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THE IMPACT OF PROPERTY TAXATION ON BUSINESS INVESTMENT IN ALBERTA

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SUMMARY

When considering an increase in their non-residential property tax rates, Alberta municipalities must also take into account the adverse effects such an increase will likely have on business investment in their communities. Based on data on commercial and industrial permit values for 17 Alberta cities from 1998 to 2017, this paper shows that increasing the non-residential property tax rate corresponds to a drop in businesses investment in buildings and structures. Raising the non-residential property tax rate by, for example, 10 per cent results in a seven per cent drop in business investment.

Businesses have long expressed concerns about municipal government's excessive reliance on taxing commercial and industrial property. The issue has become particularly salient in Alberta since the City of Calgary increased its non-residential property tax rate, not only to replace its business tax, but also to offset the decline in the property tax base from the reduction in the assessed value of downtown office buildings.

Calgary rationalized that eliminating the business tax and shifting the tax burden to the non-residential property tax would boost the city's competitiveness and attractiveness, besides contributing to improved administrative efficiency in the tax system. The business tax that the city eliminated was responsible for almost a quarter of non-residential and business tax revenues. However, the city envisioned that eliminating this tax

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and transferring its onus to the non-residential property tax would generate the same amount of revenue.

This study finds that if the non-residential property tax rate is increased by one mill — the tax rate per $1,000 of property value — there is a concordant drop in annual real per capita commercial and industrial building permits by about $39.37. This then creates a boomerang effect – a decline in investment results in a lower stock of capital and a corresponding reduction in property and income tax bases in the future. With higher tax rates eroding tax bases, revenues thus cannot keep pace proportionately.

Taxes on residential and non-residential property in Alberta make up about half of the total revenues for the province's municipalities. Property taxes are vital for financing local public services. While this study shows that spending more on municipal services does not significantly affect business investment, or business decisions on where to locate, increasing non-residential property taxes has a negative impact on such decisions and investments.

Policy-makers in other Alberta municipalities observing the effects of the City of Calgary's recent hike in non-residential property taxes in the midst of an economic downturn should take into account the potential adverse effects on local economic growth and their municipal revenue bases. This study will contribute to informed policy-making in the province's municipalities.

1. INTRODUCTION

According to *The Economist* (2013), property taxes are regarded as among the least damaging taxes since land is a major component of the property tax base and "taxing it cannot distort supply in the way that taxing work or saving might discourage effort or thrift." *The Economist* also acknowledged that "property taxes that include the value of buildings on land are less efficient, since they are, in effect, a tax on the investment in that property. Even so, they are less likely to affect people's behaviour than income or employment taxes." Consistent with these views are the Johansson et al. (2008) and Di Sanzo, Bella and Graziano (2017) studies, based on panel data for OECD countries, of the effects of taxation on economic performance. The latter study concluded that "recurrent taxes on immovable property seem to be the least harmful for the growth."

Nonetheless, the business community and various commentators have expressed concerns about municipal governments' excessive reliance on taxing commercial and industrial property because it may adversely affect the formation of new businesses and investment in buildings and structures. In particular, taxation of non-residential property has recently become a controversial issue in Alberta because the City of Calgary has increased the non-residential property tax rate to replace its business tax and to offset the decline in the property tax base from the substantial reduction in the assessed value of office buildings in the downtown core. Understanding the impact of property taxes on businesses investment is crucial for an informed discussion about the tax policies of local governments.[1] Unfortunately, there is very limited information about the impact of property taxes on business investment in Canada and in Alberta.

This study investigates the effects of non-residential property taxes on business investment — as measured by commercial and industrial permit values — using annual panel data for 17 Alberta cities over the 1998-2017 period. We find that the elasticity of business investment with respect to non-residential property tax rate is about -0.69. This shows that a 10 per cent increase in the non-residential property tax rate is associated with about a 6.9 per cent decrease in business investment. This elasticity estimate implies that a one mill increase — the tax rate per $1,000 of property value — in the non-residential property tax is associated with a reduction in annual real per capita commercial and industrial building permits by about $39.37. This decline in investment means the stock of capital will be lower than it otherwise would be following a tax rate increase, and property and income tax bases will be adversely affected in the future.

The remainder of this paper is organized as follows. In Section 2, we provide a brief survey of the literature on the effects of property taxes on business formation, investment and economic growth. In Section 3, we provide background information about property taxes in Alberta's municipalities. Our econometric results are presented and discussed in Section 4. Section 5 contains our overall conclusions.

[1] See Kitchen, Slack and Hachard (2019) for an overview of property taxation issues in Canada.

2. THE EFFECTS OF PROPERTY TAXES ON BUSINESS ACTIVITY AND ECONOMIC GROWTH

Much of the literature on the economic effects of property taxation is based on U.S. studies using state and municipal level data. Dye et al. (2001) examined the effects of business property tax on business activities using municipal data from the Chicago metropolitan area. They found that high property taxes were associated with slower growth of non-residential properties and adverse effects on local employment. A similar study by Wu (2010) used municipal data from Massachusetts to investigate the effect of property taxes on the location of business establishments. Wu's empirical results indicated that an increase in property taxes resulted in fewer business establishments in municipalities. White (1986) also found similar results for municipalities in California. Based on panel data on U.S. states from 2001 to 2012, Amatov (2015, 30) investigated the impact of individual, corporate and property taxes on job creation, and found that "property taxes play a role in location decision making by manufacturing companies." Most recently, a study by Giroud and Rauh (2019, 24), based on a sample of over 27 million establishments between 1977 and 2011, found that the share of property taxes in state and local revenues had a negative impact on the number of establishments in a state.

To the extent that higher property taxes discourage business investment, they can have adverse effects on economic growth. A study by Ojede and Yamarik (2012), based on a panel data of 48 U.S. states from 1967 to 2008, found that a one per cent increase in sales or property taxes lowered U.S. state-level, long-run real income growth by 0.5 per cent. They concluded that property taxes lowered both short-run and long-run economic growth and sales taxes lowered long-run growth, while income taxes had no short-run or long-run impact. Gale, Krupkin and Rueben (2015) found that property taxes had a consistently negative impact on growth rates of real per capita income in the U.S states based on panel data from 1970 to 2011.

