). The use of panel data provides a number of important benefits relative to the use of pure cross-section or time series data. These benefits include efficiency gains from the greater number of observations due to pooling, reduced multicollinearity, the ability to control for individual unobserved heterogeneity and, more importantly, the ability to capture both the intra-temporal (i.e., cross-section) as well as inter-temporal (i.e., time series) dynamics of the municipality cost structures, among others.[9]

We use a two-way fixed effects model.[10] To this end, we consider the following generic specification of the cost regressions:

$$E_{it} = \alpha_i + \delta_t + \beta_1 H_{it} + u_{it}$$

where E_{it} denotes per-household or per-capita expenditure, in a particular category (i.e., total, health, protection, etc.) for municipality i in year t (i=1,2,…,68; t=1996, 2006); H_{it} denotes the number of households or population or assessment of municipality i in year t (i=1,2,…,68; t=1996, 2006); the parameter α_i captures the impact of time invariant determinants of costs such as the geographical location of the municipality; the parameter δ_t captures the impact of regulatory and other factors that equally affect all municipalities in Ontario at any given time but that may vary over time; our parameter of interest β_1 captures the impact of municipal growth on household or per-capita expenditures; and u_{it} is the usual error term that varies among the municipalities as well as over time. Our analytical framework is a two-way error components model that incorporates the impact of both municipality invariant and time invariant factors that may affect expenditures.

Given the existence of a time dimension of the panel dataset, one issue that has to be addressed is the inflationary impact on expenditures. We do this by deflating each category of expenditures by an appropriate price index. Given the short-time dimension of the panel data set relative to the number of municipalities

employed in this study, we also address the issue of stability. The results of the Chow (1960) pooling test indicate stability is not a problem.

A factor that affects per-capita expenditures is household or population density of a municipality. In terms of the fiscal impact of growth, the density of new developments should be considered as an explanatory variable in our two-way fixed effects model. Intuitively, higher density growth should reduce per-capita spending and vice versa for lower density growth. This hypothesis is substantiated by Edwards and Xiao's (2009) study of growth brought about by annexation. Unfortunately, density data for new developments are not available for Ontario. However, as will be seen from the goodness-of-fit measures reported below, the included variables explain a large percentage of the variation in per-household/capita expenditures.

Table 1 provides descriptive statistics for each category of per-capita/household expenditures for 1996 and 2006. Every expenditure category increased (in real terms) over the ten-year period. Furthermore, all categories exhibited positive skewness, indicating that most of the expenditures are in the lower end category and fewer expenditures are in the higher end. We attempted to identify patterns in per-capita and per-household expenditures for various expenditure categories but found none.

Table 1: Descriptive Statistics for Various Expenditure Categories

Category	Statistics	Per-capita expenditure		Per-household expenditure	
		1996	2006	1996	2006
Total	Mean	1661.1	2163.3	3651.5	4880.9
	Median	1535.1	2103.2	3531.2	4718.1
	Skewness	1.4756	0.6467	1.0245	0.2225
General government	Mean	175.27	192.34	383.26	435.23
	Median	153.69	177.67	351.49	403.01
	Skewness	1.2783	1.7368	1.1874	1.4470
Fire	Mean	76.48	96.96	170.62	220.67
	Median	74.95	95.63	160.05	203.70
	Skewness	0.6018	0.2776	0.4779	0.2957
Protection	Mean	226.54	333.44	509.34	760.52
	Median	253.83	332.50	572.24	771.10
	Skewness	0.0672	0.2415	-0.0510	0.0633
Transportation	Mean	316.41	339.91	685.25	754.32
	Median	301.29	316.59	636.44	751.40
	Skewness	1.7784	0.9130	1.1284	0.4471
Environment	Mean	280.94	321.28	617.82	731.59
	Median	257.39	308.02	616.02	720.01
	Skewness	0.8624	0.8170	0.2695	0.2372
Health	Mean	57.21	157.26	120.94	345.70
	Median	35.86	116.94	84.96	274.13
	Skewness	4.2491	4.3378	5.0218	4.3244
Social	Mean	415.35	473.01	911.91	1064.5
	Median	355.87	471.93	824.04	1019.6
	Skewness	1.8385	0.5918	1.9351	0.3795
Recreation	Mean	147.09	190.19	327.39	434.49
	Median	140.37	186.23	311.86	420.67
	Skewness	0.5708	1.5180	0.4706	1.3259
Planning	Mean	43.23	65.76	95.30	148.22
	Median	37.66	55.16	81.00	125.66
	Skewness	2.1708	2.4554	2.0480	2.5505

