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# Through the Roof: The High Cost of Barriers to Building New Housing in Canadian Municipalities

*Barriers to increasing housing supply, many stemming from excessive regulation, are driving up the price of new homes in Canada. The extra costs range from an average \$229,000 per new single-detached house in the eight most restrictive cities, to \$600,000 in Vancouver. Municipal and provincial governments should review land-use policies and reduce development charges.*

Benjamin Dachis and Vincent Thivierge

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## THE STUDY IN BRIEF

The cost of housing has been going through the roof in many parts of Canada. Most government policies have focused on curtailing the demand for housing, but they have not taken meaningful steps to increase housing supply.

In any competitive market without barriers to entry, regardless of the product being sold, the overall market price should equal its marginal cost of production. The same is true of housing. The marginal cost of constructing a single-detached house is primarily due to the costs of labour, materials, and time during its physical construction. A well-functioning housing market results in the market price of housing being close to the feasible cost of constructing it. If prices persistently exceed this construction cost, it is often due to barriers that inhibit new construction. These barriers often stem from excessive regulations.

We estimate that, because of the barriers to building more single-family houses, homebuyers in the eight most restrictive cities paid an extra \$229,000 per new house between 2007 and 2016. In Vancouver, the cost of housing restrictions is by far the largest in Canada, at \$600,000 for the average new house, and ranks among the largest internationally as a share of market costs.

Why are housing costs so high? We find that restrictions and extra costs on building new housing – such as zoning regulations, development charges, and limits on housing development on both Greenbelt land and land between urban areas and the Greenbelt – are dramatically increasing the price of housing. The extra costs on new and existing homes are over \$100,000 in some Ontario municipalities. While land-use regulation can generate important benefits, in most cases studies find that the costs imposed by housing regulation outweigh the benefits.

Municipal governments and provinces should enable more housing construction by taking steps such as easing restrictions on developing agricultural land, simplifying and updating zoning bylaws, and reducing development charges.

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## The cost of housing in Canada has increased dramatically in recent years. According to data from Real Property Solutions (RPS), the price of single-detached dwellings more than doubled from January 2005 to the end of 2016.

With measures such as taxes on foreign buyers and tightened federal mortgage policy, most government policies have focused on curtailing the demand for housing, but they have not taken meaningful steps to increase housing supply. Yet evidence from around the world shows that government policies limiting the supply of housing are among the key causes of higher house prices.

Restrictions on housing supply hinder the efficiency of the housing market. Delays in building what people demand result in shortages and, therefore, higher prices. Numerous studies (Glaeser, Gyourko, and Saks 2005; Cheshire and Hilber 2008) have established that a well-functioning housing market results in the market price of housing being close to the feasible cost of constructing it. If prices exceed this construction cost, it is often due to excessive regulations that inhibit new construction.<sup>1</sup> We find a persistent gap between the cost of building new housing and its market price in major Canadian census metropolitan areas (CMAs). This gap between construction costs and price is largely due to barriers to housing developments. These barriers often stem from regularity burdens but can also include factors such as congestion and a lack of transportation or access to developable land. These

barriers account for around 50 percent of the cost of housing in the Vancouver area – an amount equivalent to the cost of regulatory barriers that other studies have found for Manhattan, New York City. In Canadian cities in which the market price of new housing is more than 20 percent higher than the cost of construction, we estimate that, because of the barriers to building more single-family houses, homebuyers paid an extra \$229,000 per new house between 2007 and 2016.

Regulatory barriers to building new homes result in higher prices for existing homes as well. Policies that reduce the supply of new housing result in less competition in the resale market for existing homes, boosting their price. For that reason, current homeowners are often strong supporters of land-use regulations. In a second and separate analysis below, we measure the effect of specific regulatory burdens on house prices – and have detailed price and policy data for Ontario municipalities. We are able to estimate how much the price of single-detached housing would fall if municipalities that impose above-average costs and barriers on housing development improved their performance to the current provincial average. We find that the regulatory burden is around \$45,000 for the average single-detached home in Ontario, and

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1 As explained in more detail below, we use measures of construction cost that exclude the cost of land. Conversely, when prices are well below the cost of construction, as in a few Canadian cities and as American studies have shown in many cities, the discrepancy reflects an oversupply of housing, usually because of falling population while housing stocks remain durable.

over \$100,000 in some municipalities. In addition, high development charges and onerous land-use restrictions are the largest driver of the regulatory cost burden on housing.

We focus our analysis on single-detached housing, which makes up more than half of all housing in Canada according to the 2016 Census. Our evidence shows that policies that restrict the supply of these kinds of houses are a major cause of their high price, much more so than low interest rates and household growth have been.<sup>2</sup> Across Canada, the current owners of single-detached homes enjoy higher prices for their homes at the expense of people looking to buy homes, such as young and growing families, people looking to move to another part of Canada, and new immigrants. Municipal governments and provinces can reduce regulatory and development cost burdens on housing by replacing development charges with user fees, easing zoning restrictions, and allowing for greater flexibility in developing new housing in places with little land zoned for new housing.

## HOUSING SUPPLY RESTRICTIONS AND PRICES

Although governments do not control geographical barriers to development, they control housing regulations. Many studies have investigated the causes and effects of housing regulations around the world, and we summarize them here.<sup>3</sup>

### The Causes of Land-Use Regulation

Strict building regulations often emerge from communities in which land is scarce because of geographical constraints or a large amount

of existing development (Hilber and Robert-Nicoud 2013; Saiz 2010). Once homeowners purchase a home, they sometimes have strong incentives to prevent new homes from being built or new developments from changing the character of the neighbourhood in which they purchased. New homes create competition when existing homeowners put their houses up for sale. Competition lowers the potential rate of return on investment in housing – the largest asset in many households (Fischel 2001). As a result, existing homeowners often support local government policies such as zoning regulations that restrict new development, resulting in NIMBYism – the abbreviation for “not in my back yard.”

### The Effect of Land-Use Regulation on House Prices

The vast majority of studies on housing regulations find that increasing the strictness of building regulations increases housing prices by limiting the growth of housing supply (Gyourko and Molloy 2015). For example, in a study of Boston-area housing policies, Glaeser and Ward (2009) show that individual regulations can reduce the supply of housing by up to 22 percent. Another study shows that increasing the time to approve subdivisions across US cities by one month led to a reduction in building permits by 10 percent (Mayer and Somerville 2000). In a study of English cities, Hilber and Vermeulen (2016) show that house prices would fall by around 25 percent if the most restrictive region replicated the planning policies of the least restrictive. US cities with more regulations on housing supply had higher volatility in house prices (Malpezzi and Wachter 2005), and house-

2 Restricted by the availability of data, we focus in our analysis on single-detached dwellings. However, in many of the same municipalities that we highlight in this *Commentary*, we expect a similar regulatory burden for higher-density housing such as row houses, townhouses, apartments, and condominiums.

3 This discussion is based on the review by Gyourko and Molloy (2015).

price bubbles during the 1980s and 1990s were more pronounced in cities with strict regulation (Glaeser, Gyourko, and Saiz 2008). Grout, Jaeder, and Plantinga (2011) find that the urban growth boundary (akin to a greenbelt) in Portland, Oregon, increases residential prices only in neighbourhoods where it constrains development, creating a nearby amenity of green space that buyers value.

### **The Costs and Benefits of Land-Use Regulations**

Housing regulations have an economic cost beyond increasing home prices. Restrictions on supply in the largest urban areas mean fewer opportunities for people from elsewhere to live and work in the most productive cities. When people move from low- to high-productivity locations, they improve not only their own earning potential but that of others around them. If restrictions on supply make moving to high-demand areas too expensive, people languish in low-productivity regions and lower overall national economic growth. A study in the United States found that overly stringent land-use regulations in highly productive cities like New York or San Francisco prevented workers from relocating from low-productivity regions to high-productivity regions because of the gap in housing prices between regions. By not relocating, potential workers and people already in the high-productivity regions are economically worse off, slowing yearly economic growth between 1964 and 2009 by 0.3 percentage points per year and decreasing the size of the US economy by nearly 14 percent in 2009 (Hsieh and Moretti 2015). Another recent study found that US labour productivity would be

12 percent higher if all states moved only halfway from their current level of zoning restrictiveness to that of the least restrictive state (Herkenhoff, Ohanian, and Prescott 2017). Strict land-use regulations also harm individuals more directly by not allowing landowners to use their land for their most productive possible use. A US study found that a one-third (approximately) increase in the strictness of local regulations eliminated about one-third of the potential economic use of the land (Turner, Haughwout, and van der Klaauw 2014).<sup>4</sup>

Restrictions on housing development also inform one of the key modern economic debates: inequality. One study (Knoll, Schularick, and Steger 2017) has found that 80 percent of the increase in home prices across 14 advanced countries since the Second World War has been due to the increasing prices of land, with construction costs holding flat. This pattern was not true in previous recorded history. Rognlie (2015) shows that the increase in house prices since 1945 explains almost all the increase in the inequality of global wealth relative to income as documented by Piketty (2014).

Land-use regulations have at least one benefit: they internalize negative building externalities, such as pollution from industrial sites, resulting in residents having a cleaner environment in which to live. Land-use regulations such as greenbelts can maintain local amenities, including views of natural landscapes. These regulations generate social benefits that might be more important for certain localities than the costs of building regulations (Turner, Haughwout, and van der Klaauw 2014; Glaeser, Gyourko, and Saks 2005). Severen and Plantinga (2017), for example, find that California's

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4 Turner, Haughwout, and van der Klaauw (2014) test causality and control for social and economic differences across cities by using fine-scale geographical data. They compare properties directly across municipal borders so that the metropolitan area is otherwise identical except that one block across the street, for example, is subject to the regulation of one municipality while the comparison house is subject to regulation in another.

*Coastal Act* raised real estate prices not through restricting supply but by generating amenities.

However, empirical and theoretical studies have generally found that the cost imposed by housing regulations in many cities largely outweighs the benefits provided by land-use regulation (Gyourko and Molloy 2015). Our analysis below relates solely to the economic costs of supply restrictions. Policymakers should weigh these costs against the benefits of building-restriction regulations before adding any additional regulations.