In comparison to the U.S., there are relatively few Canadian econometric studies of the economic effects of property taxes. Bird, Slack and Tassonyi (2012, Chapter 8) contains an econometric study of the tax sensitivity of the residential and non-residential property tax bases of a group of local governments in the Greater Toronto Area. In general, they concluded that higher tax rates erode tax bases and consequently, revenues do not increase in proportion to the tax rate.

Using municipal data from Ontario, Smart (2012) investigated whether provincially mandated reductions in municipal business property taxes between 2000 and 2006 affected the number of business establishments. As Smart emphasized, the effect of property taxes on business activity depends on how the property tax is viewed. If it is viewed as a capital tax, it will raise the cost of investment in buildings and structures. On the other hand, if the property tax is viewed as a payment for municipal services, any difference between the burden of the property tax and the benefits of municipal services will be capitalized in land prices. The dependent variable in Smart's regression model was the change in the logarithm of the number of business establishments in a municipal area. The main variable of interest was the change in the logarithm of effective property tax rate on employment in the municipality, defined as total

commercial and industrial property tax revenue divided by total employment. Smart's estimate of the elasticity of establishments to the municipalities' effective tax rate was -0.25, which was statistically significant, but in Smart's view economically small. Smart (2012, 22–23) concluded that "businesses are relatively immobile in response to changes in local tax differentials, even over a period of several years" and that the results were "more consistent with an extended 'benefit tax view' than the 'capital tax view' of property taxation."

Since 2014, the C.D. Howe Institute has produced estimates of the marginal effective tax rates on investment (METR), which incorporate the effects of business property taxes in 10 major cities in Canada.[2] Found and Tomlinson (2020, 4) reported that the METR in Calgary in 2019 was the third lowest, after Montreal and Saskatoon, at 38.4 per cent. The provincial property tax contributed 4.6 percentage points and Calgary's municipal property tax contributed 19.2 percentage points to the total METR. In other words, property taxes accounted for more than 50 per cent of the total tax wedge. These results indicate the potential importance of business property taxation in evaluating the overall competitiveness of the business tax system in Alberta. Found (2017) estimated that the MCF for non-residential property taxes in Ontario was 5.56 based on his estimate of -0.82 for the elasticity of the property tax with respect to the effective property tax rate.

3. PROPERTY TAXATION IN ALBERTA'S CITIES

In this section, we provide background information about property taxes in Alberta, with a focus on property taxes levied by the 17 cities that are the subject of this study. Our analysis is limited to these cities due to the paucity of relevant data for other municipalities. Municipalities in Alberta levy taxes on residential and non-residential property, and these property taxes represent about 50 per cent of the municipalities' total revenues. Prior to 1994, school boards also levied property taxes. Starting in 1994, the provincial government assumed full responsibility for financing education, and began levying a province-wide education property tax. The municipalities collect this tax and remit it to the province. Since 1994, the province's share of property tax revenue has dropped from 50 to 25 per cent and spending on education is not directly related to the province's property tax revenues.

The assessed values of railways, farmland, machinery and equipment and linear property for property taxation are based on regulated values provided annually by the Ministry of Municipal Affairs. For all other types of properties, including residential, commercial and industrial properties, the market value is the basis for their annual assessment for taxation. Municipalities set two different mill rates on the assessed value of property — a residential rate that applies to residential property or farmland, and a non-residential rate that applies to commercial and industrial property, machinery and equipment, linear property and railways.

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2 The METR is a measure of the tax wedge between the pre-tax rate of return and the after-tax rate of return on a marginal investment. See McKenzie (2016) on the theory and measurement of METR.

The non-residential mill rates levied by Alberta's 17 cities are shown in Figure 1.[3] The average mill rate increased only slightly from 12.72 in 1998 to 13.28 in 2018. However, there were significant changes in individual municipalities' mill rates. Between 1998 and 2018, the non-residential mill rate increased in nine municipalities, with the largest increase of 12.69 mills in Chestermere, which became a city in 2014. Mill rates declined in the remaining eight municipalities over that period.

Figure 1: Statutory Non-Residential Municipal Mill Rates in 17 Cities in Alberta

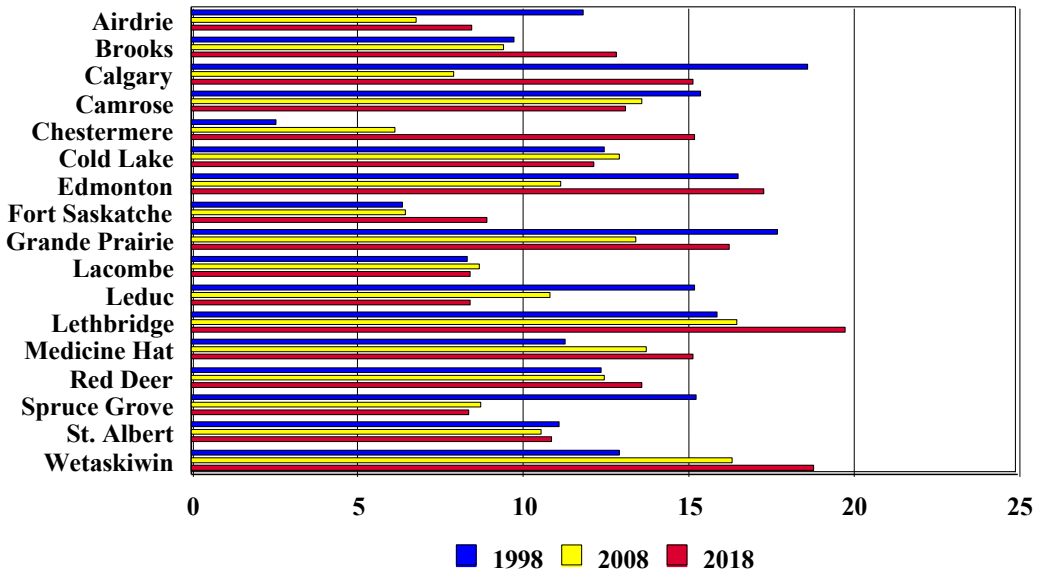


Figure 2 shows the percentages of property tax revenues derived from residential, commercial and industrial, and other property for Alberta in 2017.[4] On average, 58 per cent of property tax revenues were collected from residential property, 40 per cent from commercial and industrial property and 1.5 per cent from other property classes. However, the sources of property tax revenue varied considerably, with Fort Saskatchewan obtaining 26 per cent from other property because of the petrochemical industry located in that city, while Chestermere obtains 93 per cent from residential property.

