

The Prevalence of Low Income Tax Payments Among Owners of Expensive Homes in Vancouver and Toronto

Thomas Davidoff, Paul Boniface Akaabre, Craig Jones, UBC*

October 25, 2022

Abstract

Homes in the top 5% of value in Greater Vancouver as of 2018 had a median value of \$3.7 million, but the median owner of these homes paid income taxes of just \$15,800. Using data from the Canadian Housing Statistics Program, we analyze the relationship between homeowners' income tax payments and the value of the homes they own. In Toronto, the elasticity of non-corporate owners' income taxes paid with respect to property value appears to be in line with that in many U.S. cities at roughly .7 (a 10 percent increase in property value is on average associated with a 7 percent increase in income tax paid). In Vancouver, that same elasticity is only approximately .3 or .5, depending on whether the elasticity is calculated based on medians or means, and would be at or near the bottom among U.S. metropolitan areas. These results call into question the overall progressivity of taxation in Greater Vancouver. We provide mixed evidence concerning the role of foreign buyers in making Vancouver's income tax - property value relationship weak. New buyers in both Toronto and Vancouver exhibited a particularly weak relationship between income tax and property value between 2011 and 2016, unlike in Montreal or U.S. metropolitan areas. A modest minimum income tax based on property value could raise billions of dollars annually in both the Vancouver and Toronto metropolitan areas.

JEL keywords: Taxation, Housing Demand.

1 Introduction

We analyze the relationship between individual residential property value and homeowners' income tax payments in Vancouver and Toronto. This study is motivated by suggestive evidence that owners of expensive properties in and around Vancouver pay relatively little tax, and also by recent Canadian policy reforms. Using data from the Canadian Housing Statistics Program (CHSP) and the U.S. and Canadian censuses, we ask: how much income tax is

*Contact: thomas.davidoff@sauder.ubc.ca. We thank Wendy Kei, Josh Gordon, Jean-Phillippe Deschamps-Laporte, Haig McCarrell, and participants at seminars at Statistics Canada and the Canadian Economics Conference for helpful suggestions and guidance using CHSP data.

paid by non-corporate owners of residential properties at different quantiles of metropolitan home price distributions?¹

Government might want to ensure that owners of expensive homes pay high income and property taxes for multiple reasons. Like most developed countries, Canada imposes progressive income taxation at the federal and provincial levels, indicating desire to redistribute resources from those with plenty to those with few. But flow income is not the only possible basis for an annual tax, and some prefer that stocks of wealth form part of that basis. It is a very old idea that property values are more accurate signals of lifetime resources than fluctuating and mutable declared annual incomes.² Using income as the sole basis for taxes may be undesirable due to tax evasion, legal but possibly socially undesirable avoidance, or intergenerational and international transfers not subject to taxation. Living in an inexpensive home may be a difficult hurdle to evasion of a residence-based tax for wealthy households if housing and other goods are poor substitutes. Also, because taxable income exerts a positive fiscal externality, it may be desirable to subsidize homes in which income is earned relative to those in which it is not.³ Finally, some forms of demand for residential property linked to low reported income (e.g. money laundering or short-term rentals) may be politically or socially undesirable, and generally low overall tax payments by some affluent households might spark concerns about horizontal inequality. Either a federal minimum income tax based on property value, or a local property surtax with exclusions for income tax paid would ease fiscal constraints in a way that might be politically popular.

There are also reasons not to tax property differently based on income tax paid related to the “benefit” and “capital” views of property taxation. Such a tax would distort housing consumption of affluent households who pay low income tax, both harming the tax-avoiding household and limiting the ability for governments to earn revenue. Further, to the extent that low income tax payments are associated with less time spent in Canada, such schemes would amount to property taxation that falls rather than rises in benefits received by the owner.⁴ However, to the extent that the benefits of public goods are greater for owners

¹In CHSP data, there are no links to corporate owners’ income tax payments. The quantiles we consider are groupings of households from (lowest quantile) the owner of the lowest valued property to the property lower than 95 percent of all properties, up to (highest quantile) owners of homes more expensive than at least 95 percent of all homes.

²See, for example, (Wallace E. Oates and Robert M. Schwab. “The Window Tax”. In: *Land Lines* April [2014], pp. 10–14).

