

# Foreign Buyer Taxes And Housing Affordability

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## Abstract

To improve housing affordability many jurisdictions around the world have introduced substantial taxes and other restrictions on non-resident home buyers. We use the foreign buyer tax introduced in British Columbia, Canada in August 2016 to investigate the extent to which such taxes and restrictions improve housing affordability for the local population by reducing house prices. Our work is based on a direct transaction-level identification of foreign buyers. This identification was instituted through legislation prior to the announcement and subsequent introduction of the tax. Using a difference in differences methodology to compare house price changes pre- and post-tax between high and low foreign buyer concentration neighbourhoods, we find the tax to reduce house prices on the order of 6%. The quantitative effects are also striking, with overall foreign buyer share falling from 9.5% of transactions in the six weeks prior to the announcement of the tax to 1.7% for the four months following the tax. Additionally, we find that the tax had no effect on areas and market segments with little presence of foreign buyers.

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## 1 Introduction

Foreign investment is one of the most frequently cited explanations for the rapid home price appreciation in Hong Kong, London, Melbourne, New York, San Francisco, Seattle, Singapore, Sydney, Toronto, Vancouver, and other “destination” cities. A simple Google search for “Foreign Investment and Home Prices” generates over three million results, including frequent news articles, blog entries, opinions, and public commentary on the topic. This interest and attention is not surprising. Housing choices represent some of the most important life-long financial decisions for most people, price appreciation in those cities has far outpaced income or wealth growth of the local population, and the presence of foreign investors in the markets is often believed to be observable.

Responding to affordability and belief that foreign investment is a driver of rapid price appreciation, many jurisdictions around the world have introduced substantial taxes and other restrictions on foreign buyers. We study the effect of this type of tax on housing affordability by estimating the effect of the August 2016 introduction by the Province of British Columbia (BC), Canada of the Additional Property Transfer Tax (colloquially the foreign buyer tax or FBT) on local house prices. This transaction tax of 15% of the “fair market value” of the home was imposed on all purchases where one of the buyers, either as an individual or through ownership of shares in an acquiring corporation, was “non-Canadian person”.<sup>4</sup> The tax was on all residential property transactions and imposed throughout Greater Vancouver Regional District, which is identical to the Vancouver Census Metropolitan Area (CMA), a housing market of 2.5 million people widely

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<sup>4</sup> Canadian citizens, refugee claimants, and permanent residents are “Canadian persons” and thus exempt from the additional property transfer tax.

considered to be one of the least affordable in North America.<sup>5</sup>

We exploit transaction level data that allows to identify whether a foreign buyer participated in a transaction. These data allow us to estimate very precisely the presence of foreign buyers in various regions and market segments both before and after the introduction of the tax. Using a difference in differences methodology we compare house prices before and after the announcement of the tax in areas that had above or below median concentrations of foreign buyers. We find that house prices in high foreign buyer areas fell by 6% relative to those in low foreign buyer concentration areas after the tax. In the aggregate foreign buyer share of transactions fell from 9.5% prior to the tax to 1.7% in the four months following the introduction of the tax.

As we present below in the literature review, ours is not the first work on the effect of foreign capital on house prices. Nor is it the only work on the effects of taxes or restrictions on foreign purchasers on local house prices. The principal innovation in our work is that we explicitly observe whether a foreign buyer is one of the purchasers, as an individual or through a beneficial interest in a corporate purchase. In contrast, earlier studies rely on the density of foreigners or newcomers in certain neighbourhoods, not on the proportion of home buyers who are foreigners.

A second innovation in our work lies in the nature of the Government of British Columbia's approach in identifying foreign buyers and then introducing the foreign buyer tax. For five weeks prior to the announcement of the tax the province collected data on buyer nationality before the surprise July 25, 2016, announcement of the transaction tax of 15 percent of the value of the home on homes

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<sup>5</sup> The tax was not imposed on treaty lands of the Tsawwassen First Nation, which are in the Greater Vancouver regional District / Vancouver CMA

purchased by foreign residents from August 1, 2016, forward.<sup>6</sup> For identification, our test involves a large tax, implemented with no warning, where we can identify those that would have been subject to the tax prior to its introduction, which greatly facilitates the identification of the effect of foreign buyers on the market and the effect of the tax.

We proceed as follows. Section 2 summarizes the affordability and policy context in Vancouver, BC that created pressure to curb capital inflows into residential real estate as well as the international range of foreign buyer taxes and restrictions. Section 3 discusses the prior academic literature on the subject. Section 4 presents the data, methodology and results of the effect of the introduction of the foreign buyer tax. Section 5 concludes with a summary of our findings and suggestions for future work.

## **2 Policy Context: Vancouver and International**

### *2.1 Vancouver Affordability Challenge*

In 2016 Vancouver was regularly identified as having one of the world's least affordable housing markets. Whether by price to income ratios in the Demographia survey or as a bubble in the UBS Global Real Estate Bubble Index Vancouver house prices were extremely high relative to local incomes.<sup>7</sup> In a Canadian context, affordability challenges in Vancouver are not new. As Figure 1 shows, Vancouver has consistently had a owner payment to income ratio than other ma-

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<sup>6</sup> The tax amount was pro-rated by the share of ownership assigned to the non-Canadian buyers.

<sup>7</sup> [www.demographia.com](http://www.demographia.com) and [www.ubs.com](http://www.ubs.com).

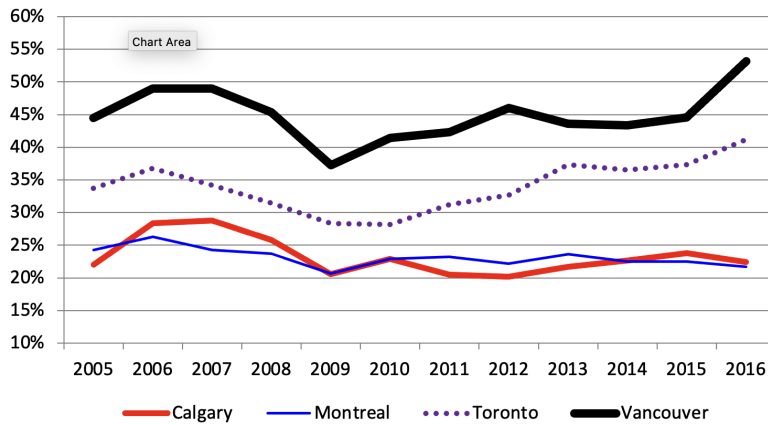


Fig. 1. Owner payment to income ratio

major cities in Canada, and this is generally true with data back to 1978.<sup>8</sup> Though housing affordability had been a concern for many years, the rapid house price increases 2015-16 shown in Figure 2 worsened the affordability situation, especially when compared to other Canadian cities. Price growth was also high in Toronto, and Ontario would follow British Columbia in imposing a tax on foreign buyers in the Toronto area.