Although not presented in the Table, owing to space constraints, we also compared the ten-year growth rates of municipalities and their per-capita expenditures in 2006. The household growth rate ranges from -15.7 percent to 67.8 percent and the population growth rate ranges from -18.4 percent to 87.4 percent. The average rate of growth is approximately 12 percent for both population and households. The growth rates are evenly distributed between the highest and lowest rates. The low growth areas tend to be more rural and northern whereas the high growth areas are in close proximity to Toronto, Ontario's largest city. The variance in assessment growth is even larger. There is also a wide variance in per-capita expenditures ranging from a low of $1,253 for York Region to a high of $4,771 for Dryden. The average per-capita expenditure is $2,121. Likewise, there is a wide variance in the costs of individual services.

Regression Results

Household Growth Effects: Table 2 reports the fixed effects regression results for each category of per-household expenditures. For total expenditures and most expenditure categories, the signs are negative indicating that with household growth per-household expenditures decrease. However, with the exception of protection, all other categories, including total expenditures, are not significant, even at the ten percent level which indicates that growth has no significant effect on per-household expenditures. Another notable aspect of Table 2 is that the F-tests for two-way fixed effects are significant for all expenditure categories. The significance of the test statistic F_1 for individual fixed effects indicates that municipal-specific time invariant factors such as geographic location are important in explaining variation in per-household expenditures, except for planning. Similarly, the significance of the test statistic F_2 for time fixed effects indicates that regulatory and other factors that affect all the municipalities equally at any given time, but that vary over time, are important in explaining variations in all categories of expenditures. Finally, the overall fit, as measured by R^2, ranges from good to very good for all categories.

Table 2: Two-way Fixed Effects Regression Results for Per-household Expenditures
(p-values in parentheses)

Category	$\hat{\beta}_1$	R^2	F_1	F_2
Total	-0.0092 (0.1122)	0.88	5.3592* (0.0000)	107.661* (0.0000)
General government	-0.0016 (0.1642)	0.69	2.0547* (0.0019)	7.0148* (0.0080)
Fire	0.0003 (0.2707)	0.95	15.4658* (0.000)	74.8840* (0.0000)
Protection	-0.0019** (0.0576)	0.92	8.2238* (0.0000)	146.563* (0.0000)
Transportation	-0.0004 (0.7635)	0.78	3.3898* (0.0000)	7.0174* (0.0080)
Environment	-0.0012 (0.2510)	0.88	6.6643* (0.0000)	30.4641* (0.0004)
Health	-0.0022 (0.2171)	0.68	1.4465** (0.0676)	39.3072* (0.0000)
Social	-0.0027 (0.4585)	0.71	2.3711* (0.0003)	4.8058* (0.0284)
Recreation	0.00001 (0.8660)	0.88	6.1876* (0.0000)	54.2777* (0.0000)
Planning	0.0002 (0.7333)	0.62	1.3565 (0.1084)	12.3949* (0.0004)

*Significant at 5 percent level; ** Significant at ten percent level;

F_1 and F_2 are the relevant F-statistics for individual and time fixed effects, respectively.

Population Growth Effects: Table 3 reports the fixed effects regression results for expenditure and protection; all other categories are not significant, even at the ten percent level. Thus, similar to household growth, population growth has no significant effect on per-capita expenditures. Once again the test statistics F_1 and F_2 are significant for all expenditure categories indicating that municipal-specific time invariant factors and regulatory factors are important in explaining variation in all categories of per-capita expenditures. Finally, the overall fit, as measured by R^2, ranges from good to very good for all expenditure categories.