### THE GAP BETWEEN BUILDING COSTS AND PRICES IN CANADIAN URBAN AREAS

The Canadian evidence relating to restrictions on house building is limited: it is largely based on the survey data of developers, and not on actual measures of policy.<sup>5</sup> The Canadian Homebuilders' Association (2014) conducted annual surveys of member companies for their views of critical problems. The top national concerns for many years, especially in Ontario, were the shortages and high prices of land on which to build along with high development charges.<sup>6</sup> In this section, we estimate the broad economic cost of restrictions on new housing development for all major Canadian metropolitan areas. In the following section, using detailed data from Ontario municipalities, we will identify the specific barriers to housing development in that province.

### The Cost of Building Restrictions Across Canada

In any competitive market without barriers to entry, regardless of the product being sold, a basic prediction of economic theory is that the overall market price for that good will equal its marginal cost of production. The premise of ground-breaking work by Glaeser, Gyourko, and Saks (2005) that we apply to Canada is that an uninhibited and competitive market price for an average new single-detached home should equal the marginal cost to construct it. Imperfections in the market – which can include a lack of available transportation options to new land sites, additional costs of construction, lack of land for development (for regulatory reasons, not natural geography, as we explain below), and a lack of competition among landowners or builders – create a gap between the marginal cost of construction and price. These imperfections in the market for developing land are the indirect evidence we use that barriers of some kind are driving up the market price of land and, therefore, of housing too.

#### *The Cost of Housing Construction (Excluding Land) in Urban Areas*

The marginal cost of constructing a single-detached house is primarily due to the costs of labour, materials, and time during its physical construction. These costs vary across the country. Statistics Canada reports the cost of construction of a single-detached home for each CMA in Canada

5 No studies that we are aware of have measured the effect of regulations on house prices in Canada. One study collected developer viewpoints across 48 Canadian cities and found that longer approval timelines and greater uncertainty; high development costs, fees, and rezoning prevalence; and a low degree of community support for development decreased the supply of housing (Green et al. 2016).

6 Another Canadian study surveyed developers in 20 urban areas and found a wide range of development application fees and processing times, infrastructure charges, and other costs on builders. It did not, however, investigate the consequences of these policies (Realpac 2012, 2013).

– an amount that excludes the cost of land.<sup>7</sup> From 2007 to 2016, the average construction cost ranged from \$200 per square foot or less in places such as Abbotsford, BC, cities in New Brunswick, or Kingston, Ontario, to between \$300 and \$350 per square foot in Vancouver and Kelowna, BC, and in Edmonton. This last city is a good example of the intuition behind our analysis here. The cost of construction in Edmonton was the highest of any city in Canada in the 2007–16 period, likely because of high labour costs in construction due to competition from high-paying construction jobs in the nearby oil sands.

Owners of vacant land compete with each other to offer housing developers terms they will accept to build housing. In a market with many vacant plots available, landowners will fiercely compete, reducing the cost of land to the point at which they are indifferent over whether to keep the land as is or sell it to developers. If land is scarce, as would result from restrictions on land use or traffic congestion or a lack of transportation options that makes travelling to more distant land costly, those landowners who have land in areas that governments have allowed to be used for building will have market power. As a result, they can charge developers a higher price for land – a price that will be reflected in a higher cost for the homebuyer. Similarly, if regulatory delays for builders lengthen the time to construct houses or if additional fees are applied by municipalities through development charges, the result will be a higher cost of housing up to the point that a sufficient number of buyers will bear.

Construction costs for single-detached dwellings are also inherently higher in urban areas with high demand or with hard-to-replicate natural amenities such as waterfront views. In urban areas with little open land available, developers will invest in higher-cost sites to redevelop, such as former industrial land that they must remediate. Vancouver and Toronto, two urban areas with high demand, both had construction costs above \$350 per square foot in 2016, ranking them second and fourth, respectively, among Canadian metropolitan areas. Builders develop land in high-demand urban areas more intensively, providing either higher-quality homes or putting more homes in a given area, both of which increase construction costs per square foot. The same effect will occur in areas with local amenities, such as waterfront properties: in an open housing market, taller buildings will rise in high-demand areas to house more people looking to live near the amenity. These taller buildings would become substitutes for single-detached housing, expanding to a point that keeps the cost of housing near the local amenity at the marginal cost of construction in a market without barriers to building.

The marginal cost of construction for condominiums or apartments is the cost to developers of adding one more floor to a building.<sup>8</sup> As the price of land goes up, developers have an incentive to make land a smaller share of the cost of building homes. Hence, as land prices increase in urban areas with high demand, buildings get taller. Some types of mid-rise apartments may have declining costs per additional floor. If that is the

7 Individual municipalities report permit values to Statistics Canada. Although each municipality may collect data slightly differently, both Statistics Canada and the provincial financial reporting guide in Ontario advise cities to report only on physical construction costs.

8 In economic terms, a single-detached home is the marginal unit decision for single-detached homebuilders, while adding a whole floor is the marginal decision for multi-residential builders.

case, builders would continue to build the tower taller as long as there was sufficient demand for the additional units. However, at some point in construction, each new floor added to a building makes the construction project more expensive. For example, at a certain height, developers must switch from low-cost wood frames to more-expensive concrete for structural strength, increasing the marginal cost of adding that extra floor.<sup>9</sup> As land prices go up, developers build taller buildings with an increasing marginal cost of construction up to the point that buyers are still willing to pay that price. However, in the case of government-imposed zoning restrictions on building height, which are common in Canadian urban areas, the marginal cost of construction of an additional floor would be less than the market clearing price. Although we do not have data for multi-residential construction, this example demonstrates why the marginal cost of constructing housing should determine the market clearing selling price of condominiums.

A number of US and UK studies have found that the market for housing construction is highly competitive, with no dominant providers (Glaeser, Gyourko, and Saks 2005; Cheshire and Hilber 2008). We assume that the same is true in Canada.<sup>10</sup> Any difference between the cost of supply and the market price, especially over a long period, is likely due to persistent restrictions on access to new land.

### *Measuring the Barriers to Land Access in Canadian Urban Areas*

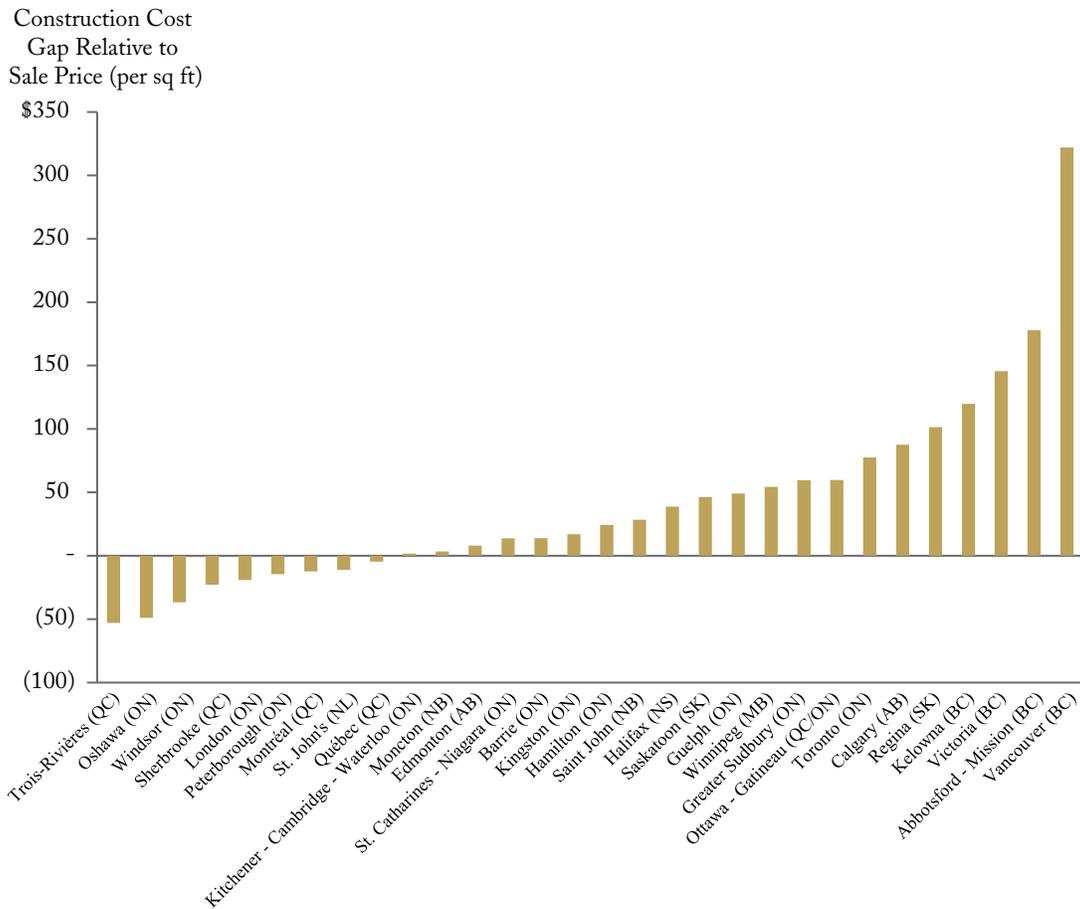
Following the method used by Glaeser, Gyourko, and Saks (2005), we indirectly estimate a measure of the broad cost of barriers to building more housing (see the appendix for details). Most other studies use the market price of all housing, including both newly built and the existing stock of housing. However, newly built housing is often of a higher quality than the existing stock. We use data from the Canada Mortgage and Housing Corporation (CMHC) on the market price of newly built, single-detached homes sold into each major Canadian urban area. That allows us to compare the production cost and the market price for similar markets in terms of housing quality.