One public reaction to worsening affordability was to blame foreign investment, particularly by wealthy Chinese for the affordability problems. Media accounts of wealthy Chinese became a staple in media accounts of Vancouver.<sup>9</sup> In the absence of clear data on foreign investment, as opposed to investment by immigrants or by

<sup>8</sup> Payment is mortgage, property taxes, home insurance, and heating costs. A 5-year term, fixed rate, closed, NHA insured mortgage. 80% LTV priced at the ratehub.ca discount mortgage rate. Statistics Canada median income for all non-elderly economic families (Cansim Table 2060011). Brookfield RPS benchmark house prices and index. Real Property Association of Canada Property Tax Report, 2014, then indexed using provincial average expenditure levels (Statistics Canada, Cansim Tables 2030003 and 2030021). Heating and property insurance costs are calculated from the same Statistics Canada source.

<sup>9</sup> See <https://www.macleans.ca/economy/whats-the-point-of-vancouver/> and <https://financialpost.com/personal-finance/mortgages-real-estate/chinese-are-buying-third-of-vancouver-homes-analysts-rough-tally-estimates> for discussion of the role of foreign capital in housing affordability.

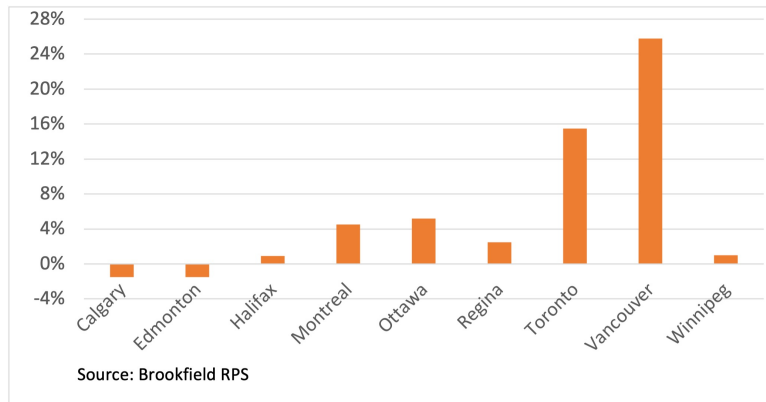


Fig. 2. **House price appreciation 2015-16**

members of visible minority groups, the debate became charged with accusations of racism on one side and selling out to wealthy foreigners on the other or making inferences based on homebuyers with non-anglicized Mandarin names .<sup>10</sup>

The first data on the extent of foreign purchases of Vancouver housing emerged in July 2016. Beginning June 10, 2016, the Province had begun mandating that all purchasers of residential property had to identify residency and citizenship on their property transfer filings. For corporate purchases, this extended to foreign owner shares in the acquiring corporate entity or beneficial ownership shares. For the period June 10, 2016, - July 24, 2016, foreign nationals were involved in 9.5% of all Vancouver metro area residential property transactions. This proportion was even higher for single-family homes. To put this in perspective, the number of transactions involving a foreign buyer in this six-week period represents approximately 30 percent of residential building permits (number of units) issued over a typical period of the same length. This is especially pronounced in the single-family market, where the number of transactions involving a foreign buyer during this six-week period represented over 100 percent of the new building permits issued over a typical period of the same length. Considering that some building permits

<sup>10</sup> For media coverage of race and the housing market see <https://www.cbc.ca/news/canada/british-columbia/vancouver-foreign-ownership-study-1.3301061> and <https://thetyee.ca/News/2015/08/07/Vancouver-Housing-Debate-Racism/>.

represent replacement of existing properties, foreign buyers absorbed a very high proportion of the net new supply increase in the region, especially in the single-family segment. Subsequent data for 2017 on the housing stock, as opposed to new purchases by Statistics Canada's Canadian Housing Statistics Program reported non-resident ownership rates of 5% for the Vancouver metro area overall.<sup>11</sup>

On July 25, 2016, the Government of the Province of British Columbia announced the introduction of the additional property transfer tax of 15% of "fair market value" for purchases of residential properties by "non-Canadian Persons".<sup>12</sup> The tax was effective on all transfers of residential properties registered from August 2, 2016, on. The tax was also pro-rated by the share of the property owned by a non-Canadian person, directly or through a corporation. While the tax was announced without warning, the affordability crisis had led to calls to tax or ban foreign investment in Vancouver residential real estate, so it cannot be considered a complete surprise. However, there had been no indications in the media or by the government that such a tax was being implemented.

The tax had a clear effect on the share of purchases with at least one foreign buyer. June 10, 2016, to August 1, 2016, 13.2% of residential property transfers (1,974 purchases) in the Vancouver metro area involved a foreign national. Over this period the figure was 3.6% (545 purchases) for the rest of the province. After the tax was imposed (August 2, 2016, to October 31, 2016) the share of purchases involving a foreign national in the Vancouver metro area fell by 11.4 percentage points to a 1.7% share. In the rest of the province the foreign national share fell by 1.4 percentage points to 2.2%.

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<sup>11</sup> See Cansim Table 350001

<sup>12</sup> In addition to citizens and permanent residents, certain other classes of buyers were exempted. These included Canadian controlled limited partnerships, mutual funds, and trusts.

## *2.2 Foreign Buyer Tax International Context*

Many jurisdictions around the world have imposed special conditions, whether taxes or purchase restrictions, on foreign buyers of residential real estate. These take the form of property transfer or stamp taxes on property transactions at differential rates based on residency or citizenship; differential property taxes, where the tax rates differ by citizenship or residency; variation in the actual or effective marginal tax rates on capital gains from residential real estate that differ by citizenship or residency; and finally limits on the type of property that can be purchased by foreigners or non-residents. The application of higher transaction taxes on non-residents or purchase restrictions seems to be limited to those countries that are currently facing or have in the recent past faced challenges to affordability from rapidly rising house prices, where concern among the population is specifically focused on the role of foreign capital.