3 The mill rate refers to the property tax rate per $1,000 of property value.

4 Other property includes machinery and equipment, linear property, railways, farmland and adjustments to property taxes.

Figure 2: Sources of Property Tax Revenues for Alberta Cities in 2017

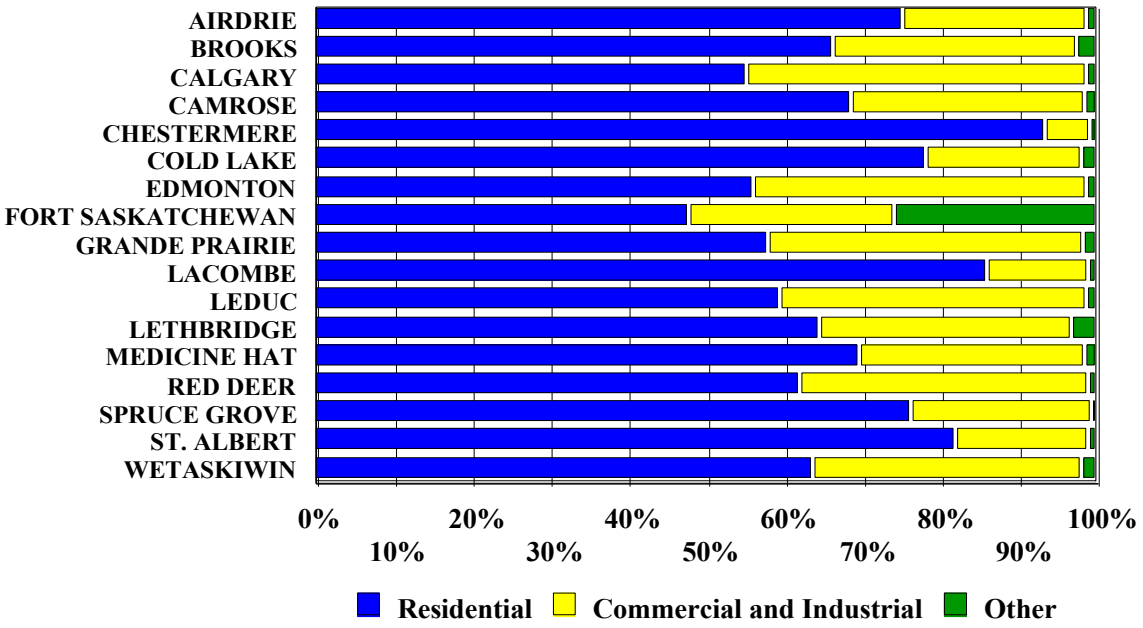
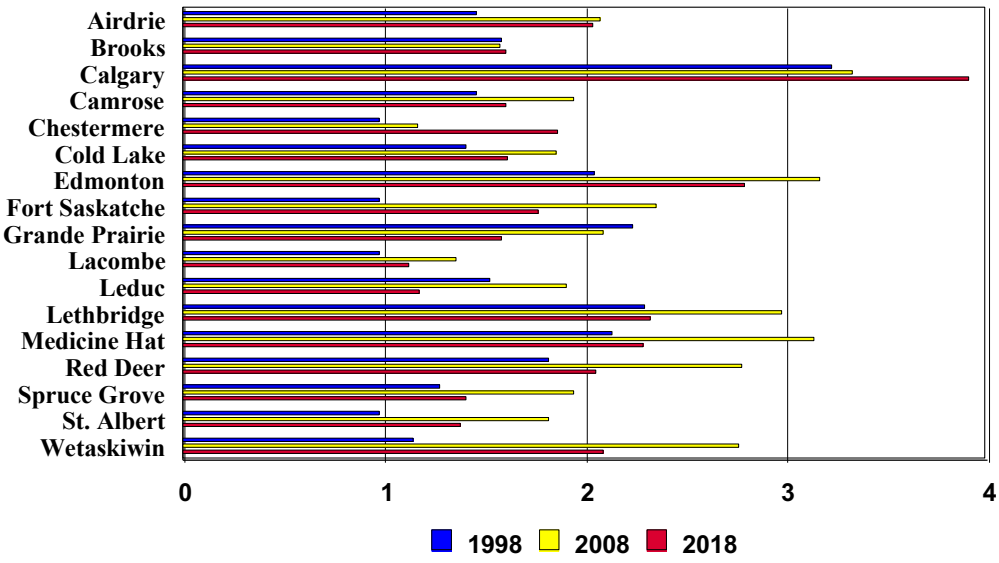


Figure 3: Ratio of Non-Residential to Residential Property Tax Rates, 1998, 2008 and 2018



Most municipalities impose a higher mill rate on non-residential property than on residential property. Figure 3 shows the ratio of non-residential mill rate to residential mill rate in the 17 municipalities. Between 1998 and 2008, most cities increased their non-residential mill rates relative to their residential rates, which increased the average ratio from 1.61 to 2.27. The ratio declined in only two cities — Brooks and Grande Prairie. Between 2008 and 2018, 14 municipalities reduced their ratios. Only Brooks, Calgary and Chestermere bucked this trend by increasing non-residential mill rates faster than residential rates. Over the entire 20-year period, the municipalities, with the exception of Grande Prairie and Leduc, became relatively more reliant on taxation of non-

residential property. The data in Figure 3 also show that the ratio of non-residential to residential mill rates is the highest in Alberta's two largest cities, with a ratio of 3.93 in Calgary and 2.82 in Edmonton in 2018.

In this study, we measure business investment by the value of commercial and industrial building permits issued by the municipalities. Since cities in our sample vary in size, we use business investment per person to facilitate comparison. Further, we deflate the value of business investment with the construction price index in order to put the values in 2017 dollars.