³A similar argument flows from (W.J. Corlett and D.C. Hague. “Complementarity and the Excess Burden of Taxation”. In: *Review of Economics and Statistics* 21.1 [1953], pp. 21–30): complements for leisure should be taxed given heavy reliance on an income tax.

⁴Benefit and capital views of property taxation are described further in (George R. Zodrow and Peter M. Mieszkowski. “The new view of the property tax A reformulation”. In: *Regional Science and Urban Economics* 16.3 [1986], pp. 309–327).

of expensive homes (whose property values rise more when overall values rise), given that Canada tends to fund locally provided public goods (notably schools) through income taxes, there may be a benefit tax argument for minimum property taxes with income tax exclusions.

Whatever the merits, Canadian governments have revealed through their policy choices a preference that homes be occupied by Canadian taxpayers. The stated purpose of these measures is typically to reduce housing cost for Canadian residents. British Columbia’s Speculation and Vacancy and Foreign Buyer Taxes punish homeowners who are neither landlords nor regular residents, and the Speculation Tax also targets homeowners who earn most of their income outside of Canada. The City of Vancouver has an Empty Homes Tax that also targets homes that are not regularly occupied. The 2022 Canadian federal budget includes a commitment to banning foreign buyers for two years in an effort to reduce housing prices. British Columbia in 2018 introduced further progressivity into its property tax formulas by imposing higher regular and transfer tax rates on properties valued at greater than \$3 million. While in opposition, the now-governing NDP raised the issue of students listed as owners of expensive homes on Vancouver’s West Side.⁵ Prior to the introduction of the suite of measures to link Canadian tax paying status to property values, two separate groups of Vancouver-area academics proposed taxes that would introduce minimum tax payments based on property value.⁶

A legal question salient in the Vancouver context is the extent to which income earned outside of Canada used to purchase homes are subject to Canadian taxation. An affluent overseas individual providing equity for a local relative with low local income would not be subject to Canadian taxation. Based on discussion with tax practitioners, whether the “residential ties” associated with home ownership are sufficient to force an affluent direct owner of a Canadian property with mostly overseas income to declare that income in Canada appears to be a grey area as a matter of enforcement. Such an owner would be subject to British Columbia’s Speculation Tax if the overseas income were properly declared. In 2022, Vancouver’s city council debated a proposal to request the right to impose progressive property taxes.

Property taxes alone, of course, could ensure that all owners of expensive homes pay high taxes to government. However, the scale of property versus income taxes are quite different in British Columbia. For example, the owner of a \$4 million dollar home in the

⁵“Homemakers, students own \$107 million in Vancouver neighbourhood” Martin McMahon, City News Everywhere, September 27, 2016.

⁶A UBC-led proposal for higher property taxes, with write-offs for income tax paid and gross rental income declared to the Canada Revenue Agency can be found at housingbc.weebly.com. Around the same time, Rhys Kesselman and Josh Gordon of Simon Fraser University proposed a progressive property tax that would allow offsets for income taxes.

City of Vancouver would be subject to roughly \$10,000 in property tax, an additional \$2,000 in “additional school taxes” on the portion over \$3 million, and would also owe flat rate sanitation and water charges of roughly \$2,400. That total of less than \$15,000 is tiny relative to the income tax on earnings sufficient to purchase that property assuming reasonably high leverage, as discussed below. If owners of expensive homes do not pay high income taxes, they thus likely face a low overall Canadian tax bill.⁷

The existing literature provides reason to expect a weak relationship between income tax paid and property value in Greater Vancouver. Gordon,⁸ building on Wozny⁹ and earlier work, uses CHSP data to estimate correlations among home price levels, mean income among residential property owners, and non-resident ownership shares across jurisdictions in the Vancouver and Toronto census metropolitan areas. Gordon finds that in Greater Vancouver, among single-family detached homes, median property value has approximately zero correlation with median owner income; Toronto exhibits a higher correlation. In both metropolitan areas, Gordon finds a high correlation across jurisdictions between median detached single family home value and the fraction of buyers identified as non-resident in the CHSP data.