Hong Kong, Israel, Singapore, Toronto (by act of the Ontario provincial government), and the Australian States of New South Wales (Sydney), Queensland (Brisbane and Cairns), and Victoria (Melbourne) all have property transfer taxes or stamp duties that tax foreign buyers at a higher rate than their own nationals pay. There is variation among these as to the tax level for citizens, principal residents, and others and whether taxes vary by the number of homes owned. For example, the Australian state taxes vary substantially by state, ranging from 0.75 to 8% depending on the state. The Province of Ontario's (Canada) imposed its 15% tax in April 2017 on purchases of residential property in the Greater Golden Horseshoe Region (greater Toronto) by foreign buyers in April 2017. Both British Columbia and Ontario have since raised the tax rate to 20% and expanded its coverage. In Singapore, as of May 2022 the tax on foreign buyers is 30%. Hong Kong has a complex stamp tax structure where the tax rises with the number of properties a buyer owns and length of hold. For example, a second property



purchased by a non-resident in Hong Kong would have a 30% tax.

More extreme than taxes on foreign buyers are explicit prohibitions or restrictions that effectively prevent purchases by non-residents of most properties. Among OECD countries the most prominent examples are Australia and New Zealand. In Australia foreign nationals are effectively limited to purchases of property in larger new developments. In 2018 New Zealand amended their *Overseas Investment Amendment Act* to prohibit the purchase by foreigners of existing homes, limiting them to investments in large apartment blocks, hotels, and “long-term accommodation facilities”. Canada introduced a two-year moratorium on foreign purchases across most of the country effective Jan. 1, 2023. Switzerland has geographic restrictions on foreign purchases through the *Lex Koller* rules. These allow individual Swiss Cantons to restrict the number of homes that are available to “non-Swiss” persons.

### 3 Literature background

For foreign buyers to worsen affordability in local housing markets, foreign capital inflows must lead to increase in house prices in ways that are not fully compensated in local wages. Favilukis and Van Nieuwerburgh (2021) present a theoretical model calibrated to New York City and Vancouver prices that shows when out of town buyers purchase units, which are then left vacant, this results in aggregate welfare loss in a monocentric city. Higher property transfer taxes on foreign buyers are explicitly modeled in Chao (2015), who find this is a second-best solution to the negative local welfare effects of foreign buyers.

Over the last 10 years empirical studies have demonstrated the effects of capital flows on local house prices. Research such as Sa et al. (2011), Liao et al.

(2015), Cvijanovic et al. (2015), Sá (2016), Badarinza and Ramadorai (2018), Monfared and Pavlov (2017) Pavlov and Somerville (2020), Li et al. (2020), and Gorback and Keys (2020) have demonstrated using data from different countries, in macro=models, in-cross city panels, individual housing markets, and with a wide variety of different types of market shocks the transmission of demand by non-residents or by foreign wealth to higher local housing prices. The local market studies also show that the price effects are concentrated in the neighbourhoods most favoured or the likely location choice of those using foreign source capital for local real estate purchases.

British Columbia's tax on foreign buyers takes the form of a property transfer tax. Transfer taxes and stamp duties in the housing market are a well-studied phenomenon. Dachis et al. (2012), Besley et al. (2014), and Best and Kleven (2018) demonstrate that higher taxes on property purchases leads to longer hold periods by property owners. Consistent with longer holds are the reductions in mobility found by Hilber and Lyytikäinen (2017) and by Eerola et al. (2019). Using the introduction of a step up in the transfer tax rate for higher priced houses in the City of Toronto but not the surrounding suburbs, Han et al. (2021) show that it not just affects hold periods, but also lowers the rate of tenure transition from renters to owners. The aggregate effect of higher transfer taxes in Määttä and Terviö (2014) is lower welfare. The <https://www.overleaf.com/project/61a91be214300c3d5b17ea30> aggregate effects are likely to differ in our case as they are targeted to a smaller group of buyers, rather than the universal taxes studies in the transfer tax literature.

The foreign buyer tax studies here are a particularly focused type of demand intervention in the housing market. The Chinese government has been active at times trying to cool their residential real estate market with demand side interventions. These have been both more standard macro-prudential levers and explicit

restrictions on the number of properties investors can purchase, a 100% tax on investors, particularly non-local buyers. Yan and Ouyang (2018) and Somerville et al. (2020) find that the purchase restrictions had little effect on prices and affordability but did lead to large declines in transactions. A targeted Tobin tax similar in construction to the foreign buyer tax we study is the Hong Kong government’s Special Stamp Duty on short-term property holds of two years or less, which is intended to reduce speculative short-term investing in the housing market. Agarwal et al. (2022) find the 2010 introduction of the tax led to a sharp reduction in short-term holds but limited evidence of an effect on prices. The absence of a price effect also shows up in Hilber and Schöni (2020) in studying purchase restrictions on second homes in tourism areas in Switzerland. They find no effects on second home prices but overall negative economic effects that resulted in lower prices of homes available only to local buyers.

One other paper attempts to assess the house price effects of transfer taxes on foreign buyers. Hartley et al. (2021) conduct a comprehensive cross-market analysis of the effects of purchase taxes on non-resident foreign nationals on changes in house prices. The authors use a synthetic control methodology to separately estimate a path house price appreciation in the absence of taxes for each of Melbourne, New Zealand, Sydney, Toronto, and Vancouver using a panel of Canadian metro areas, Australian state capitals, and US MSAs with area size depending on the data available. The large differences in policy environments, tax rates, dirty data with other types of housing policy interventions, and post-tax price paths make it hard to draw clear lessons from this work. Their peak effects are a between and -20 and -43% lower price appreciation for the cities and -3% lower for New Zealand, even though New Zealand banded most foreign purchases completely. The nature of the methodology makes it challenging to explain the pattern of variation. Unlike their paper, we use transaction level data where we observe whether a purchase is made by a foreign buyer or not, enabling us to avoid synthetic controls and

conduct a cleaner test at granular within market geography.

## 4 Effect of the Foreign Buyer Tax

### 4.1 *Theory and Identification*

In aggregate, if foreign buyers are part of total housing demand, then removing some part of their demand would lower demand in the aggregate and result in lower house prices. For affordability overall, irrespective of tenure, foreign buyers must be more likely to have the units they own not be occupied by renters. If they are, then foreign buyer demand would push up owner prices while lowering renter prices. More demand to own, but then an increased supply of housing units on the rental market. In Favilukis and Van Nieuwerburgh (2021), the negative welfare effects from foreign ownership arise because they buy properties and then leave them vacant.