We use data on housing costs that include only the physical construction costs and exclude costs such as development charges, the price of land, and time costs for each development application. These data allow us to isolate the marginal cost of construction, following Glaeser, Gyourko, and Saks (2005), meaning that the gap between the market price of new homes and the physical construction cost is likely caused by barriers exclusively due to accessing land. The causes of these barriers could include congestion on roads making access to outlying areas difficult, delays in development, extra costs for developers, and financing long-term infrastructure through upfront development charges on developers passed on to homebuyers.

9 Another example is that, as buildings get taller and house or employ more people, there is a greater demand for elevators. As buildings become taller, the amount of floor space devoted to elevators increases to the point that the cost of adding another floor that would require an additional elevator would take away enough otherwise saleable floor space to make the marginal cost of the extra floor uneconomical.

10 Indeed, according to Industry Canada data, more than 99 percent of the over 33,000 establishments in the residential buildings construction industry in Canada have fewer than 100 employees. However, this statistic is not a perfect measure of competition because a large share of production may be driven by a few large market players. The situation will also differ at each local level.

**Figure 1: Cost of Barriers to Building Single-Detached Homes in Canadian CMAs, 2007–16**



Note: All prices are in 2016 constant dollars. Aggregate prices and costs are weighted by the number of permits in each CMA per quarter.  
 Source: Authors' calculations from RPS, CMHC, and Statistics Canada data.

All these factors contribute to our measure of the construction-cost gap of barriers to land access.

Figure 1 presents the gap in dollars per square foot between the average CMA-level market price for new homes sold between 2007 and 2016 and the average physical construction cost for single-detached housing in Canada's 30 largest CMAs over the same years (according to Statistics Canada).<sup>11</sup> To calculate the final cost

of construction, we add a 25 percent markup to account for the fixed cost of land. This markup represents the inherent cost of providing some services to land – a cost that is largely invariant across urban areas. We also include a 17 percent markup to account for the profit margin of developers. To make our results comparable, both additions are identical to the assumptions made in Glaeser and Gyourko (2017).

11 We do not include the CMAs of Saguenay (QC) or Thunder Bay and Brantford (ON) because the CMHC does not report complete information on the average cost of new single-detached housing in those urban areas.

For most CMAs, our cost measure, which is simply the difference between the building construction cost per square foot and the market price per square foot, is close to zero. This minimal difference is to be expected in a normally functioning municipal housing market.<sup>12</sup> However, for a few CMAs such as Abbotsford, BC, and Vancouver, single-detached house prices exceed the construction cost of new units by \$150 per square foot or more. In Vancouver, the cost gap is \$300 per square foot (Figure 1). In some urban areas with very little new housing demand, such as Windsor and London in southwestern Ontario, or Trois-Rivières and Sherbrooke in Quebec, the gap is negative.<sup>13</sup> That result could reflect housing market imperfections or an excess supply of housing due to the durable nature of housing.

Given that the supply and demand sides of markets can take time to adjust, deviations of house prices from building costs could arise in a given CMA in a certain year. However, persistent deviations of prices from construction costs are clearer signals of barriers to development in a CMA (Gyourko and Molloy 2015). The gap has been positive and rising for single-detached housing in both Toronto and Vancouver since 2007, reaching over \$200 per square foot in Vancouver (Figure 2). The increase in the price of housing has little to do with increases in the per square foot cost of construction,<sup>14</sup> which did not increase nearly as much as house prices from 2007 through 2016 in Vancouver. It is no surprise that Vancouver has the highest barriers to new construction, as many

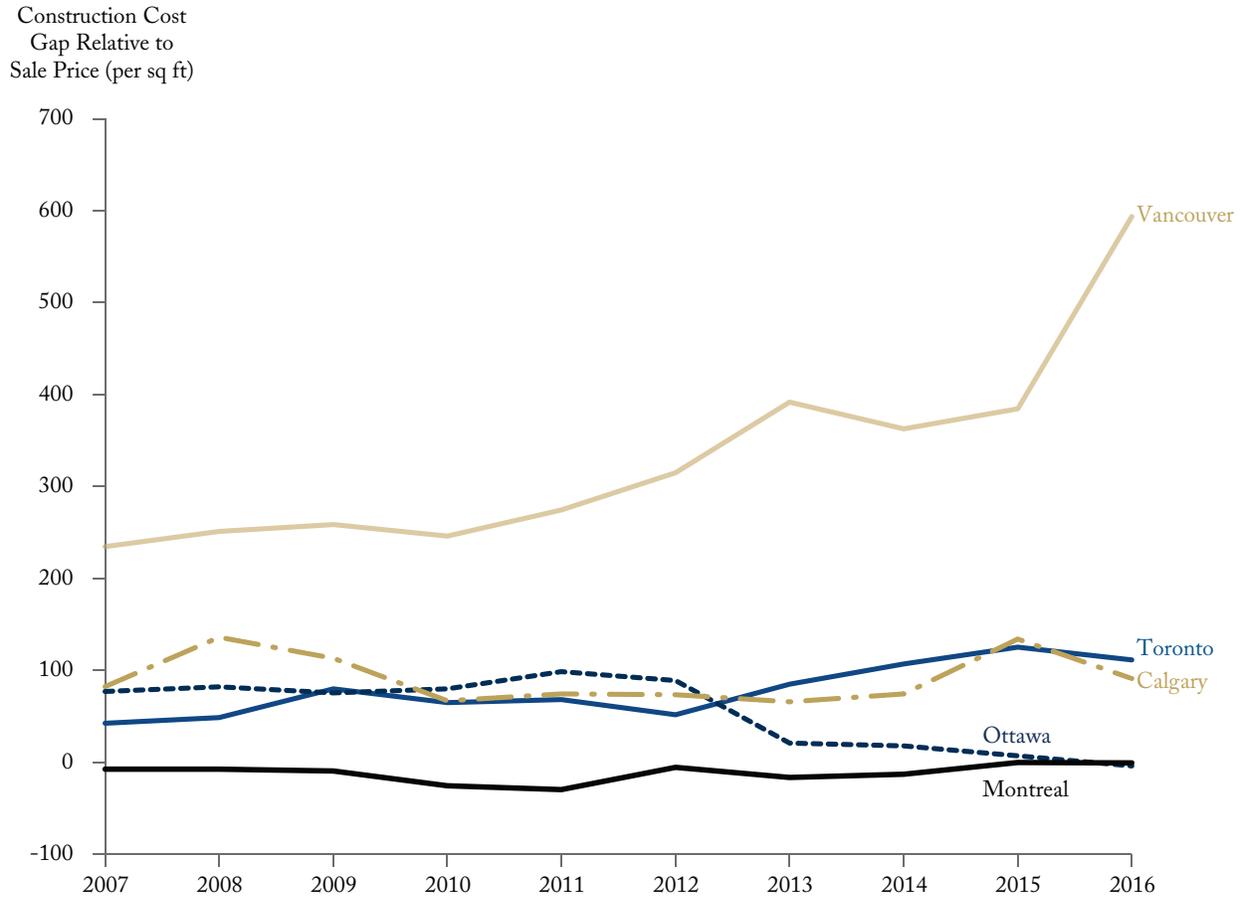
municipalities throughout the region have adopted strict zoning rules that limit neighbourhood density. In contrast, the construction cost gap has been closing in Ottawa and has stayed around \$0 in Montreal since 2007. It has remained largely flat in Calgary too.

### *Measuring the Cost of Barriers to Land Access in Canadian Urban Areas*

The Canadian results show that the regulatory burden now makes up around 50 percent of the cost of housing in the Vancouver area (Table 1) and more than 20 percent in Toronto. In eight Canadian urban areas – Vancouver, Abbotsford, Victoria, Kelowna, Regina, Calgary, Toronto, and Ottawa-Gatineau – new homebuyers paid an average of an extra \$230,000 on a new house because of limits on new building. If there were no barriers to supply, developers would have produced, over the period of this analysis, more housing further along their supply curve – and thus at a higher cost of production – to meet market demand. Vancouver's cost of housing restrictions are by far the largest in Canada, resulting in a 50 percent extra cost of \$640,000 for the average new house, and are among the largest internationally as a share of market costs. Using a similar methodology, though with the market price of the existing stock and not new units, other studies have estimated the regulation burden to be around 68 percent in Brussels, about 50 percent in Manhattan around the year 2000 (Cheshire, Nathan, and Overman 2014), and

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- 12 We also conducted the analysis using the prices of all houses in each CMA, not just new homes, using RPS data. In most cities, the cost of construction greatly exceeded the market price, which is to be expected because the construction cost of a newly built house should exceed the average price of houses being sold. To put all results on a per square foot basis, we use data on the average living-size area single-detached houses in each CMA, using data from RPS. See appendix for details.
- 13 Oshawa is an outlier in our analysis. It has a high cost of construction (similar to that in nearby Toronto) but a low sale price of new housing. That results in a negative construction gap.
- 14 This result is similar to US findings that show that real construction costs have increased by only one-third since the 1970s, but that residential land values quadrupled over the same period (Davis and Heathcote 2007).

Figure 2: Cost of Barriers to Building Single-Detached Homes in the Five Largest CMAs, 2007–16



Note: All prices are in 2016 constant dollars. Aggregate prices and costs are weighted by the number of permits in each CMA per quarter. Source: Authors' calculations from RPS, CMHC, and Statistics Canada data.

as severe as 800 percent for UK office buildings (Cheshire and Hilber 2008).