Table 1 shows the minimum, median and maximum values of commercial and industrial building permits (in 2017 dollars) for the 17 cities from 1998 to 2017. The data indicate that there has been a wide range of building permit values in each city, as indicated by the difference between the maximum and minimum values. For example, Fort Saskatchewan had per capita building permits of over $14,000 in 1998, and a minimum value of $313 in 2010.[5] There is also substantial variation in the value of building permits among the cities, as indicated by the variation in the median value for each city. Brooks had the lowest median per capita value at $215, while Leduc had the highest at $1,392.

Table 1: Real Per Capita Value of Commercial and Industrial Building Permits, 1998 to 2017

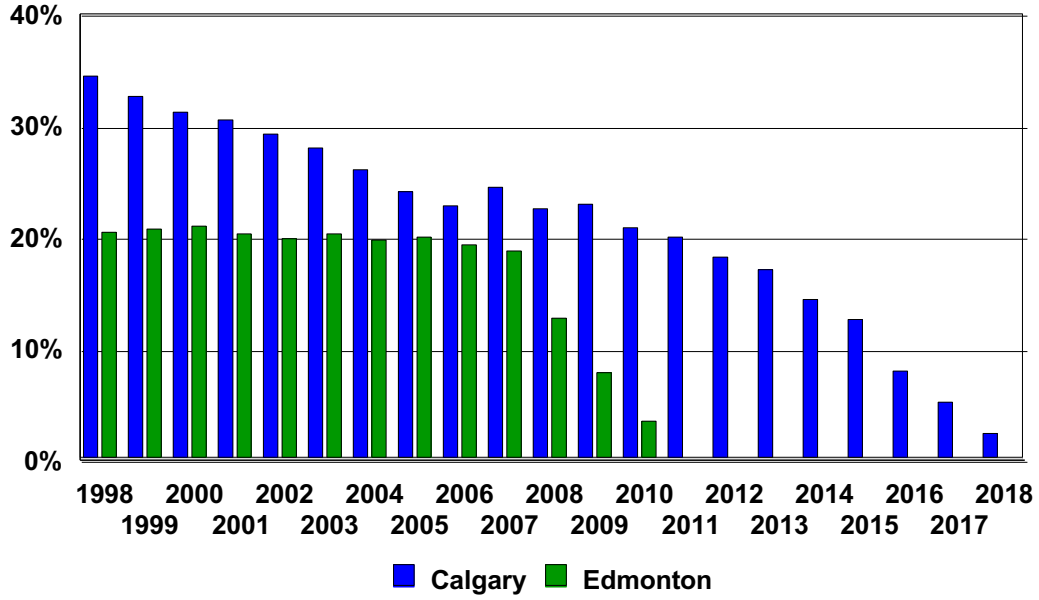
	Miniumum	Median	Maximum
Airdrie	198	956	2,530
Brooks	0	215	1,544
Calgary	270	700	2,221
Camrose	31	472	4,207
Chestermere	0	294	1,492
Cold Lake	3	342	1,080
Edmonton	299	524	852
Fort Saskatchewan	313	926	14,039
Grande Prairie	308	844	2,914
Lacombe	28	430	965
Leduc	250	1,392	3,795
Lethbridge	164	425	801
Medicine Hat	41	343	1,031
Red Deer	104	490	1,873
Spruce Grove	175	667	2,377
St. Albert	72	315	1,447
Wetaskiwin	0	241	1,850

Note: In 2017 dollars.

[5] The per capita value of building permits in Fort Saskatchewan dropped to $345 in 1999.

Some Alberta cities had levied a business tax, also known as an occupiers' tax, on the net rental value of a business property. The legal liability for payment of the business tax was on the occupant of the business property, while the owner of the property was liable for the property tax. An owner-occupant of a business property had to pay both taxes. During the period under study, only Calgary (1998-2017), Camrose (1998-2017), Edmonton (1998-2010), Grande Prairie (1998-2007) and St. Albert (1998-2000) levied business taxes in these years. Figure 4 shows that business taxes raised over 20 per cent of total municipal tax revenues in Calgary from 1998 to 2011, and over 15 per cent in Edmonton from 1998 to 2007. However, both cities decided to gradually eliminate their business taxes, with Edmonton starting in 2008 and Calgary in 2013.

Figure 4. Business Tax Revenue as a Percentage of Net Municipal Property Taxes and Grants in Place



In Calgary's case, the rationale for eliminating the business tax and shifting the tax burden to the non-residential property tax was that it would "enhance Calgary's economic competitiveness and attractiveness and would improve efficiency in the administration of Calgary's municipal tax system" (City of Calgary 2020). In deciding to eliminate the business tax, which had represented 24 per cent of municipal non-residential and business tax revenues in 2013, the City's stated objective was a "revenue neutral" tax reform, such that it would "generate no more or no less revenues due to the transfer of business tax revenues to the non-residential property tax" (City of Calgary 2020). While administration and compliance costs for a single property tax would probably be lower than collecting both taxes, the improvement in economic competitiveness was far from clear. The 2011 report also acknowledged that it is difficult "to gauge the differential investment effects of the combination of property and business taxes versus only the non-residential property tax," noting that:

> [In] theory and practice, the non-residential property tax and the business tax have many similarities. Both taxes use the value of real estate as a basis on which to establish assessments and consequently apply taxes, are applied predominantly to owners or occupants of non-residential real estate and are often applied to the same physical space.

However, it was pointed out that having a single property tax would make the level of taxation in Calgary more transparent and comparable with other jurisdictions, since only a few other cities had continued to levy business taxes.

Perhaps another motive for eliminating the business tax was that its revenues had not kept pace with the growth of non-residential property tax revenues. As the 2011 report on business tax consolidation in Calgary noted, the main reason for the declining share of revenues from the business tax was that for 18 years, the council had not increased the business tax rate.

4. EMPIRICAL ANALYSIS AND DISCUSSIONS

4.1 SPECIFICATION AND DATA

As stated earlier, our main objective is to investigate the effect of non-residential property taxation on business investment, as measured by the value of commercial and industrial building permits in a municipality. As noted in Section 3, property taxes are levied by both municipal and provincial governments. The province levies the education property tax, which the municipal governments collect on behalf of the provincial government. The education property tax on non-residential property is levied at a province-wide rate (3.64 mills in 2017), but the rates applied across municipalities vary, reflecting the variations in the municipalities' property assessment procedures. In our empirical analysis, as discussed below, we use effective property tax rates to account for systematic variations in property assessments across municipalities.