The second necessary condition to observe an effect on overall affordability is some degree of elasticity in housing supply. If additional housing supply is easy to provide, then the foreign demand would be absorbed by new supply and the effect on prices would be minimal. However, cities such as Hong Kong, Melbourne, Singapore, Sydney, Toronto, and Vancouver with foreign buyer taxes all natural geographic boundaries and strong regulatory frameworks that can limit the increase in residential land supply. A rich extant literature has demonstrated the extent to which demand increases and supply constraints unavoidably generates rapid price appreciation, especially in land-oriented property types and in areas with geographic constraints.<sup>13</sup>

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<sup>13</sup> See A.Rose (1989), Mayer and Somerville (2000), Quigley and Raphael (2005), Chao and Yu (2009), Saiz (2010), Jackson (2016), and Davidoff (2016), among many others

Identifying the effect of the tax from aggregate changes in house prices requires no other changes or trends in housing demand and supply. Therefore, one cannot judge the impact of a foreign investment decision by examining the price evolution in the entire region following the restriction because we cannot observe the alternative scenario in which no restriction was imposed. In other words, the fact that prices may have gone up or down or remained unchanged following a foreign buyer restriction contains no information regarding the effectiveness of the restriction. Instead, we exploit differences in foreign buyer concentration across geographies to distinguish between neighbourhoods that are more or less likely to experience a demand shock from the tax.

Using variation across neighbourhoods for identification requires two conditions for us to differentiate the tax effect from other changes. First, foreign investors must cluster in specific neighborhoods and this clustering must persist over time. Clustering can occur when potential foreign investors are likely to have more information about neighborhoods with existing high concentration of residents with the same origin either because they know people directly or because real estate agents and other professionals specializing in these areas are likely to have experience in working with foreign investors. This can endogenously persist when the set of local amenities or services that respond to them, which then raises the probability of a future investor choosing that area. This seems particularly likely if foreign investors use their units for vacation stays. Second neighbourhood cross-elasticity of demand must be sufficiently inelastic, that relative prices changes can persist. Specifically, local buyers do not flock to areas when foreign demand declines slightly because of the tax.

We rely on the results to confirm the existence of these conditions. If the purchases

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for the relationship between land supply, geography, regulations, demand shocks, city form, and house prices and new supply.

by foreign investors do not cluster in neighbourhoods for which they have stronger preferences, but instead randomly choose locations within the region, then an empirical approach that relies on differences in foreign buyer market presence across neighbourhoods would not detect any difference in price appreciation between high- and low foreign buyer concentration neighborhoods because these differences would be random. The existence of a statistically significant difference in price appreciation between high- and low-concentration neighborhoods itself implies that foreign investors cluster in specific neighborhoods in a persistent way and that the foreign buyer tax had a significant impact. In the same way, if local purchasers are indifferent, then price variation across neighbourhoods would not reflect differences in foreign buyer demand because local buyers would arbitrage differences away. To the extent that the clustering of foreign investors evolves over time, any difference in price appreciation would be biased towards zero. This suggests that any results we identify should be considered a lower bound of the true impact.

#### *4.2 Empirical Methodology*

To investigate the impact of the foreign buyer tax we compare the property price evolution around the time the tax was introduced for neighborhoods with high concentration and low concentration of foreign buyers. Specifically, we conduct difference in differences regressions comparing house prices in high- and low-concentration neighborhoods before and after the introduction of the tax. The concentration assignments are based on the share of foreign buyers among purchasers in each neighbourhood in the five weeks prior to the announcement of the tax. As with any natural experiment approach, we observe there is no unobserved factor that is correlated with the tax and disproportionately affects foreign buyers. In the results section below we provide extensive robustness tests on tax timing

and foreign buyer neighbourhood preferences designed to mitigate any potential concerns that the change in price difference between high- and low-concentration neighborhoods could be caused by an unrelated factor.

For all methods described in the paper, we use semi-log regression models. The explanatory variables in the hedonic pricing model are lot size, lot size squared, living area, living area squared, age, age squared, number of bedrooms, number of bathrooms, single garage indicator and double garage indicator. We include the square of age, lot size, and living area to capture the non-linear impact of these variables on price. Finally, we model the interaction between time and foreign buyer concentration through an indicator variable for high concentration neighborhoods and an indicator variable that takes the value of one if the transaction occurred after the introduction of the tax.

$$ForeignConcentration = \frac{(\text{Number of foreign buyer transactions})}{(\text{Total number of transactions})} \quad (1)$$

In this analysis, we use census tract as a definition of a neighborhood. While other definitions are possible, using census tracts offers a good balance between using small geographic areas and having enough transactions within each area to compute the concentration of foreign buyers. A census tract is defined as “High Concentration” if it has above-median concentration of transactions in which a foreign buyer was involved relative to all transactions. In the robustness section of this report, we also present the results for alternative concentration levels cut-offs. The concentration levels are determined by foreign buyer purchasing patterns in the six weeks prior to the announcement of the tax, when data on foreign buyers was collected but before any news of a tax.

The specific model we estimate is as follows:

$$\log(\text{Price}) = \beta_0 + \beta_1 \text{Characteristics} + \beta_2 \sum 1(\text{Property in Tract } i) + \beta_3 \text{Foreign} + \beta_4 \text{postJuly2016} + \beta_5 \text{Foreign} * \text{postJuly2016} \quad (2)$$

We are primarily interested in the parameter  $\beta_5$  which captures the interaction between the high-concentration indicator variable and the post-event indicator variable. A negative parameter would indicate that prices in neighborhoods with a high concentration of foreign buyers declined more than the rest of the city following the introduction of the tax.

### 4.3 Data Description

The analysis in this report uses data from two sources: BC Ministry of Finance property transfer tax (PTT) information and BC Assessments property information. The PTT data contains information on each transaction, including transaction price and whether each purchaser was subject to the Foreign Buyer Tax or not. The foreign status of each purchaser was recorded starting on June 10, 2016, about six weeks before the foreign buyer tax took effect. The BC Assessment data contains property characteristics for all properties in British Columbia. Specifically, it contains information on the actual use of the property and its main physical characteristics, such as build area size, lot size, number of bedrooms, number of bathrooms, garage, and age. As well we know the street address of each property, allowing us to match each to a census tract.