Table 3: Two-way Fixed Effects Regression Results for Per-capita Expenditures
(p-values in parentheses)

Category	$\hat{\beta}_1$	R^2	F_1	F_2
Total	-0.0016** (0.0578)	0.84	3.9867* (0.0000)	75.9351* (0.0000)
General government	-0.0002 (0.2068)	0.68	2.0378* (0.0021)	4.0552* (0.0440)
Fire	-0.0000 (0.9186)	0.95	15.4725* (0.000)	76.7038* (0.0000)
Protection	-0.0004* (0.0074)	0.91	7.5339* (0.0000)	147.505* (0.0000)
Transportation	-0.0000 (0.6418)	0.82	4.1798* (0.0000)	3.8787* (0.0489)
Environment	-0.0002 (0.2498)	0.80	3.8036* (0.0000)	12.8436* (0.0004)
Health	-0.0003 (0.1828)	0.69	1.5475* (0.0388)	36.3665* (0.0000)
Social	-0.0003 (0.5033)	0.70	2.1947* (0.0008)	3.3577** (0.0669)
Recreation	-0.0000 (0.4884)	0.83	4.0653* (0.0000)	41.9464* (0.0000)
Planning	-0.0000 (0.8920)	0.61	1.2833 (0.1560)	13.4999* (0.0002)

*Significant at 5 percent level; ** Significant at ten percent level;

F_1 and F_2 are the relevant F-statistics for individual and time fixed effects, respectively.

Assessment Growth Effects: Assessment growth can be either residential or non-residential growth (that consists of commercial and industrial growth). Although the breakdown between commercial and industrial growth was available in 1996, it was no longer available for 2006. Therefore, the growth variables used in the regressions are residential, non-residential and total assessment. Comparing the two years could be problematic because, in part, they reflect a change in market values and the effects of a major change in tax policy that took place in 1998. However, in our case, comparisons are still meaningful because the tax changes were uniform and independent of growth rates. Comparing the impact of the different types of assessment growth enables us to determine which type of growth is most beneficial (or detrimental) from an expenditure viewpoint. Residential assessment growth may indicate in-movement of retirees whereas non-residential growth may reflect in-movement of industry and therefore the impact may very well differ.

Table 4 reports the fixed effects regression results for each category of per-household expenditures. As indicated, the impact of assessment growth on total per-household expenditures is negative regardless of the type of assessment growth considered. However, only protection is significant at the 5 percent level for both residential assessment and total assessment whereas all other categories are not significant even at the ten

percent level. Thus, these results indicate that, for the most part, assessment, be it residential or non-residential, has no significant impact on per-household expenditures.

Table 4: Two-way Fixed Effects Regression Results for Per-household Expenditures
(p-values in parentheses)

Category	$\hat{\beta}_1$		
	Residential	Non-residential	Total
Total	-0.0000 (0.1464)	-0.0000 (0.5271)	-0.0000** (0.0570)
General government	-0.0000 (0.2238)	-0.0000 (0.4997)	-0.0000 (0.2901)
Fire	-0.0000 (0.3119)	-0.0000 (0.8172)	0.0000 (0.3056)
Protection	-0.0000** (0.0352)	-0.0000 (0.8271)	-0.0001* (0.0141)
Transportation	-0.0000 (0.9579)	-0.0000 (0.4942)	-0.0000 (0.7224)
Environment	-0.0000 (0.2875)	-0.0000 (0.9262)	-0.0000 (0.2203)
Health	-0.0000 (0.1796)	0.0000 (0.7784)	-0.0000 (0.1705)
Social	-0.0000 (0.6458)	-0.0000 (0.5734)	-0.0000 (0.4492)
Recreation	-0.0000 (0.9697)	-0.0000 (0.9276)	-0.0000 (0.9349)
Planning	0.0000 (0.8766)	-0.0000 (0.6694)	-0.0000 (0.9900)

*Significant at 5 percent level; ** Significant at ten percent level.

Although not reported in the Table, owing to space constraints, the F_1 test statistic for individual fixed effects and the F_2 statistic for time fixed effects are both significant for virtually all expenditure categories, indicating the importance of municipal-specific time invariant factors and regulatory factors in explaining variation in per-household expenditures. Finally, the overall fit, as measured by R^2, ranges from good to very good for all categories. For the sake of brevity, these statistics are not reported.