### Barriers to Building and High Housing Prices in Ontario Municipalities

Our analysis so far has looked at the overall gap between the construction costs of houses

and their price. Data on construction costs are available only at the CMA level. However, specific municipalities determine policies such as zoning rules, development charges, or other potential costs on housing. We collected detailed data at the municipality-specific level provided by the Ontario Ministry of Municipal Affairs – data that might

**Table 1: The Cost of Barriers to Building Single-Detached Homes, 2007–16**

CMA	Average living size (square feet)	Number of units created	Restriction cost (\$ per square foot)	Restriction cost (percent of cost)	Average new single-family house price (\$ thousands)	Increase in cost per new house (\$ thousands)
Ottawa – Gatineau	1,873	2,953	60	23	492	112
Regina	1,302	875	101	28	473	132
Calgary	1,737	5,449	88	24	631	152
Toronto	2,161	10,640	78	22	751	168
Kelowna	1,727	561	120	27	775	207
Victoria	1,812	691	146	37	720	264
Abbotsford	1,746	317	178	51	607	311
Vancouver	1,999	3,524	322	50	1,298	644
<b>Average of top-eight restrictive cities</b>						<b>229</b>
<b>Average of all Canadian cities</b>						<b>113</b>

Source: Authors' calculations from RPS, CMHC, and Statistics Canada data. All prices are in 2016 constant dollars. Aggregate prices and costs are weighted by the number of permits in each CMA per quarter.

affect the price level of single-detached dwellings.<sup>15</sup> We also have data on the price of single-family homes for almost all Ontario municipalities. We will now investigate the effect on single-family house prices due to five potential barriers (see Table 2 for a summary of the average and worst municipality in Ontario on each metric, and Box 1 for a description of each item):

- the share of single-detached-dwelling building permits that require a zoning review;
- the average development charge levied on a single-detached dwelling in a municipality;
- the share of each municipality's land that is zoned for agriculture;
- the share of each municipality's land that is designated for the Greenbelt; and
- whether a municipality is subject to the Growth Plan for the Greater Golden Horseshoe.

15 Our analysis focuses on single-detached house prices. We do not have price information on condominiums in a sufficient number of cities to conduct a similar analysis. We do an additional test of the effect of supply restrictions on aggregate housing prices and report the results in the appendix. The results are largely similar.

**Table 2: Regulatory and Development Performance of Ontario Municipalities**

	Zoning review requirement rate	Average development charge	Agricultural share	Greenbelt share
Highest large-city value	82% (Toronto)	\$66,380 (Vaughan)	49% (Hamilton)	80% (Caledon)
Province-wide average	34%	\$31,367	33%	38%
Years data reported	2013–16	2012–16	2005–13	2005
Number of municipalities reporting (province-wide)	286	95	298	97

Source: Authors' calculations from Ontario Ministry of Municipal Affairs data. Note: Agricultural and Greenbelt share is only for municipalities subject to the Growth Plan for the Greater Golden Horseshoe. Large-city values are only from municipalities with 50,000 residents or more within the area subject to the Growth Plan for the Greater Golden Horseshoe. Province-wide average is weighted by population of municipality.

To assess the economic cost of these policies, we calculate the relationship between the price of single-detached dwellings in each lower- and single-tier municipality in Ontario and the municipality's development cost and regulatory performance on each of these metrics. We use the average of each municipality's regulatory and land-use policies listed above for all years and compare that to 11 years of housing prices for that municipality from 2005 through 2016.<sup>16</sup> This regression analysis allows us to isolate how much prices in a municipality respond to, for example, what share of building permits must go through a lengthy zoning review or are subject to high development charges, while holding constant other characteristics of that municipality, such as the

income of its residents or the share of land dedicated to agriculture. See the appendix for details.

### *The Regulatory Causes of High Housing Prices in Ontario Municipalities*

The first step to assessing the effect of supply constraints is to control for factors that would influence the demand for housing. We control for annual income and annual household growth in each municipality and for other metropolitan area- and year-specific factors. We find a relationship between increasing development costs and delays and land-use limitations that leads to an increase in the overall cost of single-detached dwellings. Restrictions on building new homes ripple through

16 Our method follows that of Hilber and Vermeulen (2016), who show the effect of development and planning policies on house prices in the United Kingdom. They also include an instrumental variable technique to control for potential reverse causality such that zoning and development charges make a municipality more desirable or that people build higher quality houses, which then causes demand to rise compared with areas with less zoning. Because they find that the results of development policy are the cause of higher house prices, and not the reverse, we do not replicate their instrumental variable approach.

### Box 1: The Predicted Effects of Ontario-Specific Supply Constraints on Housing Prices

The Ontario Building Code specifies that once a developer submits an application for a single-detached dwelling that fits the existing zoning and applicable laws of a municipality, the municipality must either approve or reject it within 10 days. If a developer or a municipality believes a building permit application might not meet local zoning requirements, these permit applications are placed into a separate stream that is not subject to any time limit. Toronto has the highest share of permit applications subject to this review (82 percent, compared to 27 percent in the rest of the GTA), and projects in this category undergo an extensive project review. A municipality with an above-average number of housing developments subject to a review process is likely to see higher home prices.

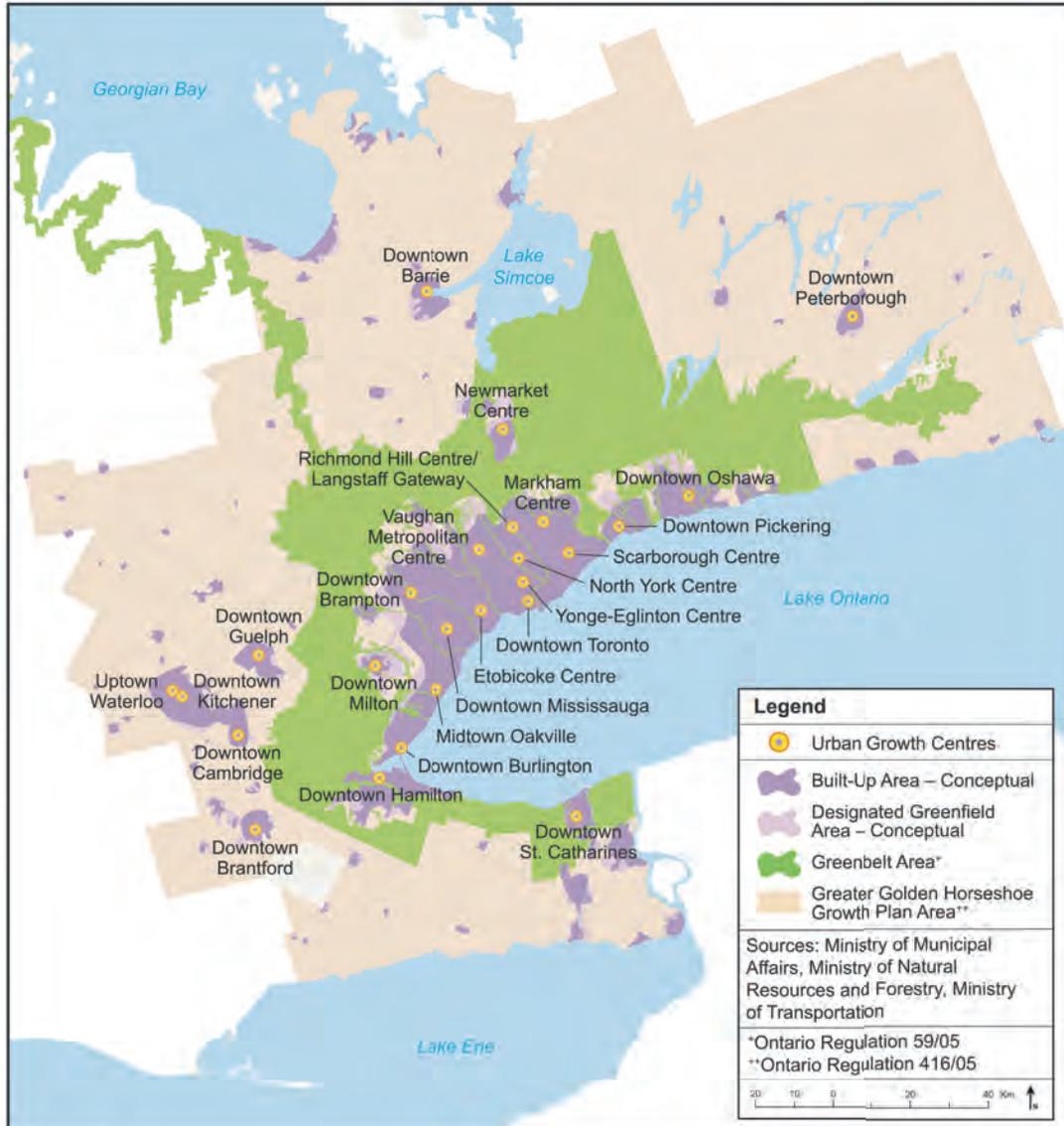
Most major single-, upper-, and lower-tier municipalities levy a development charge on the developers of new buildings. We calculate the average combined development charge rate, which was in excess of \$66,000 in Vaughan, compared to around \$31,000 for the other 94 municipalities that levy a development charge; in many other places, there is no development charge. As Dachis (forthcoming) reveals, a number of studies around the world show that higher development charges increase the price of housing.

Most Ontario municipalities track the amount of land within their municipal boundaries which has been zoned for agriculture. When municipalities have a large share of land dedicated to agriculture (such as Hamilton, which has about half of its land zoned for agriculture), less land is available for greenfield housing construction (construction on undeveloped land, which is usually former agricultural land). The resulting shortage of land leads to increases in home prices. It often takes many years even to attempt to rezone land designated for agriculture into land available for new housing. The uncertain and long rezoning process means that municipalities with a large share of land zoned for agriculture will likely see high house prices.

The province of Ontario created the Greenbelt surrounding existing development in the GTA in 2005. The Greenbelt extends from the Niagara Region to surround the majority of the existing development to the North and East (Figure 3). New development on Greenbelt land is heavily restricted. The Greenbelt includes both agricultural land and park space and represents as much as 80 percent of the area of the town of Caledon and 38 percent for the average Ontario municipality.

In addition to the Greenbelt, the province of Ontario also has growth plans that apply to municipalities both inside and outside of the Greenbelt (the beige shaded area of Figure 3). Municipalities in these regions are required to approve a certain share of their homes within existing urban development boundaries (the dark purple areas of Figure 3), and new developments outside the existing growth boundaries must be of a certain density (see Ontario 2017). Starting in June 2009, municipalities subject to the Growth Plan for the Greater Golden Horseshoe were allowed to approve new developments outside their existing urban growth boundary only if the new developments met a densification target of at least 50 jobs or 50 residents per hectare. In addition, municipalities had to meet an intensification target that 40 percent of all new approvals needed to be within the existing urban growth boundary. The province recently released a revised Growth Plan that will increase the densification target to 80 jobs or 80 people per hectare and require 60 percent of new development to be within existing growth boundaries (Ontario 2017). We expect the Growth Plan to have the largest effect on house prices in municipalities that have a large amount of land zoned for agriculture.