We use all properties classified as residential uses by BC Assessment and thus subject to the tax to identify neighbourhood concentration. These include single-family, acreage, duplex, townhouse, condo, mobile or manufactured, vacant, and seasonal. The data also includes farmland, in which case the foreign buyer tax may



be applicable to the portion of the land classified as farmer's dwelling. We perform separate analysis for single-family homes and multi-family properties, such as duplex, condominium, and townhouse units, as described below. These four property types cover 99% of the residential transactions in Greater Vancouver. The excluded property types - farmland in the urban area, acreage, multi-unit rental buildings, mobile/manufactured homes, vacant land, and seasonal properties cover only 2% of foreign buyer transactions between June 10, 2016, and September 10, 2017, and by property type, none are numerous enough to support estimation. We also trim the data, excluding transactions with recorded transaction price under \$100,000 and over \$10,000,000, which are the bottom 0.61% and top 0.08% of the transaction price distribution.

Tables 1, 2, 3, and 4 provide summary statistics for the data used in this analysis. Tables 1 and 2 report the summary statistics for the single-family sample, before and after the introduction of the tax, respectively. Tables 3 and 4 report the summary statistics for the multi-family sample, again before and after the introduction of the tax. While the single-family and the multi-family samples are distinct, the variables as measured before and after the introduction of the tax have similar values, suggesting that the composition of the properties that transacted did not materially change before and after the introduction of the tax.

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
sale_price	42,242.000	1324447.949	1026160.666	106,000.000	10000000.000
Est lot size in sqft	42,223.000	8,445.367	7,534.650	1,045.000	107,158.000
Estimated finished area	42,228.000	2,031.211	916.736	352.000	12,650.000
Number of bedrooms	42,045.000	4.264	1.368	0.000	15.000
Number of bathrooms	42,045.000	3.442	1.647	0.000	20.000
Dummy, =1 if has multi-car garage	42,242.000	0.636	0.481	0.000	1.000
Effective age	42,242.000	23.896	17.046	0.000	115.000
Dummy, =1 if has single car garage	42,242.000	0.190	0.392	0.000	1.000

Table 1  
Summary statistics, single-family, Jan 1, 2015 - July 30, 2016.

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
sale_price	20,240.000	1490306.546	1031087.237	105,000.000	10000000.000
Est lot size in sqft	20,222.000	8,319.292	7,854.713	1,002.000	217,800.000
Estimated finished area	20,238.000	1,863.359	819.226	384.000	11,764.000
Number of bedrooms	20,180.000	4.044	1.283	0.000	12.000
Number of bathrooms	20,180.000	3.067	1.484	0.000	12.000
Dummy, =1 if has multi-car garage	20,240.000	0.587	0.492	0.000	1.000
Effective age	20,240.000	29.706	18.072	0.000	108.000
Dummy, =1 if has single car garage	20,240.000	0.214	0.410	0.000	1.000

Table 2  
Summary statistics, single-family, August 2, 2016 - September 27, 2017.

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
sale_price	50,467.000	509,953.395	402,482.491	100,100.000	9680000.000
Estimated finished area	50,378.000	1,063.326	394.043	301.000	7,547.000
Number of bedrooms	49,285.000	2.046	0.847	0.000	9.000
Number of bathrooms	46,817.000	1.930	0.813	0.000	12.000
Dummy, =1 if has multi-car garage	50,467.000	0.012	0.109	0.000	1.000
Effective age	50,467.000	15.726	12.450	0.000	85.000
Dummy, =1 if has single car garage	50,467.000	0.016	0.127	0.000	1.000

Table 3  
Summary statistics, multi-family, Jan 1, 2015 - July 30, 2016.

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
sale_price	36,543.000	588,449.572	425,871.133	100,001.000	8700000.000
Estimated finished area	36,522.000	1,025.519	376.483	299.000	4,485.000
Number of bedrooms	35,509.000	1.992	0.834	0.000	8.000
Number of bathrooms	33,670.000	1.874	0.809	0.000	7.000
Dummy, =1 if has multi-car garage	36,543.000	0.009	0.094	0.000	1.000
Effective age	36,543.000	16.000	12.972	0.000	80.000
Dummy, =1 if has single car garage	36,543.000	0.011	0.105	0.000	1.000

Table 4  
Summary statistics, multi-family, August 2, 2016 - September 27, 2017.

#### 4.4 Results

The primary statistical test we perform is the estimation of Model 2 using single-family transactions. The tax legislation was announced and had first reading on July 25, 2016, but took effect on August 2, 2016. This induced many foreign buyers to close their purchases before August 2, 2016, the effective day of the tax. To do so, they may have had to offer the sellers some additional incentives or even potentially a higher price. Therefore, transactions completed between announcement of the tax and its effective date could potentially be at prices not fully consistent with the market value at the time.<sup>14</sup> While all transactions following August 2, 2016, were subject to the newly introduced tax rules, some transactions, especially in the first weeks, would have been negotiated and contracts signed before the tax was announced. The prices of these transactions would not incorporate the effects of the tax on the market or the buyer, again not allowing for clean identification. In addition, we do not observe transactions that were cancelled because of the tax. To create a clean identification, we that were negotiated before the tax was introduced but closed after clearly does not incorporate the effect of the tax and, therefore, cannot be used to assess the impact of the tax. Moreover, there is a strong possibility that some transactions were canceled following the introduction of the tax. Since we do not observe the canceled transactions, the transactions that completed shortly after the introduction of the tax represent a biased sample of all transactions that would have occurred had the introduction of the tax been known. In the analysis, we exclude transactions between July 25 and September

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<sup>14</sup> The transaction date in the data is when a conveyance of title is registered at the BC Land Title Office, not when a purchase and sale agreement is signed between the buyer and seller. At a minimum it is said to take three days following the latter for the former to occur. With typical sales this make take several months to allow the buyer to exit their property.