Table 5 reports the fixed effects regression results for each category of per-capita expenditures. As indicated, the impact of assessment growth on total per-capita expenditures is mostly negative for each of the three categories of assessment growth (i.e., residential, non- residential and total assessment). However, only the protection category is significant at the 5 percent level for both residential assessment and total assessment. All other categories are not significant, even at the ten percent level. Again, these results indicate that for the most part, residential or non-residential assessment has no significant impact on per-capita expenditures. Once again, the F_1 test statistic for individual fixed effects and the F_2 statistic for time fixed effects, are both significant for virtually all expenditure categories, indicating the importance of municipal-specific time invariant factors and regulatory factors in explaining variation in per-household expenditures. Finally, the overall fit, as measured by R^2, ranges from good to very good for all categories. For the sake of brevity, these statistics are not reported.

Table 5: Two-way Fixed Effects Regression Results for Per-capita Expenditures
(p-values in parentheses)

Category	$\hat{\beta}_1$		
	Residential	Non-residential	Total
Total	-0.0000 (0.1412)	0.0000 (0.9867)	-0.0000 (0.1024)
General government	-0.0000 (0.2971)	0.0000 (0.4587)	-0.0000 (0.4029)
Fire	-0.0000 (0.9684)	0.0000 (0.6712)	0.0000 (0.8886)
Protection	-0.0000* (0.0163)	0.0000 (0.6170)	-0.0000* (0.0141)
Transportation	-0.0000 (0.9877)	-0.0000 (0.8148)	-0.0000 (0.9054)
Environment	-0.0000 (0.3759)	0.0000 (0.8761)	-0.0000 (0.3588)
Health	-0.0000 (0.1625)	0.0000 (0.6734)	-0.0000 (0.1709)
Social	-0.0000 (0.7052)	-0.0000 (0.7278)	-0.0000 (0.5670)
Recreation	-0.0000 (0.5371)	0.0000 (0.7473)	-0.0000 (0.5847)
Planning	-0.0000 (0.9002)	-0.0000 (0.8544)	-0.0000 (0.8264)

*Significant at 5 percent level; ** Significant at ten percent level.

Conclusions

In this paper, panel regression analysis is used to examine the impact of urban growth on per-capita and per-household expenditures. To this end, households, population and assessment are used to measure growth. The analysis is repeated for the major expenditure categories. Our results indicate growth to be expenditure neutral.

The only studies that we can make meaningful comparisons with are older U.S. studies (Ladd 1994, Danielson and Wolpert 1992, Oakland and Testa 1995) that found that fast growing areas experienced higher tax burdens. Although our results are not consistent with this previous research, they are also not consistent with the argument by municipal officials that, because new development requires less maintenance, growth is therefore advantageous from an expenditure viewpoint. The development community, not surprisingly, makes the same argument.

Several factors may explain the difference between our results and those that find that growth is not advantageous from an expenditure viewpoint. First, there is considerable variation in the size of Ontario municipalities, which means that some are less than minimum efficient size, such that growth lowers per unit expenditures, whereas others are beyond minimum efficient size, such that growth increases per unit expenditures. Second, prior to the period of study, the Province of Ontario had already initiated restrictive urban sprawl policies by maintaining firm municipal urban boundaries and by prohibiting development outside of these boundaries. The increased density would have put downward pressure on per-household expenditures. To further supplement its restrictive approach to development, the Province in 2006 introduced further legislation

such as the Places to Grow Act and the Greenbelt Plan (see Ontario Ministry of Municipal Affairs and Housing 2006). However, our results do not capture the impact of these more recent development restrictions which are only now affecting development patterns. The Province continues to update these plans and to introduce further legislation such as the Brownfield Act (see Ontario Ministry of Municipal Affairs and Housing 2014) that permits municipalities to give grants or waive taxes for high density infilling developments on former industrial lands. Another possible explanation of the difference in the results is that U.S. municipalities were not as reliant on development fees but instead relied on property taxes to finance new developments.