In this study, we calculate the elasticity of income tax paid with respect to property value, that is, the expected percentage difference in income taxes paid between the owners of homes that are different by one percent. To our knowledge, this elasticity calculation is novel. It is generally believed that the wealth elasticity of housing demand is positive, but somewhat below one (so that if wealth doubles, the value of housing purchased would increase, but not double. See Davis and Ortalo-Magne¹⁰ for a literature review and a claim that an elasticity of one is approximately correct). Lifetime income is imperfectly correlated with reported taxable income. However, income taxes are progressive and thus likely feature elasticities greater than one, so we do not have clear priors on the elasticity of income tax paid with respect to property value.¹¹ There are two reasons why the median elasticity calculation may be preferable in our setting. First, a tax reform imposing a minimum income tax based on property value would generate revenue only from low-paying individuals, so contributions to the mean from outlying high payers would not be relevant. Second, mean-based elasticities appear to be affected substantially by the presence of low-value rental properties with high-income owners.

⁷We do not observe corporate tax paid by entities controlled by residential property owners.

⁸Joshua C. Gordon. “Solving puzzles in the Canadian housing market: foreign ownership and de-coupling in Toronto and Vancouver”. In: *Housing Studies* 37.7 (2020), pp. 1250–1273.

⁹Richard Wozny. *Low Incomes and High Housing Prices*. Research note. Site Economics, 2017.

¹⁰Morris A. Davis and Francois Ortalo-Magne. “Household Expenditures, Wages, Rents”. In: *Review of Economic Dynamics* 14.2 (2011), pp. 248–261.

¹¹CANSIM and IRS tables reveal rising average effective tax rates in Canada the U.S.

We consider two elasticities of tax paid with respect to property value: first, how much higher is the typical (median) income tax among owners of properties with values that are some percentage larger than those of another group in the same metropolitan area? The second elasticity considers means: how much higher are mean (or aggregate) income tax payments among the group with larger property values? The distribution of elasticities across U.S. markets is not sensitive to that choice, nor is Toronto’s computed elasticity. However, we will see that Vancouver’s elasticities are greater for means than medians. Moreover, the apparent role of “foreign” buyers in driving Vancouver’s weak property value - income tax elasticity depends on the choice of median or means.

In the following sections, we establish baseline elasticities of tax paid with respect to property value, present the main findings concerning Vancouver and Toronto from the CHSP, and use 2016 Canadian Census data to explore the extent to which two natural explanations for Vancouver’s unusually low elasticities. Finally, we present some simple calculations to ask how much revenue could be generated if Canada or B.C. imposed minimum income tax payments based on property value.

2 Empirical Elasticities of tax payments with respect to property value

2.1 Benchmarking from U.S. metropolitan areas

To approximate the elasticity of taxes paid with respect to property value in U.S. metropolitan areas, we use IPUMS census data combined with the NBER Taxsim model Ruggles et al. and Feenberg and Coutts.¹² We compute these elasticities separately for different metropolitan areas as we are not interested in income sorting across markets, but rather the elasticity conditional on a common price level. Matching the Canadian data described below, we bin the U.S. data into 5% quantile bins from the 0-5th percentiles of home value to the 95th-100th. The IPUMS data is the universe of homeownership household heads in the 2019 wave of the American Community Survey.

In this exercise, we confine ourselves to owner-occupied homes, which will not be the case with CHSP data. That selection should lead the U.S. benchmarks to be somewhat higher than the Canadian values: rental homes tend to be concentrated at the bottom of the quality distribution within markets.¹³ The corporate share also rises in the top quantile of property

¹²Steven Ruggles et al. *IPUMS USA*. Dataset 12. IPUMS, 2022; Daniel Feenberg and Elisabeth Coutts. “An Introduction to the TAXSIM Model”. In: *Journal of Policy Analysis and Management* 12.1 (1993).

¹³See, e.g. Halket, Nesheim, and Oswald. (Jonathan Halket, Lars Nesheim, and Florian Oswald. *The*

values in Canada presumably for tax management purposes.

For each home value quantile bin, we compute the median census self-reported property value and household income. To map from household income to tax burden in Taxsim, we assume a married couple files jointly, with child exemptions for bin-median or bin-mean reported family size minus two. There may be itemization of mortgage interest if the median sum of first and second mortgage debt exceed the standard deduction. We consider tax year 2019, so there is no possible federal deduction for state and local taxes. The total tax paid is the sum of federal and state taxes plus FICA deductions.