30 to ensure clean differentiation between pre and post-tax purchases.<sup>15</sup>

Table 5 reports the results of this estimation for +/-3, +/-6, and +/-12-month estimation windows around the August 2, 2016, imposition of the tax. The coefficient of primary interest is the standard DiD interaction term between the post-treatment period dummy (the post-July 2016 variable) and the treatment group dummy (the indicator for high concentration of foreign buyers. The general form of this variable label is *i.postMONTHYEAR.high.foreign.share*. In Table 5 the post-July 2016 variable takes the value of 0 for all transactions before July 25, 2016, and the value of 1 for all transactions after August 30, 2016, in the window period, with the exclusion noted above. The high concentration variable, as discussed above, takes the value of 1 if a transaction is located within a census tract with above-median concentration of foreign buyers, and zero otherwise. This and all other estimated models in this report use fixed effects for the BC Assessment Neighborhood Codes (in the City of Vancouver there approximately four census tracts per neighbourhood area) and monthly time effects. We further cluster all errors by census tract to account for a potential correlation in errors for properties within the same tract.

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<sup>15</sup> The dates for the windows are as follows: i) +/- 3 months: between May 1, 2016, and July 25, 2016, or between October 1, 2016, and December 31, 2016; ii) +/- 6 months: between February 1, 2016, and July 25, 2016, or between October 1, 2016 and March 31, 2017, and iii) +/- 12 months: between July 30, 2015, and July 25, 2016, or between October 1, 2016, and September 30, 2017.

VARIABLES	(1)	(2)	(3)
	+/- 3 months excl June 25 to Sep 30	+/- 6 months excl June 25 to Sep 30	+/- 12 months excl June 25 to Sep 30
Est lot size in sqft	0.000*** (3.70)	0.000*** (3.76)	0.000*** (3.83)
Lot size squared	-0.000*** (-2.63)	-0.000** (-2.36)	-0.000** (-2.47)
Estimated finished area	0.000*** (5.01)	0.000*** (7.49)	0.000*** (7.34)
floorarea2	-0.000 (-0.88)	-0.000*** (-3.94)	-0.000*** (-3.76)
Number of bedrooms	0.013** (2.46)	0.014*** (2.69)	0.012** (2.31)
Number of bathrooms	0.081*** (7.58)	0.080*** (8.13)	0.079*** (8.77)
Dummy, =1 if has single car garage	0.005 (0.30)	0.021 (1.49)	-0.002 (-0.13)
Dummy, =1 if has multi-car garage	-0.009 (-0.53)	-0.010 (-0.60)	-0.008 (-0.57)
Effective age	-0.005*** (-2.89)	-0.003** (-2.29)	-0.002* (-1.69)
Age squared	0.000*** (4.74)	0.000*** (5.14)	0.000*** (4.85)
1.post.July2016	0.023 (1.29)	0.117*** (8.12)	0.189*** (20.04)
1.high_foreign_share	0.359*** (5.22)	0.369*** (5.24)	0.360*** (5.17)
1.post.July2016.1.high_foreign_share	-0.046** (-2.43)	-0.062*** (-3.99)	-0.064*** (-4.23)
Constant	13.427*** (76.77)	13.303*** (75.58)	13.170*** (76.54)
Observations	10,709	19,882	42,581
R-squared	0.552	0.551	0.536
Neighborhood+time effects	Yes	Yes	Yes

Robust t-statistics in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 5  
Foreign Buyer Tax effect on single-family Homes

Across all three window sizes we find negative and statistically different than zero estimates of the effect of the tax. The DiD interaction term coefficients are  $-4.6\%$ ,  $-6.2\%$ , and  $-6.4\%$  for the  $+/-3$ ,  $+/-6$ , and  $+/-12$ -month estimation windows, respectively. These suggest clearly negative effects on prices from the tax in the census tracts where foreign buyers were most likely to purchase units, relative to

other census tracts. While process continued to rise over the period, this increase was lower in the high foreign buyer concentration census tracts. The individual variables related to concentration of foreign buyers offer interesting insights, in addition to their interaction. For instance, neighborhoods with high concentration of foreign buyers command a price premium of 35 to 37 percent relative to the rest of the region, as illustrated in the above example.

The remaining explanatory variables have signs and significance levels consistent with prior literature on hedonic price estimation. The one potential exception they may be an interaction effect is the positive coefficient on the number of bedrooms and the positive coefficient on square of finished area. Most prior studies have found that both variables have negative effects on prices in a hedonic regression. This may very well reflect evolving preferences in the face of very high land prices in the region but is unlikely to be in any way related to the foreign buyer tax.

As a robustness test for the results in Table 5 we test different concentration cut-off levels to define what constitutes an area with high concentration of foreign buyers. Above the cut-off between a high and low foreign buyer concentration area is whether the share of foreign buyers June 10 - July 24 in a census tract is above or below the median tract value. In Table 6 we report the interaction coefficient between the time and concentration variable for the following alternative concentration definitions. In regressions (1) and (2) we change the definition for a low foreign buyer concentration area to be below the 30th and 40th percentile respectively, while retaining the above median definition of a high concentration area. In regressions (4) and (5) we change the definition for a high foreign buyer concentration area to be above the 60th and 70th percentile respectively, while retaining the below median definition of a low concentration area. The impact of the tax as measured by the interaction between time and high concentration is negative and highly statistically significant for all cut-off levels used. This result

suggests that the overall finding related to the effect of the foreign tax is robust to the exact definition of high and low concentration neighborhoods.

VARIABLES	(1) <30th or >50th pct	(2) <40th or >50th pct	(3) median	(4) <50th or >60th pct	(5) <50th or >70th pct
1.postJuly20161.high_foreign_share3	-0.066*** (-3.75)				
1.postJuly20161.high_foreign_share4		-0.059*** (-3.55)			
1.postJuly20161.high_foreign_share			-0.062*** (-3.99)		
1.postJuly20161.high_foreign_share6				-0.053*** (-3.31)	
1.postJuly20161.high_foreign_share7					-0.067*** (-3.23)
Observations	15,743	18,191	19,882	17,255	13,996
R-squared	0.555	0.552	0.551	0.609	0.606
Neighborhood+time effects	Yes	Yes	Yes	Yes	Yes

Robust t-statistics in parentheses  
\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 6  
Foreign Buyer Tax effect on single-family Homes with different cut-offs, +/- 6 months.

A second robustness test we repeat the estimation of Model 2 using different time cut-offs dates. This creates a series of placebo tests on tax implementation, where we analyze the data as though the tax was announced on those dates. For this test we use the +/- 3-month window and use cut-offs (placebo tax implementation dates) at the end of February, March, April, May, December, and January. These tests also serve as a pre-tends test for the cut-offs before July 2016. We do not use cut-offs at the end of June, August, September, October, and November as the +/- 3-month estimation window for those months would overlap with the introduction of the tax and its post-tax window.