Our analysis is based on a simple log-log empirical model, specified as:[6]

$$\ln(INV_{it}) = \alpha_1 \ln(PTYtax_{it-1}) + \beta' Z + \mu_i + \varepsilon_{it} \quad (1)$$

where $ln(INV_{it})$ is the log of per capita commercial and industrial building permit values in 2017 Canadian dollars in city i in year t.[7] Municipal building-permit data are the primary input in Statistics Canada's series on Investment in Building Construction (Table 34-10-0175-01), albeit with adjustments for "for industry profit and other costs not normally included in the value of a permit." Consistent with Statistics Canada's definition, our business investment dataset represents the spending value of businesses

6 Smart (2012) also used a somewhat similar specification. In our sensitivity analysis, we check for various alternative specifications.

7 The construction price index dataset is available only for Calgary and Edmonton. We use Calgary's construction price index for Calgary and Airdrie. For the other 15 municipalities, we use the construction price index of Edmonton.

for buildings.[8] Our build-permit data only include new investment and ignore related activities such as renovations and other improvements. Further, we focus on the effect of non-property tax on the new business investment, rather than the effect on the value of existing non-residential property values, because we are interested in the impact of property taxes on current economic activities in the city.[9] Henceforth, we refer to the dependent variable as business investment.

The key variable of interest, *PTYtax,* is the effective non-residential property tax rate in municipality *i* in year *t*. The *PTYtax* rate refers to the amount of property tax payable per $1,000 of the assessed value of a property (this is also generally referred to as the mill rate). This key variable is the sum of the effective business property tax (BPT) rate and the business occupancy tax (BOT) as discussed above. The effective BPT is obtained from the statutory municipal non-residential property tax rate after accounting for the presence of systemic deviations in assessment practices across municipalities. During the period under investigation, some of the municipalities also imposed business taxes. To account for the effects of business taxes on business investment, we use the business occupancy tax (BOT) rate defined as the ratio of municipal business tax revenue to total non-residential property assessment values. We express the business tax rate as business tax revenue per $1,000 of total assessed value of non-residential property. Again, we account for systematic variations in property assessment valuations across the municipalities. Thus, we use effective BOT in our analysis. See Appendix 1 on the details of the computations of effective BPT and BOT rates. We believe these effective rates represent the tax burdens more accurately than do statutory tax rates.

Note that investment decisions leading to issuance of current building permits would likely have been made in the previous year based on that year's tax rate. Consequently, to address this lag relationship between the tax rate and investment, we use one period lagged values of property tax rate as our key explanatory variable. This is a common approach used in previous related panel data studies which use per capita values to enable comparison across jurisdictions of different sizes.[10] Z represents a vector of all other control variables that can influence business investment, μ_i denotes municipal-specific constant term and ε_{it} is the error term. Note that municipal dummies, μ_i capture time-invariant municipal effects such as differences in municipal property assessment methods, distance from main population centres, distance from other cities and so on.

In Eq. (1), our key coefficient of interest is α_1, which shows the effect of the non-residential property tax rate on business investment. More specifically, the coefficient indicates the percentage change in business investment associated with a one per cent change in the non-residential property tax rate. In other words, the coefficient measures the elasticity of business investment with respect to the non-residential

8 Thus, our analysis implicitly assumes that construction value and market value of property development are similar since the original dataset from Statistics Canada was constructed this way.

9 See Found (2017) for a discussion of the capitalization of property taxes in property values.

10 See for example, Church (1981), Wassmer (1993) and Ferede and Dahlby (2012) and the references contained therein.

property tax rate. Since higher non-residential property taxes add to the cost of doing business in a municipality, we expect this to discourage business investment. Thus, we expect α_1 to be negative.

In addition to the non-residential property tax rate, other factors can influence the location of businesses in a given municipality and the amount of their investment. We attempt to capture the effects of these variables by Z in Eq. (1). More specifically, we include municipal population, the unemployment rate and other municipalities' average non-residential property tax rate as control variables. We provide the rationales for the inclusion of these explanatory variables below.

The level of business investment in a jurisdiction depends on the business cycle. Businesses tend to invest more during economic booms and invest less when economies face downturns. We control for the business cycle's effect by including the unemployment rate as an additional explanatory variable. Ideally, we would like to use municipal-specific unemployment rate data. However, due to the lack of unemployment rate data for all the municipalities (with the exception of the big cities, Calgary and Edmonton), we use the provincial unemployment rate. We expect the unemployment rate to have adverse effects on business investment.

Another important factor that can influence business investment is the population of a municipality, which proxies its market size. Thus, we include the city's total population as a control variable, and we expect business investment to increase with the city's population. Further, the location of businesses can be impacted by various public services that municipal governments provide in their jurisdiction. In fact, some previous studies suggest that the level and quality of municipal public services can affect businesses' location decisions. To account for this possible effect, we include municipal real per capita total expenditure as a proxy for the various services that municipal governments provide.[11] We expect the municipal expenditure variable to have positive effects on business investment.

Our dataset covers 17 municipalities over the sample period 1998-2017. Our sample period was limited by the availability of complete data for our variables of interest.[12] The basic summary statistics of the key variables of interest are shown in Table 2 below.

11 See Wassmer (1993), which employs a somewhat similar framework and finds that a higher property tax rate in a city is associated with a lower capital and smaller property tax base in the city.

12 The dataset on municipal non-residential mill rates is available for the 1998-2018 period. However, we restrict our sample period to 1998-2017 because information about municipal government finances is not available for year 2018 at the time of this research.

Table 2: Summary Statistics, 1998-2017

Variable	No of Observations	Mean	Std. Dev	Min	Max
Per capita value of building permits (in 2017 $)	336	728.13	951.20	0.00	14,038.89
Log of per capita value of building permits (in 2017 $)	336	6.11	1.22	0.00	9.55
Business property tax (BPT)	340	12.09	3.72	1.97	22.85
Business occupancy tax (BOT)	340	0.67	2.09	0.00	12.44
Non-residential property tax rate	340	12.76	4.47	1.97	31.22
Per capita municipal expenditure (in 2017 $)	340	2,213.20	846.73	1,000.87	6,755.86
Unemployment rate (%)	340	5.25	1.27	3.24	9.14
Population (in thousands)	340	134.92	285.38	2.23	1,246.34
Neighbours' non-residential property tax rate	340	12.76	1.90	7.48	20.03
Tax base (in millions of 2017 $)	340	4,500.00	11,700.00	11.60	71,800.00

Notes: Non-residential property tax rate is the sum of the business property tax rate (BPT) and the business occupancy rate (BOT) The tax base is total assessed non-residential property values in 2017 dollars. All other variables are as previously used.