For each of 129 U.S. metropolitan areas with over 500 observations of homeowners, we separately regress log Taxsim-approximated income tax on bin-median reported property value to compute a quasi-elasticity of income tax payment with respect to property value for that metropolitan area. Each of these is a regression with at most 20 observations (in some cases there are fewer observations when multiple quantiles share the same property value; property value is self-reported and there are clusters at round numbers). The regression coefficient is the elasticity of interest. The mean value is 0.67, the median is .68, the 25th and 75th percentiles are .61 and .73. The minimal and maximal values are .44 and .95. The values for San Francisco and New York, which might be thought of as analogous to Vancouver and Toronto are .67 and .79 respectively.¹⁴ Figure 1 plots median values by quantile (horizontal) against median Taxsim income tax (vertical) for these two cities. When bin medians are replaced for property value and income with means there is very little consequence at the center of the distribution across metropolitan areas, changing the value at both the median and mean to .63 (from .67 and .68), and at the minimum and maximum to .44 and .88 respectively.

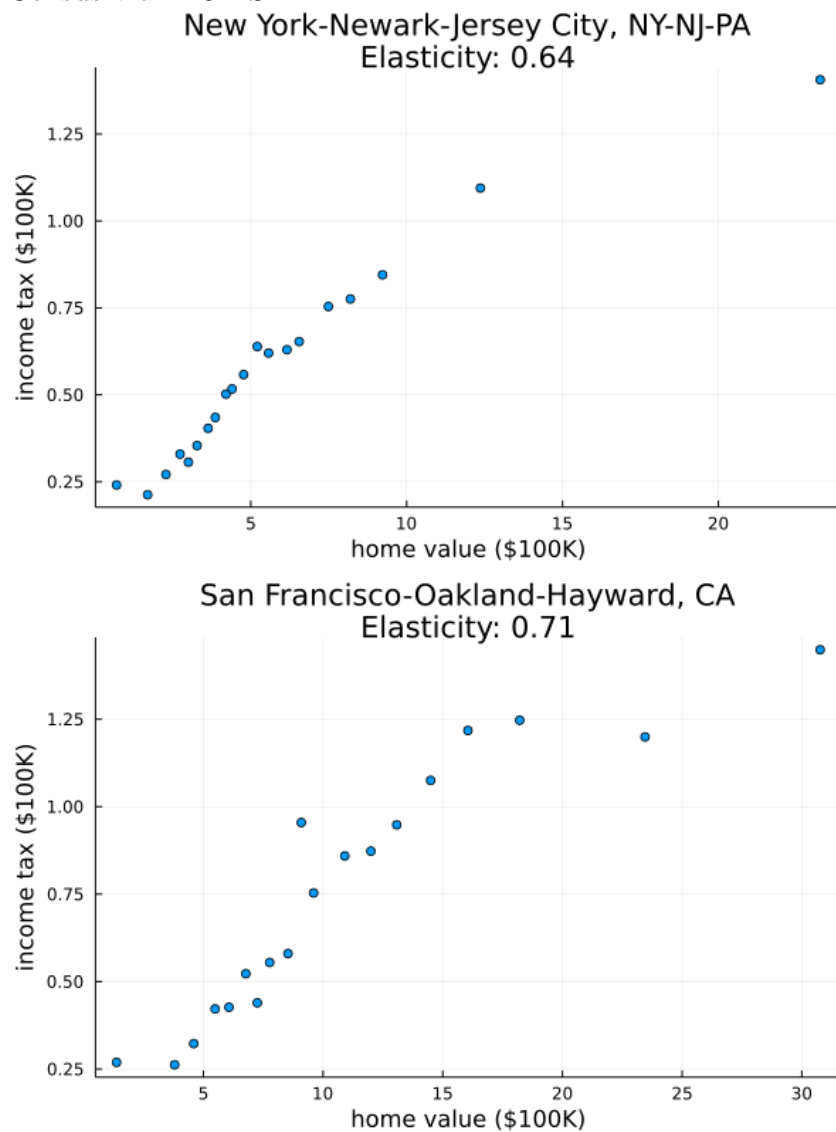
2.2 Canadian Housing Statistics Program data from Vancouver and Toronto