Figure 3: The Greenbelt and Growth Plan for the Greater Golden Horseshoe



Source: Ontario Ministry of Municipal Affairs

the entire market, making the average existing home – not just new homes – in each municipality more expensive for the following reasons (after holding other possible policies and differences across cities constant; see Appendix Table 1, column 4).

- A municipality that puts all homes through a zoning review would make single-detached homes 5 percent more expensive than a municipality that did so for none.<sup>17</sup>
- Every 10 percent increase in development charges on a new single-detached dwelling results in homes increasing in price by 0.45 percent.<sup>18</sup>
- A municipality with half its land in the Greenbelt would have 14 percent higher prices than a municipality with no land in the Greenbelt.<sup>19</sup>
- A municipality subject to the Growth Plan with half its land zoned for agriculture would have home prices about 6 percent higher than a municipality with the same share of land zoned for agriculture not subject to the Growth Plan.
- A municipality subject to the Growth Plan with half its land zoned for agriculture would have homes 6 percent more expensive than a municipality also subject to the Growth Plan with no land zoned for agriculture.<sup>20</sup>

These specific policies directly influence housing prices on their own. Taken together, what do these results mean in practice for major Ontario municipalities? We estimate how much single-detached dwelling prices would fall if each municipality that had above-average barriers to supply lowered them to the current provincial

average (as reported in Table 2). For example, Toronto requires that over 80 percent of all building permits go through a zoning review. We estimate what the change in prices would be if it – along with every other municipality with an above-average zoning review rate – required reviews only at the provincial average rate of 34 percent. Similarly, Vaughan requires, on average, over \$66,000 in development charges. We show what the change in housing costs would be if development charges there – along with other cities with high development charges – were around the current provincial average of \$31,000.

We estimate the effects for the cities of Ottawa, Toronto, and Hamilton and for individual GTA lower-tier municipalities, then create a region-wide weighted average for Durham, York, Peel, Halton, and Niagara regions (Table 3).<sup>21</sup> Cutting development charges to the provincial average would have the largest effect in York and Peel regions, reducing single-detached home prices by around \$78,000–\$52,000. One of the single largest increases in single-detached home prices due to regulations is in Toronto, because of its high rate of subjecting single-detached building-permit applicants to a zoning review. Cutting the zoning review rate to the provincial average would reduce single-detached home prices in Toronto by \$27,000. The total benefit of reducing development and zoning costs by half would be an over \$80,000 reduction in single-detached dwelling prices in York Region and nearly \$75,000 in Toronto.

17 While economically significant, this result is not statistically different from zero in our main results, falling just short of statistical significance at the 10 percent level.

18 This conclusion assumes that interest rates for a conventional mortgage are at 4.5 percent. It results from an interaction variable produced by interest rates and the development charge in each municipality. See the appendix for details.

19 We do not include the Greenbelt around Ottawa.

20 This analysis is based on an interaction of the Growth Plan with the share of land in each municipality that is zoned for agriculture. See the appendix for details.

21 We weight the totals from each lower-tier municipality by its 2016 stock of single-detached dwellings.

**Table 3: The Effect on Single-Detached Dwelling Prices from Reducing Development and Zoning Costs and Delays**

Region	2016 average single-family dwelling price	Reduction in price if municipalities ...		Total reduction in costs	Price with restrictions reduced	Restrictions as share of SFD price
		Had provincial average development charges	Had provincial average zoning approval rate*			
	<i>Actual price</i>	<i>Reduction in price</i>			<i>Predicted price</i>	<i>(percent)</i>
Durham Region	554	-27	-3	-29	525	5
York Region	969	-78	-3	-81	888	8
Toronto	943	-47	-27	-74	869	8
Peel Region	714	-52	0	-52	662	7
Halton Region	771	-49	-3	-52	719	7
Hamilton	436	-13	0	-13	423	3
Niagara Region	319	-2	-1	-4	315	1
Waterloo Region	414	-9	0	-9	405	2
Rest of GGH	393	-8	-3	-11	382	3
Rest of Ontario	291	-2	-1	-2	289	1

Source: Authors' calculations from Ontario Ministry of Municipal Affairs, RPS, and Statistics Canada data. Note: Approval rate is not statistically significant at the 10 percent level.

We estimate the effect if municipalities increased the amount of land available for development to be in line with the average municipality in the province. We also estimate the effect if each city lowered the amount of agricultural and Greenbelt land to the provincial average, and without being subject to the Growth Plan (Table 4). In Niagara Region and Hamilton, for example, municipalities have a large share of land zoned for agriculture. Allowing development on a portion of land in a municipality dedicated for the Greenbelt could reduce single-detached dwelling prices by around

\$50,000 in Hamilton and around \$25,000–\$30,000 in York and Halton regions. Loosening the restrictiveness of the Growth Plan would have the greatest effect on municipalities with a large share of land zoned for agriculture: over \$20,000 in Hamilton and in the Durham and Niagara regions. Zoning, not necessarily developing, more of the agricultural land in a municipality to make it available for residential use – while keeping the size of the Greenbelt constant – would reduce home prices by as much as \$15,000 in Hamilton and \$13,000 in Niagara Region and other parts

**Table 4: The Effect on Single-Detached Dwelling Prices from Reducing Greenfield Land-Use Restrictions**

Region	2016 average single-family dwelling price	Reduction in price if municipalities ...			Total reduction in costs	Price with restrictions reduced	Restrictions as share of SFD price
		had provincial average share of land in Greenbelt*	were not subject to Growth Plan	had provincial average share of land zoned for agriculture*			
	<i>Actual price</i>	<i>Reduction in price</i>				<i>Predicted price</i>	<i>(percent)</i>
Durham Region	554	-16	-23	-6	-45	510	8
York Region	969	-30	-14	-1	-44	925	5
Toronto	943	0	0	0	0	943	0
Peel Region	714	-8	-7	-2	-17	698	2
Halton Region	771	-26	-13	0	-39	732	5
Hamilton	436	-49	-27	-15	-91	345	21
Niagara Region	319	-12	-20	-13	-45	274	14
Waterloo Region	414	0	-14	-9	-24	391	6
Rest of GGH	393	-2	-16	-13	-31	362	8
Rest of Ontario	291	0	0	-2	-3	289	1

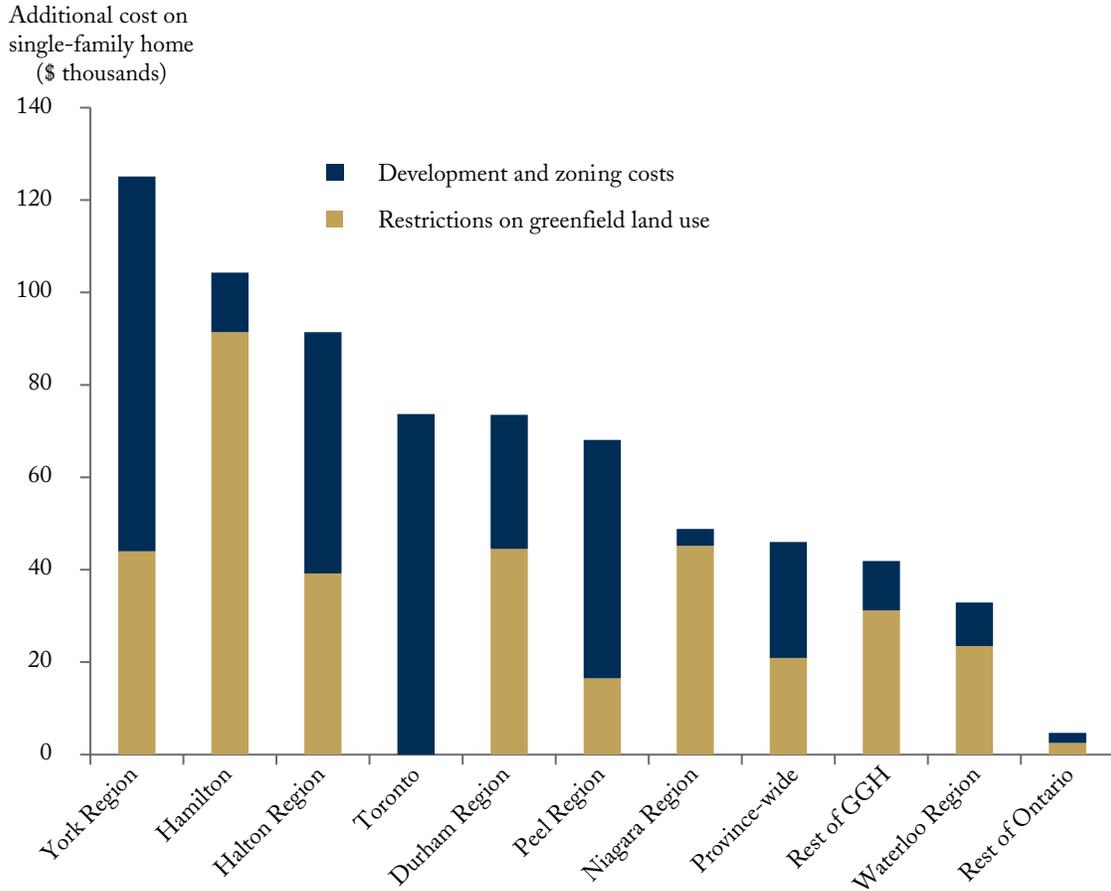
\* Approval rate is not statistically significant at the 10 percent level.