4.2 EMPIRICAL RESULTS AND DISCUSSIONS

Our main econometric results are reported in Table 3 below. In all regressions, we include municipal dummies to account for municipal time-invariant fixed effects. The municipal dummies will capture such important factors as distance from the main population centres, major economic bases of the municipalities and so on. The fixed effects can also control for variations in assessment standards across municipalities. The estimation is conducted using ordinary least squares (OLS) with heteroskedasticity and autocorrelation robust standard errors.

We begin our empirical analysis in column (1) by regressing business investment on the non-residential property tax rate. As discussed before, we normalize business investment by population to account for differences in the size of municipalities. Thus, in our main regression, we include the level of municipal population as an additional control variable. We do so because previous studies suggest that the level of population can influence business investment in a jurisdiction. A municipality's population can affect businesses and business investment in at least two ways. On the demand side, large population generally represents large market potentials, and this can attract businesses to the municipality and raise business investment. The presence of a larger population also signifies the potential for a larger labour supply, and this can encourage business investment. Consequently, in column (1), we include population as an explanatory variable that captures the potential impact of market size on investment.

Capital is mobile across jurisdictions and can move from a high-tax jurisdiction to a low-tax jurisdiction. Thus, business investment in a municipality may be influenced by the property tax rate of other neighbouring municipalities. To account for this possible horizontal tax competition, in column (1) we also include the weighted average (weighted by the inverse of the distance between the municipalities) property tax

rate of other municipalities as an additional control variable. If there is horizontal competition in municipal non-residential property taxes, we expect the coefficient of this variable to be positive.

In general, as discussed before, higher non-residential property tax rate can discourage investment. Thus, we expect the coefficient estimate of this key variable to be negative in column (1). We also expect the coefficient of population to be positive for the reasons explained above. Moreover, we expect the coefficient of neighbours' non-residential property tax rate to be positive if businesses move from a high-tax municipality to a low-tax municipality. Column (1) shows that the coefficient of non-residential property tax rate is negative and statistically significant as expected. The results suggest that a one per cent increase in non-residential property tax reduces real per capita business investment by about 0.62 per cent. Similarly, the coefficient of population is, as expected, positive and statistically significant, suggesting that an increase in municipal population increases per capita business investment. On the other hand, neighbours' non-residential property tax rate appears to have no statistically significant effect on business investment.

Table 3: Effects of the Property Tax Rate on Non-residential Real Estate Investment, 1998-2017

	(1)	(2)	(3)	(4)
Non-residential property tax rate	-0.623**	-0.678**	-0.690**	-0.788**
	(0.312)	(0.320)	(0.322)	(0.383)
Population	1.245***	1.295***	1.297***	1.530***
	(0.411)	(0.418)	(0.420)	(0.551)
Neighbours' non-residential property tax rate	-2.681	-2.758	-2.756	-2.669
	(1.669)	(1.723)	(1.713)	(1.716)
Municipal expenditure		0.243	0.254	0.275
		(0.244)	(0.241)	(0.251)
Unemployment rate			-1.220	-1.292
			(0.822)	(0.863)
Tax base				-0.141
				(0.124)
Constant	9.697*	8.024	10.499*	12.688**
	(5.232)	(5.362)	(5.521)	(5.877)
Municipal effects	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes
Observations	321	321	321	321
Adjusted R-squared	0.310	0.309	0.307	0.305

Notes: The dependent variable is the log of per capita commercial and industrial permit value in 2017 dollars. The estimation is done with OLS. Heteroskedasticity and autocorrelation robust standard errors in parentheses. Significance levels are denoted by *** for one per cent, ** for five per cent, and * for 10 per cent.

We control municipal expenditure as an additional control variable in column (2) to capture the potential effects of the public services provided by the municipalities on business investment. Column (2) shows that, as expected, the coefficient of this variable is positive, but it is statistically insignificant. Also note that non-residential property tax rate continues to have a statistically significant negative effect on business investment. Note also that the magnitude of the coefficient of non-residential property tax rate is higher in absolute value, suggesting that not controlling for municipal government expenditure may bias the coefficient estimate downwards.

In column (3), we expand our empirical analysis by including the unemployment rate as an additional explanatory variable to account for the potential effects of the business cycle on business investment. As expected, economic downturns as proxied by the unemployment rate have an adverse effect on business investment. However, the coefficient of the unemployment rate is statistically insignificant. This may be due to the lack of variation in the unemployment rate across municipalities. As we indicated before, we use the provincial unemployment rate for all municipalities, other than Calgary and Edmonton, due to lack of data. Further, municipal expenditure and other municipalities' non-residential property tax rate continue to be statistically insignificant. On the other hand, our main result of column (3) also shows that population has a statistically significant positive effect on business investment.

Note that in column (3) our key variable of interest, the non-residential property tax rate, continues to be negative and statistically significant, suggesting the robustness of the key result to the inclusion of various controls. The magnitude of the effect of non-residential property tax rate on investment is also larger now suggesting the importance of controlling for business cycle. As column (3) includes all the relevant control variables, this is our main empirical model, and we focus our discussion on this regression estimate. Note that the coefficient estimate of the key variable, the non-residential property tax rate, is -0.69 and it is statistically significant at the five per cent level, suggesting the adverse effects of this tax on business investment. The result suggests that a 10 per cent increase in non-residential property tax rate is associated with about a 6.9 per cent reduction in business investment. Note that our elasticity estimate is slightly lower (in absolute value) than the -0.82 estimate obtained by Found (2017). See also Bird et al. (2012).

To put the estimated elasticity in perspective, we can calculate the impact of a one mill increase in the non-residential property tax rate on investment. Over the sample period, the mean real per capita business investment and effective non-residential property tax rate are $728.13 and 12.76, respectively. Thus, using the estimated elasticity of -0.69, we obtain a (0.69) (728.13/12.76) = $39.37 decrease in real per capita investment from a one mill increase in the non-residential tax rate.