In terms of future research, the above explanation of higher density infilling could be tested by applying the analysis to other jurisdictions that do not have the same restrictive land use policies as Ontario. Ideally, the density of new developments should be considered as an explanatory variable as did Edwards and Xiao (2009) in their study of municipal annexations. Unfortunately, such data are not available for Ontario.[11] A second area of future research would be to repeat the analysis from 2006 to 2016 and to compare the two time periods to determine the fiscal impact of the Province's newly regulatory restrictions on density and infilling. In addition, the time period could be extended from 1996 to 2016 to test the robustness of our results. A third area of future research would be to examine the fiscal impact of positive versus negative growth in view of Glaeser and Gyourko's (2005) contention that the effects may not be symmetrical. Unfortunately, our sample size did not permit us to do so.

Overall, urban growth is neither beneficial nor costly from an expenditure viewpoint. However, aside from the fiscal impact of urban growth, there are other benefits of growth such as a more robust economy in terms of expanded employment opportunities, diversification and agglomeration economies. Our results, however, should provide valuable input into municipalities' growth strategies. Although our results are based on municipalities in Ontario, if growing municipalities in other jurisdictions find that per-capita expenditures increase as a result of urban growth, they should examine their land use and development policies.

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Notes

1 For a review of financing alternatives to facilitate urban growth, see Kneebone (2006).

2 For the pioneering study on urban sprawl, see Real Estate Research Corporation (1974), and for more recent work see Pendal, Ewing and Chen (2002), Carruthers and Ulfarsson (2008), and Hortas-Rico and Solé-Ollé (2010). For Canadian case studies of different types of development patterns in Toronto and the Municipality of Ottawa-Carleton, see GTA Task Force (1996) and Essiambre-Phillips-Desjardins Associates (1995). For a discussion on methods to encourage residential intensification, see Slack (2002) who examined the effect that financial tools such as development charges, user fees, and property taxes have on residential intensification.

3 For a review of the literature on the amalgamation of police services in Canada, see Lithopoulos (2015).

4 A potential problem with our time period was the realignment of services between the Province of Ontario and its municipalities. Specifically, fifty percent of residential education taxes were shifted to the Province and to balance this shift, social housing and social assistance were downloaded to the municipalities. To the extent that high growth areas have more job opportunities making them more affluent, the shift would have been less burdensome for the higher growth municipalities. Conversely, fast growing communities may experience high social assistance costs due to migration of job applicants from high unemployment areas of the country. Later, we examine the impact of growth on social and family services costs.

5 For a comparison of Ontario with other jurisdictions, see Canadian Urban Institute (1993).

6 The household and population data are obtained from Schedule 90, line 0010 and 0020 and the assessment data from Schedule 20 of the FIRs.

[7] Capital assets are financed primarily through debt charges which are defined in the FIRs as charges on net long-term liabilities that includes principal repayments, transfers from reserves, and interest on long-term debt. In addition, a portion of the cost of the capital asset may be assigned to the operating budget. Thus debt charges, plus any apportionment from the operating budget, represent the cost of purchasing the capital asset. Both are therefore included in expenditures because there may be substitution between capital and operating costs. If a community undertakes debt to improve aging infrastructure, then maintenance costs would be lower but servicing the debt will increase costs. In other cases, however, a new capital project such as an additional sports facility will increase and not reduce operating costs because the fees for the service would not cover the operating cost. To the extent that most municipalities debenture capital projects, the variance from year to year may not be that large. The duration time that an asset is amortized varies depending on the life of the asset, ranging from a low of 5 years for IT assets to a high of 100 years for waterlines and sanitary sewers.

[8] For more detail on the costs, see the FIRs.

[9] For a comprehensive overview of the econometrics of panel data, see Baltagi (2008).

[10] Originally we intended to use a random effects model that allows us to examine the impact of time invariant variables such as the location of the municipality but the test results were in favour of the fixed effects specification. Dummy variables can be included in a fixed effects regression by interacting these variables with other time varying independent variables. However, such interaction uses too many degrees of freedom that make it practically impossible to implement.

[11] In terms of future research, the spatial MPAC data that includes the location and type of development could be examined as a possibility to determine the density of new developments.

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