Source: Authors' calculations from Ontario Ministry of Municipal Affairs, RPS, and Statistics Canada data.

of the Greater Golden Horseshoe beyond the Greenbelt. Increasing the amount of land available for development and relaxing the Growth Plan would have the greatest effect in outlying areas of the Greater Golden Horseshoe. Taken together, loosening restrictions on land availability for new single-detached housing could reduce home prices by \$90,000 in Hamilton and around \$45,000 in the Durham, York, and Niagara regions.

A modest increase in land availability for housing development, along with cutting development and zoning costs to the provincial average, would reduce the price of single-detached housing by over \$70,000 in Toronto and the Peel and Durham regions, \$90,000 in Halton Region, over \$100,000 in Hamilton, and nearly \$125,000 in York Region (Figure 4). Province-wide increases in housing costs are due about equally to restrictions on land

**Figure 4: Potential Cost Savings from Reducing Barriers and Costs to Single-Detached Housing in Ontario**



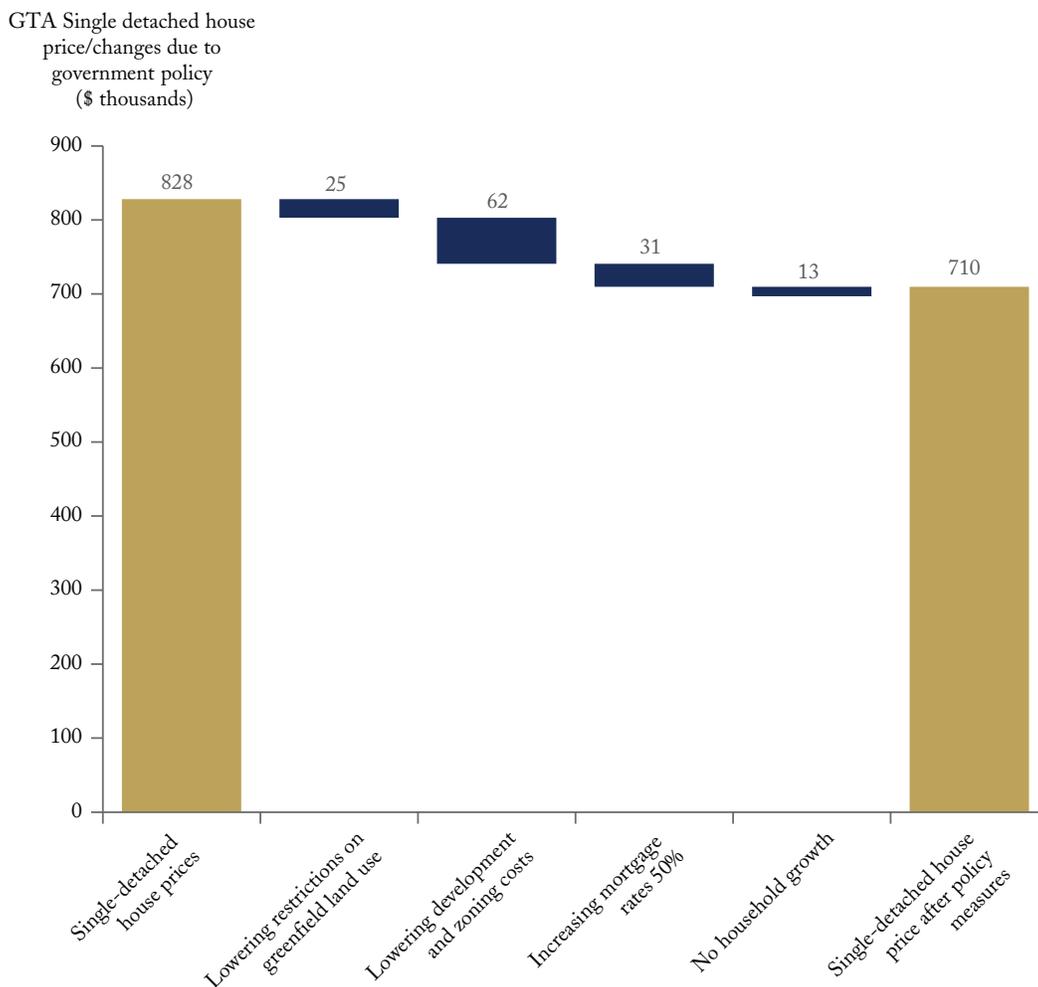
Source: Authors' calculations from Ontario Ministry of Municipal Affairs, RPS, and Statistics Canada data.

development and development costs and delays, for a total cost of \$45,000.

What are the total economic costs of these restriction policies? Multiplying the provincial average restriction by the total stock of single-detached homes produces staggering totals. The largest total benefit would come from reducing development charges, which would reduce the total cost of housing in the province by \$57 billion. Relaxing the Growth Plan and opening up a

portion of the Greenbelt would each have the second-largest benefit of \$21 billion in savings. Altogether, reducing regulatory and development burdens province-wide as outlined in Tables 3 and 4 would reduce the cost of single-detached dwellings by a total of \$123 billion. Policymakers should weigh these costs on housing against their potential benefits, to determine if the regulations they have put in place, such as the Growth Plan and zoning, pass a cost-benefit test.

**Figure 5: Impact on GTA Housing Prices from Supply Restrictions and Interest Rates**



Source: Authors' calculations from Ontario Ministry of Municipal Affairs, RPS, Statistics Canada, and Bank of Canada data. GTA municipalities are those in Toronto and in Halton, Peel, York, and Durham regions.

*The Relative Cost of Supply Restrictions Versus Demand Stimulus*

What are the relative effects of supply restrictions compared to other possible demand drivers of higher house prices? The average cost of a single-

detached dwelling in municipalities in the GTA in 2016 was \$828,000 (Figure 5).<sup>22</sup> The policies of municipal governments in the GTA and the province have resulted in prices that are, on average across the region, \$25,000 higher because of restrictions on land use and \$62,000 higher because

22 The City of Toronto and Durham, York, Peel, and Halton regions.

of above-average development costs and delays. One of the main questions for policymakers is how much home prices have been inflated through higher demand due to the low interest rates that have been in place since 2008 (Head and Lloyd-Ellis 2016). Policymakers will want to know what the likely effect of an increase in interest rates will be on the broader economy, with housing costs being the main channel (see Kronick 2017). Similarly, some cities have seen a large influx of households, driving up prices.

We add interest rates to the analysis used above to determine, in an admittedly rudimentary way, the effect the chartered bank conventional five-year mortgage rate had on house prices in any given year.<sup>23</sup> We find, as expected, that house prices go down as mortgage rates increase, reflecting lower demand for housing (Figure 5).<sup>24</sup> We take our estimated relationship between house prices and mortgage rates and ask what the hypothetical price response in the Ontario market would be if mortgage rates increased by 50 percent. With mortgage interest rates averaging 4.7 percent in 2016, we therefore examine the effect on house prices if mortgage rates increased by 2.3 percentage points, reaching 7 percent – a level last seen before the 2008 recession. We find that such a rate increase would decrease the value of single-detached dwellings by \$31,000. If cities across the GTA had no household growth instead of their annual average growth over the last three years, house prices would be \$13,000 lower. This rough estimate

shows the relative importance of supply restrictions on the price of housing. Even a dramatic increase in interest rates and a fall in household growth would not have the same effect as reducing supply barriers (such as cutting development charges or zoning requirements) in reducing the cost of single-detached housing.

## POLICY RECOMMENDATIONS

Municipalities and provinces across Canada can take steps to reduce the economic cost of restrictions on new building. Among other steps discussed in more detail elsewhere (Clayton 2015), the three obvious steps are to reduce zoning barriers, remove water and wastewater services from development charges (replacing them with a utility-based fee-for-use model), and to ease restrictions on greenfield housing development.

### Reduce Zoning and Approval Barriers

Why does the City of Toronto have the highest zoning review rate? Although Toronto amalgamated its six constituent municipalities in 1998, it has not yet fully updated the specific zoning rules that lay out the allowable height or density on any given piece of land, nor has it updated some zoning bylaws since the 1950s (Tuckey 2017). These outdated zoning regulations mean that new developments are contrary to the existing zoning bylaws, necessitating a lengthy and costly zoning review. Outdated zoning bylaws would make

23 We have only the annual averages of interest rates. Other writers, such as Glaeser, Gottlieb, and Gyourko (2010), investigate the effect of interest rates on US house prices using a longer time series going back to 1975, with more variation in interest rates than in the period we study. They find that interest rates explain one-fifth of the rise in US home prices from 1996 to 2006.

24 Because we are using house prices reported on an annual basis, we take the annual average of the interest rate on the typical five-year conventional mortgage that the Bank of Canada reports on a monthly basis: [https://www.bankofcanada.ca/wp-content/uploads/2010/09/selected\\_historical\\_v122521.pdf](https://www.bankofcanada.ca/wp-content/uploads/2010/09/selected_historical_v122521.pdf). We interact the annual average of the interest rate with each municipality's income level that year. That provides for variation across municipalities in the interest rate and is an additional right-hand side variable in the regression presented in the appendix.

infill development, similar to single-detached housing, difficult to approve in neighbourhoods that have zoning permitting only very low-density housing. Ontario municipalities, and Toronto in particular, should update their zoning bylaws to match local regulations with official plans that lay out municipal-wide objectives. In addition to reducing the length of the zoning review process, municipalities can adopt better approval practices, such as allowing electronic permit applications (rather than requiring paper filing) or using external professionals as well as municipal staff to review building permits (Duong and Amborski 2017).

Toronto frequently uses a clause in the *Planning Act* – the legislation governing municipal zoning policy – that allows it to require additional payments from developers in exchange for a site-specific variance from zoning bylaws (Moore 2018). These additional payments, known as Section 37 payments for the relevant part of the *Act*, increase uncertainty for developers and therefore increase the cost of housing. Municipalities may also have an incentive to keep zoning bylaws out of date – necessitating more project reviews – because updating them would take away future Section 37 payments. The province should place greater restrictions on the use of Section 37 of the *Planning Act*, so municipalities would have a greater incentive to set more appropriate zoning regulations. While amenities increase the value of housing, requiring developers to finance them results in homebuilders paying upfront for these kinds of services. A better solution, discussed in more detail below, is to finance municipal amenities over the life of the service.