It has been suggested that the tax base should be included as a control variable in the regression model as a proxy for agglomeration economies that enhance a municipality's business attractiveness. As a robustness check, we include the log of real assessment value of non-residential properties as an additional control variable in column (4), which shows that the coefficient of the tax base has an unexpected negative sign, but it is statistically insignificant. This may be partly because this variable

is correlated with population which was also included in the regression to account for agglomeration effects. The coefficient of non-residential property tax rate continues to be statistically significant, although with a higher absolute value than in our key result in column (3). Note also that the decline in the adjusted R-squared value indicates that including the tax base among the explanatory variables does not improve the overall fit of the model. We also conduct additional sensitivity checks in the next section to further investigate the robustness of our key result reported in column (3).

4.2 ROBUSTNESS CHECKS

In this section, we subject our estimated model of column (3) of Table 3 to various robustness checks to assess the sensitivity of our key finding. In particular, we check if the results are sensitive to the inclusion of additional control variables, exclusion of potential outlier observations and use of alternative specifications. The results of the robustness checks are reported in Table 4 below.

The overall real estate market conditions can influence business investment in a given municipality. When property values rise, it may give businesses the incentive to invest in commercial and industrial properties, anticipating appreciation of property values in the future. We proxy the housing market environment by including the home price index as an additional control variable in column (1). Ideally, we would like to include municipal-specific home price indices in our sensitivity analysis. However, due to the paucity of such data, we use the home price index for the province as a control variable. Thus, in column (1), we include real home price as additional control variables. The results show that home price is not statistically significant. More importantly, the non-residential property tax rate continues to be negative and statistically significant, suggesting the robustness of our key finding.

Table 4: Robustness Checks, 1998-2017

	(1)	(2)	(3)	(4)	(5)
	Additional control variable	**Excluding outliers**	***Linear* specification**	***Log-Linear* specification**	
				Combined property tax rate	**Decomposed property tax ratea**
Non-residential property tax rate	-0.650*	-0.688**	-42.858**	-0.065**	
	(0.333)	(0.324)	(19.374)	(0.033)	
Business property tax (BPT)					-0.068*
					(0.035)
Business occupancy tax (BOT)					-0.038
					(0.037)
Population	1.297***	1.326***	0.329	0.003*	0.004*
	(0.421)	(0.428)	(0.921)	(0.002)	(0.002)
Neighbours' non-residential property tax rate	-2.629	-2.588	-139.088***	-0.436***	-0.443***
	(1.676)	(1.687)	(38.922)	(0.110)	(0.112)
Municipal expenditure	0.266	0.250	0.067**	0.000	0.000
	(0.244)	(0.241)	(0.032)	(0.000)	(0.000)
Unemployment rate	-0.797	-1.159	-353.472**	-0.501	-0.543
	(0.957)	(0.832)	(176.601)	(0.413)	(0.432)
Home price	-2.318				
	(2.363)				
Constant	19.773*	9.897*	5335.100***	14.855***	15.311***
	(12.003)	(5.364)	(1596.575)	(3.683)	(4.017)
Municipal effects	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes
Observations	321	319	321	321	321
Adjusted R-squared	0.305	0.298	0.321	0.310	0.308

Notes: The robustness check is conducted based on column (3) of Table 3. The dependent variable is the log of per capita commercial and industrial permit value in 2017 dollars (except in column (4) where a linear form of the variable is used). The estimation is done with OLS. Heteroskedasticity and autocorrelation robust standard errors in parentheses. Significance levels are denoted by *** for one per cent, ** for five per cent, and * for 10 per cent.

[a] In column (5), we do not reject the null hypothesis that the coefficients of BPT and BOT have statistically equivalent effects on business real estate investment. This is consistent with our main approach of using a combined non-residential property tax in our main analysis.

In small data-based empirical studies, such as ours, one may be concerned that few outlier observations may influence the coefficient estimates. Although the log-log specification is less likely to be influenced by outliers, such a problem is particularly important in OLS estimation of linear models. Nonetheless, to address this concern,

we exclude influential or outlier observations and re-estimate the model in column (2). As is common in the literature, we treat those observations of real per capita business investment more than 1.5 times the interquartile range as outliers. Comparing the results of columns (2) with those of our main results of Table (3), one can see that the coefficients of non-residential property tax rate and business tax rate are still negative and statistically significant, suggesting the robustness of the results. However, the coefficient of the non-residential property tax rate is marginally lower (in absolute value).

As indicated before, the econometric model in Table 3 is based on a log-log specification. In Table 4, we check the robustness of our results to the use of alternative specifications by re-estimating the model using a linear specification in column (3). We also use log-linear specifications in columns (4) and (5). In column (3), we use the linear specification where the dependent variable and all the explanatory variables enter in a linear form. Results of column (3) show that the non-residential property tax rate continues to have negative and statistically significant effects on business investment, suggesting the robustness of our key finding to the use of an alternative specification.[13]

We further check the robustness of our main result by using a log-linear specification in columns (4) and (5). In this specification, while the dependent variable is given in a log form, all the explanatory variables enter in a linear form. In such a specification, the coefficient of the non-residential property tax rate denotes the semi-elasticity of business investment to non-residential property tax rate. Results of column (4) show that the non-residential property tax rate continues to have negative and statistically significant effects on business investment, suggesting the robustness of our results to the use of alternative specifications.

Finally, in column (5) we use the log-linear specification and decompose the total non-residential property tax rate into BPT and BOT.[14] This helps us examine which component of the property tax rate is the key influencer of business investment. Column (5) shows that the coefficient of BPT is negative and statistically significant, as expected. This shows that the municipal component of the non-residential property tax rate is an important determinant of business investment. On the other hand, the results show that the coefficient of BOT is negative, but it is statistically insignificant. The reason for this may be that while BPT is used across all municipalities, only a very few municipalities relied on BOT. Another reason for the lack of significance is that we have already included municipal dummy variables in our regression, and they capture some of the effects associated with variations in BOT.