The results on the post-treatment date and treated group interactions for the different placebo treatment dates are shown in Table 7. Only in Regression (5),



where the modeled treatment date at the end of July coincides with the actual tax start date do we observe that the estimated coefficient on the DiD interaction term is negative and statistically different from zero. All other cut-offs considered generate interactions that have smaller point estimates in absolute value and are not statistically different from zero. This suggests that prices in the neighborhoods with high concentration of foreign buyers declined relative to the rest of the region specifically and only at the time of the tax introduction, and not at any other time considered.

VARIABLES	(1) Feb cut-off	(2) Mar cut-off	(3) Apr cut-off	(4) May cut-off	(5) Jul cut-off	(6) Dec cut-off	(7) Jan cut-off
1.postFeb20161.high_foreign_share	0.018 (0.98)						
1.postMar20161.high_foreign_share		-0.024 (-1.47)					
1.postApr20161.high_foreign_share			-0.028 (-1.64)				
1.postMay20161.high_foreign_share				-0.025 (-1.59)			
1.postJuly20161.high_foreign_share					-0.046** (-2.43)		
1.postDec20161.high_foreign_share						-0.008 (-0.41)	
1.postJan20171.high_foreign_share							-0.009 (-0.44)
Observations	12,618	14,302	14,024	12,368	10,709	5,858	5,976
R-squared	0.564	0.565	0.566	0.569	0.552	0.527	0.517
Neighborhood+time effects	Yes		Yes	Yes	Yes	Yes	Yes
Jurisdiction+time effects		Yes					

Robust t-statistics in parentheses  
\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 7  
Hypothetical effect for different (false) event dates, +/- 3 months.

As a further robustness test, we repeat the analysis reported in Table 5 for multi-family units. Since the supply of higher density homes is not as restricted, their prices are not as susceptible to foreign demand as prices of single-family homes.

Foreign demand should affect prices more when providing additional supply is difficult, so that the stricter are supply restrictions, the higher the price impact would be. Topography and agricultural protection areas limit the growth of the urbanized area in the Vancouver CMA. Between 2016 and 2021 single-family detached units made up 8% of the growth in occupied housing units in the area, while units in condo and rental apartment buildings made up 61% of the growth. The lower realization new supply of single-family homes in the region suggests that foreign demand for this housing type would more fully translate into higher prices. On the other hand, since there is new supply of higher-density units in the region, part of the foreign demand would be absorbed through such supply increases and the price response would be smaller.

Table 8 reports the estimation of model 2 for higher-density housing, such as duplexes, town houses, and condominium units. Unlike with single-family units above, the interaction between the high-concentration variable described above and a variable capturing the introduction of the tax is not significant for any of the estimation windows considered. This could well be because the tax had no effect on foreign buyers of strata units. Alternatively, it could have reduced their demand, but not manifested in a post-tax effect relative to low concentration census tracts. The supply elasticity for multi-family homes is higher than for single-family homes, so that the observed price effect was specifically limited to the market segment that is most supply-constrained - single-family homes.<sup>16</sup> Alternatively, it could be the case that demand cross-elasticity across neighbourhoods for multi-family is much more elastic than is the case for single-family homes, so that while there is a reduction in demand, this is more homogeneous across neighbourhoods. This either because of less variation in foreign buyer demand, or that local buyers take advantage of the decline in foreign demand to purchase more in those

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<sup>16</sup> As noted earlier in the paper, single-family homes made up less than 10% of the growth of properties occupied by usual residents between 2016 and 2021 in the Vancouver CMA.

neighbourhoods post-tax, resulting in a smaller relative price change. Finally, if foreign buyers shift demand to the pre-sales market, which delays tax incidence until building completion at least two years later, aggregate demand would not have changed, just rep[ositioned].

VARIABLES	(1)	(2)	(3)
	+/- 3 months excl June 25 to Sep 30	+/- 6 months excl June 25 to Sep 30	+/- 12 months excl June 25 to Sep 30
Number of stories	0.006*** (5.65)	0.006*** (5.47)	0.005*** (5.06)
Estimated finished area	0.001*** (18.90)	0.001*** (23.92)	0.001*** (11.89)
floorarea2	-0.000*** (-9.61)	-0.000*** (-10.21)	-0.000*** (-5.02)
Number of bedrooms	0.067*** (5.47)	0.064*** (6.07)	0.070*** (6.49)
Number of bathrooms	0.021** (2.25)	0.019*** (2.61)	0.021*** (3.16)
Dummy, =1 if has single car garage	-0.098 (-1.61)	-0.064 (-1.25)	-0.035 (-0.75)
Dummy, =1 if has multi-car garage	0.171*** (3.15)	0.133*** (2.80)	0.133*** (3.38)
Effective age	-0.015*** (-6.54)	-0.015*** (-6.33)	-0.015*** (-7.38)
Age squared	0.000*** (2.93)	0.000*** (2.96)	0.000*** (3.71)
1.post.July2016	0.030* (1.66)	0.172*** (10.71)	0.229*** (21.46)
1.high_foreign_share	0.064** (2.58)	0.074*** (3.04)	0.078*** (3.25)
1.post.July2016.1.high_foreign_share	0.003 (0.15)	0.002 (0.13)	-0.011 (-0.78)
Constant	12.327*** (131.11)	12.270*** (196.82)	12.266*** (159.20)
Observations	14,421	27,726	57,973
R-squared	0.811	0.806	0.801
Neighborhood+time effects	Yes	Yes	Yes

Robust t-statistics in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 8  
Foreign Buyer Tax effect on multi-family units