Vancouver has a similar zoning problem to Toronto's. Outdated zoning restricts the ability of developers to build more homes in existing neighbourhoods. Municipalities negotiate with developers to provide "Community Amenity Contributions" when a development proposal exceeds zoning bylaws (Davidoff 2016, 2017). As in Toronto, the solution is to update zoning laws and then allow

developers to build without additional approval whatever suits the market within those rules.

### Reduce Development Charges

Developers pay development charges to compensate municipalities for the cost of building municipal infrastructure that services homes and commercial properties in a newly developed area (Dachis, forthcoming). Development fees are politically popular because they are portrayed as money paid by profitable developers rather than by homeowners, who have little appetite for increased property taxes.

The largest single component of these charges – ranging from 20 percent of total charges in Toronto, Ottawa, and other cities to over half in many suburban GTA areas – is for water and wastewater construction. It would be better to charge for these services based on actual end use, as is common in electricity and natural gas, instead of through up-front fees. Only if cities charge the full cost of both annual operations and construction through gradual depreciation of assets will consumers pay the full cost of water assets. When customers pay the full cost of using an asset on a life-cycle basis, they are making the choice of consuming the right amount of water every time they turn on the taps or flush their toilets. Water prices on end use are too low in many places, partly because of municipal reliance on capital financing from development charges. Removing development charges for water and wastewater and charging consumers only on end use would better reflect the full use of water, leading to less overconsumption of water as well (Ecofiscal Commission 2017). Eliminating these water and wastewater development charges would amount to a reduction in development charges similar to what we estimate above for many cities, making this suggestion a realistic approach to reducing the cost of housing. House prices would decrease by the extent to which households place

a discounted value on the future costs of higher water fees, as opposed to paying upfront for these costs with development charges.

Many of the costs of other municipal services covered by upfront development charges are not amenable to user fees. For example, police and fire services are often a part of development charges. However, there is no need for governments to charge for these services upfront. If these services benefit the entire municipality, new residents in newly constructed houses should pay for these services with property taxes at the same rate as existing residents. If there are some benefits that are specific to the new area, cities can finance these services either with area-specific property taxes or by creating special-purpose bodies that provide services to the new neighbourhood and can collect revenues only from residents of the new area.

### **Review Restrictions on Greenfield Housing Development**

Developers usually build greenfield single-detached residential development on what was previously agricultural land. However, developers in GTA municipalities are facing a shortage of land available for new housing development (Clayton 2015). The primary cause is not the Greenbelt, but because suburban municipalities are not enabling development on land between the existing urban boundary and the Greenbelt. This result is consistent with the data in Table 4, showing that municipalities with a high share of land zoned for agriculture in cities subject to the Growth Plan have higher housing costs.

The densification and intensification measures in the provincial Growth Plan likely explain the lack of development on land between existing urban areas and the Greenbelt (see Box 1 for details). These policies limit the availability of land for residential development, increasing the cost of

homes (as shown in Table 4). Further, these targets may not be appropriate across all cities subject to the Growth Plan because they all have different intensities of existing residential developments and many will face challenges in meeting these targets (Malone Given Parsons 2017). Density targets in areas with access to nearby transit may be sensible but may not be cost effective across the entire area currently subject to the Growth Plan. As such, they should be easily relaxed in cases where they are not sensible.

Finally, the province should review the costs, as shown in Table 4, as well as the benefits of preserving or expanding the Greenbelt around the GTA. While some of the Greenbelt is parkland open to the public, much of it is agricultural land that has more in common with industrial land than green space. A UK study (Cheshire and Sheppard 2002) found that the value people place on the visual amenity of inaccessible Greenbelt space, such as agriculture, was much less than their value of accessible Greenbelt park space (in 2015 Canadian dollars, \$3,300 versus \$8,000). In addition, UK Greenbelt policies were regressive in that high-income households were able to enjoy Greenbelt space, but low-income urban residents, often without vehicles, did not have access to the Greenbelt but paid the cost of the Greenbelt through higher home and rent prices. More recent studies have shown that UK Greenbelts have no amenity value beyond the owners of homes within the Greenbelt area, and that even those who lived near the Greenbelt put no value on living close by (Gibbons, Mourato, and Resende 2011). The net result of a cost-benefit analysis may show that the greatest net benefit comes from expanding the Greenbelt while allowing more development on land closer to the existing urban boundary. That goal can be accomplished by loosening the intensity and density target of the Growth Plan.

## CONCLUSIONS

Restrictions and extra costs on building new housing – such as zoning regulations, delays on permit approvals, development charges, and limits on greenfield housing development – are dramatically increasing the price of housing, by over \$100,000 in some Ontario municipalities. More generally, barriers to development on housing, which is the overall gap between the cost of building new housing and the market price, are also substantial in a number of areas in British Columbia and across the Greater Toronto Area. Municipal governments and provinces should enable more housing construction by taking steps such as easing restrictions on developing agricultural land, simplifying and updating zoning bylaws, and reducing development charges.

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## APPENDIX

### Barriers to Land Development

For our analysis at the Census Metropolitan Areas (CMA) level, we use the sale prices of single-detached new dwellings compiled by the Canada Mortgage and Housing Corporation (CMHC). The CMHC data allow us to isolate the average market price of new housing units – a price that is directly comparable to the average cost of construction of new housing in the same CMA.

Glaeser and Gyourko (2017) estimate the cost of barriers to construction for each city as the market price of housing (P) minus the Minimum Profitable Production Cost (MPPC), with both expressed in per square foot terms. The MPPC is  $MPPC = (CC + L) * EP$ , where CC is the cost of construction, L is the cost of acquiring land, and EP is the margin that developers earn as profit.

For construction costs, we use the value of building permits and number of new units created for single-detached dwellings by CMAs for the same period set out in Statistics Canada Cansim Series 026-0001. Statistics Canada reports building permit value from the CMA-wide total of its monthly Building and Demolition Permit Survey. Permit value is defined by Statistics Canada as “the value of the construction project as reported by the permit applicant or as estimated by the municipality.” This value does not include renovation costs. This permit value closely reflects the structure construction cost.<sup>25</sup> We also compared our data to those from the Altus Group (2017), which produces cost per square foot ranges for simple, single-detached wood-frame houses for nine CMAs. Those cost data are based exclusively on hard construction costs, assuming average quality finishes, and exclude regulatory costs. In all cases, our construction costs are higher than the high end of that range – meaning, if we are overestimating construction costs, we are underestimating the cost of land access. We conduct our analysis on a per square foot basis to make the construction cost comparable to the market-price value. We assume that new construction homes have the same average living space as existing single-detached homes as reported in Real Property Solutions (RPS) data. We collected average square foot size of existing single-detached dwellings in each CMA from RPS of all homes from 2007 to 2016. We compared the data for existing homes to less comprehensive data provided at a provincial level of the size of new homes from 2012 to 2014, as compiled by the Canadian Home Builders’ Association (2012, 2013, 2014) from a survey of homebuilders. The square footage amounts are similar, giving us confidence in using the more detailed square foot data from RPS.

We are required to make assumptions for the remaining terms of L and EP. Glaeser and Gyourko (2017) use “an industry rule of thumb that suggests land values are no more than 20 percent of the sum of physical construction costs plus land in a relatively free market with few restrictions on building.” They state that this measure is based on an ad hoc survey of home builders and is one that has held true for

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25 Ontario cities provide more detail on how they report construction value for the Ontario Ministry of Municipal Affairs Financial Information Return. The filing manual states: “The total value of construction activity is the hard construction or demolition cost, including: All general construction, labour and equipment; plumbing, heating and air conditioning; elevators and other building services and systems; site services and landscaping inside the property line; contractor’s overhead and profit; and provincial sales tax. These costs will approximate a construction tender in most cases. The value of construction should not include: Cost of land, professional design fees; soft costs, such as financing, marketing, legal, appraisal, surveying, soil testing or remediation, development charges; furnishings and process equipment housed in the building; and allowances.” See <https://efis.fma.csc.gov.on.ca/fir/Instructions/FIR2016%20S80D.pdf>.

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nearly a decade since some of their original work. Vacant land sales are also rare in Canada. MCAP (2017) provides an estimate of lot values for a series of locations across Toronto. Between 2015 and 2017, land prices in all parts of Toronto were never above 20 percent of the total cost of housing, usually ranging around 10 to 15 percent. Further, land prices beginning in 2012 (when MCAP began this time series) show that land prices were flat or declining from then to 2015 in most of Toronto. By using the 25 percent assumption of land costs, we are perhaps understating those costs.

Glaeser and Gyourko (2017) calculate, without explaining how, gross margins (EP) by implying them from the overall rates of return from developers of between 9 to 11 percent. From that, they estimate gross margins of 17 percent. Industry Canada data on residential construction profitability provide conflicting perspectives of whether Canadian developers are more or less profitable than those in the United States.<sup>26</sup> On the one hand, the average rate of return in Canada for residential construction in 2015 (the latest year of data) appears to be lower, with profits representing 7.4 percent of total revenues – lower than in the United States. On the other hand, Industry Canada estimates that gross margins were 33.5 percent – higher than in the United States. Taken together, these differing results suggest no clear reason to deviate from the Glaeser and Gyourko (2017) assumptions. However, in a sensitivity test, we find that if we use the 33.5 percent rate of return, it does not change results dramatically. Doing so lowers our price-to-cost gap by only 13 percent in Vancouver and Abbotsford, BC.