The foregoing sensitivity analysis confirms the robustness of our key finding that an increase in the non-residential property tax rate has adverse effects on business investment. Thus, our key finding — that an increase in non-residential property tax rate

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13 The estimated coefficient of -42.86 from the linear specification is higher (in absolute value) than the comparable estimate from our main log-log specification of column (3) of Table 3 which was -39.37. This suggests that a linear specification model may provide a higher elasticity estimate.

14 As indicated before, many municipalities did not levy a BOT. Consequently, for a large number of our observations the value of BOT is zero. This precludes the use of BOT in a direct log-log specification. Thus, we use the log-linear specification rather than the original log-log specification to investigate the robustness of our results to the decomposition of the non-residential property tax rate into its two parts (BOT and BPT).

discourages business investment in building construction in Alberta's municipalities — is robust to various sensitivity checks. An important policy implication of our main empirical results is that municipal governments should recognize the adverse effects of non-residential property taxes on business investment in building construction when they contemplate raising tax rates on the non-residential tax base.

5. CONCLUSIONS

Property taxes play a crucial role in financing various public services across Alberta municipalities. The heavy reliance of Alberta municipalities on non-residential property taxes and the recent sharp increases in these taxes in Calgary during an economic downturn have been a hot topic of discussion among policy-makers and commentators in the province. In this paper, we investigate the effects of non-residential property taxes on business investment in building construction — as measured by commercial and industrial permit values — using panel data from 17 Alberta cities over the 1998-2017 period. Thus, this study attempts to fill a gap in the Canadian literature on the effects of property taxes on economic performance and can contribute towards informed local policy-making in the province.

The empirical results in this paper show that higher non-residential property tax rate discourages business investment in building construction. We find that the elasticity of business investment with respect to non-residential property tax rate is about -0.69. This suggests that a 10 per cent increase in the non-residential property tax rate is associated with a reduction of business investment in building construction by about 6.9 per cent. Alternatively, our main result indicates that a one mill increase in the non-residential property tax rate is associated with a $39.37 decline in real per capita business investment in building construction. Another interesting result is that higher expenditures on municipal services do not have a significant impact on business investment, which is contrary to some previous studies which suggested that the level and quality of municipal public services can affect businesses' location decisions.

APPENDIX 1: PROCEDURE FOR CALCULATING EFFECTIVE MUNICIPAL PROPERTY TAX RATES

Let the statutory property tax rate in municipality i be τ_{si}, and the assessed value of property with a market value V be $A_i = \varphi_i V$, where φ_i is assessment rate in municipality i. Let the provincial education property tax rate in municipal i be τ_{pi}.

Assume that the provincial education property tax rates in municipalities i and j are set to equalize the provincial burden for a property with a market value of V.

$$\tau_{pi} \cdot \varphi_i = \tau_{pj} \cdot \varphi_j$$

$$\frac{\tau_{pi}}{\tau_{pj}} = \frac{\varphi_j}{\varphi_i}$$

or

$$\varphi_i = \varphi_j \cdot \frac{\tau_{pj}}{\tau p_i}$$

The ratio of the provincial tax rates in i and j is equal to the ratio assessment rates in j to i.

The effective municipal property tax rate in municipality i is:

$$\tau_{ei} = \tau_{si} \cdot \varphi_i$$

or

$$\tau_{ei} = \tau_{si} \cdot \left(\varphi_j \cdot \frac{\tau_{pj}}{\tau p_i} \right)$$

We can normalize the effective municipal tax rates by setting the assessment rate in municipality j equal to one. Therefore, the effective municipal property tax rates in municipality i are equal to:

$$\tau_{ei} = \tau_{si} \cdot \left(\frac{\tau_{pj}}{\tau_{pi}} \right)$$

for all i,

$$i \neq j$$

AN EXAMPLE OF THE ADJUSTMENT TO THE STATUTORY MUNICIPAL PROPERTY TAX RATE

Consider the case of Airdrie in 1998. Its statutory municipal property tax rate was 11.994 and its provincial education property tax rate was 9.964. In the same year, Calgary's provincial property tax rate was 10.6013. Airdrie's lower provincial rate than Calgary's implies that its assessment rate is higher than Calgary's. Therefore, the effective tax rate in Airdrie is higher than its statutory rate. Specifically, its effective rate is 11.994(10.6013/9.964) = 12.761.

PROCEDURE FOR CALCULATING EFFECTIVE MUNICIPAL BUSINESS OCCUPANCY TAX RATES

The effective business occupancy tax rate, υ_i , is also calculated with an adjustment for variation in assessment rates across municipalities. R_{bi} is the revenue from the business occupancy tax, V_i, is the market value of property, φ_i is the assessment rate, and A_i is the assessed value of property in municipality i.

$$\upsilon_i = \frac{R_{bi}}{\left(\frac{V_i}{1000}\right)} = \frac{R_{bi}}{\left(\frac{\frac{A_i}{\varphi_i}}{1000}\right)}$$

since $A_i = \varphi_i V_i$,

$$\upsilon_i = \frac{R_{bi}}{\left(\frac{A_i \cdot \frac{\tau_{pi}}{\tau_{pj}}}{1000}\right)}$$

since

$$\varphi_i = \frac{\tau_{pj}}{\tau p_i}$$

where

$$\varphi_j = 1$$

AN EXAMPLE OF THE ADJUSTMENT TO THE BUSINESS OCCUPANCY TAX RATE

Consider the case of Edmonton in 2007. The assessed value of its business property was $14,381,584,212 and its business occupancy tax revenue was $106,211,000. Edmonton's provincial property tax rate was 4.7478. In the same year, Calgary's provincial property tax rate was 3.8223. Edmonton's higher provincial rate than Calgary's implies that its assessment rate was lower than Calgary's. Therefore, the effective business occupancy tax rate in Edmonton in 2007 is calculated as:

$$\nu := \frac{106211000}{\left(\frac{14381584212\frac{4.7478}{3.8223}}{1000}\right)}$$

$$\nu = 5.945592$$

Without this adjustment for the lower assessment rate in Edmonton compared to Calgary, Edmonton's business occupancy tax rate would have been 8.740514. The adjustment therefore lowers Edmonton's calculated business occupancy tax rate because assessed value of property in Edmonton understates the market value of property in Edmonton and therefore the adjustment lowers the calculated effective business occupancy tax rate.

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