In order to help un-bundle the difference between the effects of the FBT on the

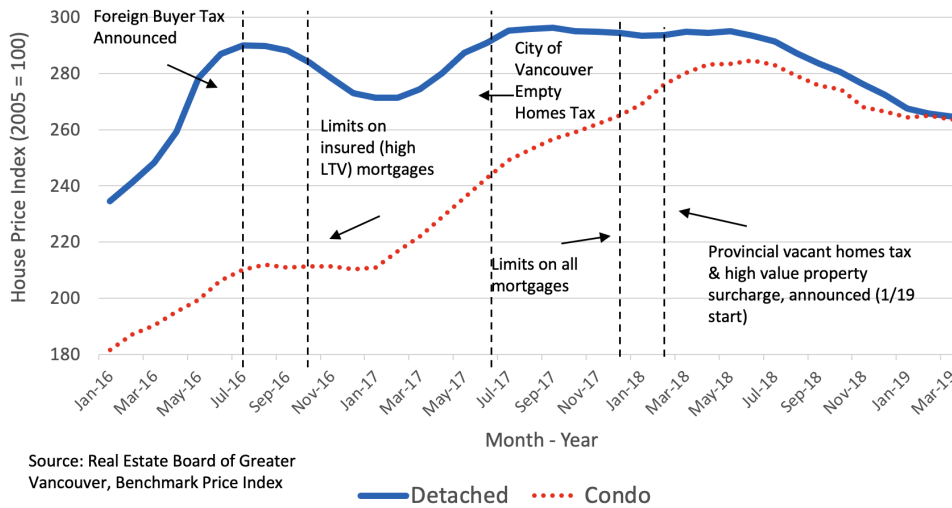


Fig. 3. House prices and housing demand policies

single-family and multi-family markets we plot prices for these two segments over the period in question. Figure 3 plots prices for both segments from 2016-19, which covers the introduction of the FBT and other interventions, such as the City of Vancouver and the Province of British Columbia’s taxes on vacant housing, and housing finance macro-prudential policies imposed at the federal level. In a simple univariate time series framework the tax is associated with changes in the path of residential property prices, but with a larger effect in the single-family market. Even though the magnitude is small, the clear change in the trajectory of condominium apartment prices does suggest the policy had an effect on demand. And as we argue, if demand for higher density housing is more uniform across foreign and local buyers, i.e. more cross-elasticity across geography, then the DiD approach would be less well-suited to identify this effect.

In addition to the analysis of transaction prices in the Greater Vancouver discussed so far, we also consider the change in transaction volume for various neighborhoods and property types before and after the introduction of the foreign buyer tax.

	+/- 3 Months		
	Before	After	Percent Change
Low Foreign Share	3,845	1,560	-0.59
High Foreign Share	3,919	1,430	-0.63
	+/- 6 Months		
	Before	After	Percent Change
Low Foreign Share	6,826	3,115	-0.54
High Foreign Share	7,242	2,814	-0.61
	+/- 12 Months		
	Before	After	Percent Change
Low Foreign Share	12,661	8,583	-0.32
High Foreign Share	13,846	7,830	-0.43

Table 9

Transaction volume for single-family units, high and low-concentration neighborhoods, pre- and post-FBT.

As Cauley and Pavlov (2002) point out, real estate transaction volume often declines faster and sometimes more significantly than real estate prices in the face of declining demand. And as noted in the literature review, studies assessing Chinese government policies to constrain investors in residential real estate had large quantity effects and small price effects.

Table 9 reports the total average single-family transaction volume for high- and low-concentration census tracts before and after the introduction of the foreign buyer tax and the percentage change. Transactions between June 25 and August 2 are excluded from this count. Average volumes decline in both types of census tracts. Uniformly across window sizes the decline is larger in the high concentration neighbourhoods. This is consistent with the aggregate decline on foreign buyer share of all Vancouver metro area transactions, from 9.5% in the six-week period prior to the announcement of the tax to 2.4% in September and October 2016 after the tax. The volume decline difference between high- and low-concentration neighborhoods is even larger for longer time periods.

	+/- 3 Months		
	Before	After	Percent Change
Low Foreign Share	4,566	3,384	-0.26
High Foreign Share	4,580	3,344	-0.27
	+/- 6 Months		
	Before	After	Percent Change
Low Foreign Share	8,351	6,813	-0.18
High Foreign Share	8,675	6,635	-0.23
	+/- 12 Months		
	Before	After	Percent Change
Low Foreign Share	15,609	15,820	-0.01
High Foreign Share	17,042	15,072	-0.11

Table 10  
Transaction volume multi-family units, high and low-concentration neighborhoods, pre and post-FBT.

Table 10 reports the average transaction volume by census tract for multi-family units. The transaction volume declines in the multi-family market are more modest, in the order of 20% and even less for longer estimation windows. This is fully consistent with the theoretical prediction that foreign buyers have a relatively smaller influence in the multi-family market because this market can, and has, experienced some supply response. This supply response can absorb some of the fluctuations in foreign demand. For instance, foreign buyers of condominium properties who purchased pre-sales contracts could assign these contracts prior to building completion to local buyers and avoid the tax, which was only payable upon registration of the title transfer once the building was complete.

## 5 Conclusion

In summary, our analysis detects a highly statistically significant decline in prices for the neighborhoods most favored by foreign investors relative to the rest of the market following the introduction of the foreign buyer tax. single-family house prices in neighborhoods with high concentration of foreign investors declined relative to neighborhoods with low concentration of foreign buyers exactly at the time of tax introduction. This decline is robust to the exact definition of high concentration of foreign investors neighborhoods. The relative decline in prices was observed only at the time of the introduction of the tax, and not at any other date we tested. The relative decline was also only observed for the most supply constrained market segment - single-family homes - and is not statistically detectable for condominium units that are relatively less supply constrained.

These findings strongly suggest that the introduction of the foreign buyer tax had a significant negative impact on transaction prices. While it is theoretically conceivable that the observed impact was caused by another unrelated and unknown factor, such a factor would have had to come into effect exactly at the same time as the introduction of the tax, and such a factor would have had to specifically and exclusively impact only the areas most favored by foreign investors and property types that are most supply-constrained. Since such a factor is extremely unlikely to exist, the introduction of the foreign buyer tax had a significant impact on prices.

While the observed price declines are not large enough to solve Vancouver's affordability problems, they do contribute to prices being lower than they would have been without the tax. A useful comparison is these policies to those enacted in China to address the inflated market there. Chinese purchase restrictions and mortgage policies dramatically reduced transaction volume with having little ob-

served effects on prices. In contrast, the explicit foreign buyer taxes in a global property destination market did affect prices. We believe part of this difference is because we identify foreign buyers at the transaction level, allowing for a clearer identification of where that demand is flowing.

Future work might explore the relationship between these purchases and immigration patterns. Some observers have suggested that a non-trivial share of foreign buyers are not foreign investors, but people who have applied to immigrate to Canada and are making property purchases prior to receiving their visas. If so, then some of the FBT effect might dissipate over time, especially in immigrant destination areas, as opposed to pure foreign investor sub-markets.



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