### Ontario-Specific Analysis

For our analysis of the effect of specific housing regulations on the level of the price of housing, we start with data from the Ontario Financial Information Return (FIR). We use information from Schedule 80D from 2014 through 2016, which was Schedule 92 in previous years, to collect information on land use, the share of building-permit applications that require additional zoning approval, and permit approval times. We use Schedule 62 to collect information on development charges. Because many municipalities have multiple development charges that apply in different parts of the municipality and for different services, we create a single total development charge amount based on the average reported total figure from the sum of the lower- and upper-tier total development charges. For municipalities that do not report a development charge, we assume they do not levy one. Because it takes time for a policy-induced supply constraint to affect house prices, we take the average over all years for each of the policy variables we use as controls in our regression (see Table 2 for information on the years and number of municipalities that report data for each variable). Our approach follows that of Hilber and Vermeulen (2016), who take the average jurisdiction-specific rejection rates and development rates of their sample of English cities.

We use Geographical Information System software to estimate the share of each Ontario municipality's land that is within the Greenbelt, based on maps from the Ministry of Natural Resources as well as municipal government (Census Subdivision) maps from Statistics Canada. In all, 97 Ontario municipalities have some of their land in the Greenbelt. We assume that other municipalities have no land subject to the Greenbelt. We also find a large degree of reporting error among cities in regard to the share of each municipality's land that is zoned for agriculture. We take the most common entry for the total hectares of land zoned for agriculture in the municipality and use that amount in place of either

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26 See <https://www.ic.gc.ca/app/scr/app/cis/performance/2361>.

missing values or when the amount of agricultural land deviates by more than 20 percent from the most commonly reported number for the municipality. A similar year-over-year change in land development is unlikely to occur.

We merge the data from the FIR with Statistics Canada data at the CMA or Census Agglomeration (CA) level for employment income. Nearly half the municipalities fall into the broad “non-CMA/CA” category, covering 1.1 million people as of 2016. There are 42 other CMAs, ranging in size from Toronto as the largest, with a population of over 6 million, to those with just over 10,000 people – such as Hawkesbury, Elliot Lake, or Ingersoll. Some CAs and CMAs do not have employment income data for all years. To estimate income for those affected municipalities, we assume that income changed in that CA or CMA at the same rate as the rest of the province relative to the first year in which we have income data for the CMA. As of our publication date, Statistics Canada has also not released income data for 2016 at the CMA level. We use provincial-wide employment income from Cansim Table 384-0002 and assume that the year-over-year growth in income is the same across the province, and we apply that growth rate to each CMA’s 2015 income level. We take the log of each year’s employment income and include that as a control in all our regressions.

In our final step, we merge our FIR and Statistics Canada data with single-detached house price data available at the individual municipality level from RPS, which provides price data for nearly every municipality with a population over a few thousand people. We have sale price information both for single-detached housing and the aggregate price of housing in each municipality for every year since 2005. This information allows us to test the effect of supply barriers, using the average annual price for each year from 2005 through 2016.

In our regression analysis, our dependent variable is the natural logarithm of the price of single-detached housing. In all regressions, we control for the income in the CMA, whether the municipality is rural or urban (according to RPS), as well as for CMA/CA fixed effects. Following Hilber and Vermeulen (2016), our regression equation in its simplest form is as follows:

$$\log(P_{icmt}) = B1_{icm} \bar{x}_{icmt} + B2_m e_{mt} + B3r_t + u_t$$

$P_{icmt}$  is the price of single family housing (which we take in log form) in year  $t$ , in municipality  $i$ , which is a subdivision of Census Division  $c$ , which is located in a Census Metropolitan Area/Agglomeration  $m$ . All our regressions have controls for each year  $t$  and Census Metropolitan Area/Agglomeration  $m$ . Our policy variables  $x$  are the average over all periods  $t$  over every year in which the municipality  $i$  reports data. Taking the average of policy variables allows us to eliminate some of the endogeneity of the effect that higher prices may have on the desire to introduce stricter land-use control. Such averaging means we cannot include controls for each municipality  $i$  to reflect municipality-specific fixed effects. Some policy variables, such as development charges, are partially set by the upper-tier government, which is the same definition as the Census Division  $c$ . We also include controls of employment income  $e$  in each Census Metropolitan Area/Agglomeration  $m$  in each year  $t$ . We also control for the Canada-wide interest rate  $r$  in each year  $t$ . All time series variables are stationarity in differences. These same variables are cointegrated and, as such, we run the regression in log-levels.

In the first two regressions, we exclude the Census Division controls. In the third, fourth, and fifth regressions, we also include controls for the 48 Census Division in which each municipality is located. However, as many of our control variables, such as the application of the Growth Plan, vary only at the Census Division level, in the second, fourth, and fifth regressions we use an interaction variable of the

Table A1: Detailed Regression Results Without Income Interaction

Dependent Variable	Price of Single-detached Swelling (log)				Aggregate Home Price (log)
	(1)	(2)	(3)	(4) preferred specification	(5)
Municipality is rural	-0.0952** (-2.73)	-0.0952** (-2.74)	0.122* (1.88)	<b>0.122*</b> <b>(1.88)</b>	0.106* (1.81)
Log of employment income in CMA – annual	-0.229 (-0.32)	1.214** (2.33)	1.234** (2.18)	<b>1.196**</b> <b>(2.26)</b>	1.330** (2.37)
Annual household growth rate	0.103** (4.29)	0.102** (4.33)	0.0602** (3.28)	<b>0.0585**</b> <b>(3.20)</b>	0.0532** (2.88)
Average days to approve single-family home	0.0000108 (0.01)	0.0000102 (0.01)	0.000663 (0.77)	<b>0.000665</b> <b>(0.77)</b>	0.000249 (0.26)
Average share of house permit applications requiring rezoning	0.162** (5.60)	0.162** (5.60)	0.0534 (1.52)	<b>0.0534</b> <b>(1.52)</b>	0.0465 (1.20)
Share of municipality's land zoned agriculture	0.00401 (0.08)	0.00455 (0.09)	0.0628 (0.91)	<b>0.0635</b> <b>(0.91)</b>	0.0608 (0.78)
Maximum combined upper- and lower-tier DC for 2012-2016 (thousand - log)	0.0640** (6.69)	0.136** (3.93)	-0.00407 (-0.25)	<b>0.0681**</b> <b>(2.12)</b>	0.0469 (1.53)
Share of land area of city in Greenbelt	0.194** (2.18)	0.194** (2.17)	0.273 (1.29)	<b>0.273</b> <b>(1.29)</b>	0.290 (1.45)
Indicator if city is subject to Growth Plan	-0.0918 (-1.54)	-0.0919 (-1.54)			
City subject to Growth Plan times share of land zoned agricultural	0.160 (1.58)	0.160 (1.58)	0.128* (2.02)	<b>0.127*</b> <b>(2.00)</b>	0.182** (2.33)
Distance of centre of municipality to downtown Toronto (km)	-0.000634** (-26.07)	-0.000633** (-26.23)	-0.00253** (-3.04)	<b>-0.00253**</b> <b>(-3.04)</b>	-0.00253** (-4.12)
Interest rate times annual average combined upper- and lower-tier DC for 2012–16		-0.0127** (-2.04)		<b>-0.0127**</b> <b>(-2.03)</b>	-0.0084 (-1.44)
Log of income times interest rate		-0.168** (-3.11)	-0.215** (-3.37)	<b>-0.167**</b> <b>(-3.11)</b>	-0.207** (-3.45)
Other controls	Census Division: (3) – (5), year, CMA/CA				
Observations	2974				

Source: Authors' calculations from Ontario Ministry of Municipal Affairs, RPS, and Statistics Canada data. All models include year fixed effects and CMA and CA indicators. Note: t-statistic in brackets using cluster robust standard errors at the Census Metropolitan Area level. \*  $p < 0.10$ , \*\*  $p < 0.05$ .

interest rate in a given year with each municipality's development charge. For example, development charges are largely determined by upper-tier governments, which are also the boundaries of Census Divisions. Specifically, the average effect of development charges on house prices is inferred from the interacted coefficient and the estimated interest rate coefficient, which is itself derived from the interacted effect of municipal income and interest rates. In the above regression equation, that would represent  $r_i^* \times icmt$  for the development charge variable. The results in the main text reflect development charges on house prices, given the interest rates that were in effect in 2016. We add a variable that measures the distance of each municipality's geographical centre to downtown Toronto.

We also include the annual rate of growth of the number of households in each municipality. Not all municipalities report household numbers every year in the FIR. In those cases, we calculate an annualized growth rate using household numbers that are two or more years apart and assume that the household growth was the same for all years with missing values.

In addition to the policy variable presented in the tables in the main *Commentary*, we also include a variable of the length of time that cities take to approve simple permits. This variable appears to have no economic or statistical relationship with house prices. That is likely because the specific process that this timing metric measures is only a small portion of the overall length of the approval process and applies only to a portion of permits that meet existing zoning regulations.

We conduct our analysis of the Growth Plan by using an interaction variable with the share of land that is zoned as agricultural. The interpretation of the results is to add the coefficients together

depending on both the effect of agricultural land on its own (a minor effect), plus whether the municipality is subject to the Growth Plan and an additional effect of agricultural land share if the municipality is subject to the Growth Plan. When we present estimates that include an interaction variable, we are also including the effect on its own of the variable that is not changing, such as income.

In our regressions, we include the effect on house prices of the annual average of the interest rate on the typical five-year conventional mortgage that the Bank of Canada reports. The effect of the interest rate will likely have a different effect on house prices in a municipality with high income compared to a municipality with low income. Further, the interest rates are the same across Ontario in any given year – that makes it impossible to distinguish the effect of interest rates from any inherent factors affecting prices in a given year. To solve these problems, we create an interaction variable that is the product of the log of employment income variable with the interest rate. In our above equation, that would be represented as  $r_i^* e_{mt}$ . The results from the fourth regression are what we use in the empirical analysis in the main *Commentary*. In our final regression, we used the same regression equation and instead used the aggregate price of houses in each municipality. The results are largely the same as in our preferred specification.

Additional results, Stata code, and publicly available data used in this analysis are available from the authors on request. To create our predicted price from reduced restrictions, we use our preferred specification in column 4 from Appendix Table 1 and use the coefficients to estimate the reduction in price that would occur from the change in the policy variable in each municipality if, instead, the municipality was at the provincial average for that variable.

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