CHSP is intended to capture the universe of residential properties in Canada, including both owner-occupied and rental. The 2018 data links the most recent property tax assessment (2016 for Toronto, 2017 for Vancouver) to total declared tax year 2017 income and after-tax income from the Canada Revenue Agency (pursuant to CHSP staff guidance, we interpret the difference as tax paid) for each individual owner listed on title of each residential property. We sum before- and after-tax income for all individuals named on title for each property

Housing Stock, Housing Prices, and User Costs: The Roles of Location, Structure and Unobserved Quality. working paper. University of Essex, 2017)

¹⁴These elasticities fall at the mean and median when the number of bins is increased from 10 to 20.

Figure 1: Median property value and Taxsim-approximated income tax liability for New York (top) and San Francisco (bottom) metropolitan areas. Underlying data from 2019 Census via IPUMS.



in the Vancouver and Toronto CMAs. We confine the data to properties owned by non-corporate owners, and hence likely over-represent owner-occupied homes.

Table 1 presents median property value and income tax paid by property value quantiles for Vancouver and Toronto. In both cities, we find the ratio of tax paid to property value to be highest for the least expensive properties, likely reflecting ownership of (relatively low value) rental properties among high-income households. In both Toronto and Vancouver, the generally declining ratio of tax paid to property value indicates an elasticity of tax paid with respect to property value below one.

The elasticity of income tax paid with respect to property value is much greater in Toronto (.72 at the median and .72 at the mean, both greater than the respective U.S. averages) than in Vancouver (.27 at the median and .51 at the mean), the median measure is well below the minimum among U.S. metropolitan areas, and the mean close to the U.S. minimum of .44.

Notably, 1 shows that median tax paid in Vancouver does not increase from the 50th to the 90th value quantiles. The median income tax paid of \$15,800 among owners of properties in the top value quantile in Vancouver, with a median value of \$3.76 million is strikingly low. The lowest value of median income tax divided by median property value across bins in Toronto is 1.69, versus .42 in Vancouver, both occurring in the top quantile.

Using bin means to compute property values and incomes rather than medians is a consequential choice in Vancouver, which evidently has skewed income distributions within home price bins. Using means, which better approximates a population regression, the elasticity of income tax paid with respect to property value rises to .5, at the 12th percentile of the U.S. metropolitan area elasticity distribution. Using means, the top 5% of homeowners pay an average of \$85,000 in income tax, with property values of \$4.22 million in Vancouver. For Toronto, the tax is \$128,900 on value of \$3.14 million in the top quantile.

Two natural guesses at why Vancouver's has an unusually flat pattern of income tax payments in property value are that: (1) long-term owners have enjoyed capital gains, may be retired, and own homes beyond their income means to purchase, and (2) non-resident owners drive the difference with Toronto and U.S. cities. These simple explanations are not validated in Table 2, which confines the sample in both Toronto and Vancouver to non-corporate homeowners who are residents of Canada under age 65 (both owners must so qualify for couple owners). Median tax paid at the highest quantile rises to \$20,000, but the remarkably low elasticity of income taxes in property value persists. At the top quantile, median tax paid divided by property value is .56%.

Table 3 subsets Vancouver data into homes in the top and bottom 25% of *jurisdictions* in Greater Vancouver for share of properties owned by at least one non-resident of Canada. Non-residents and foreign buyers for B.C.'s foreign buyer tax are not identical groups, as a

Table 1: All non-corporate owners in 2018: medians

%ile	Vancouver			Toronto		
	Value	Tax Paid	Tax/Value %	Value	Tax Paid	Tax/Value%
5	281,000	6,600	2.35	211,000	4,300	2.04
10	388,000	7,500	1.93	289,000	8,400	2.91
15	463,700	8,600	1.85	342,000	9,800	2.87
20	526,000	9,700	1.84	388,000	10,400	2.68
25	585,000	9,700	1.66	426,000	10,800	2.54
30	652,000	10,400	1.6	460,000	11,200	2.43
35	722,000	10,800	1.5	493,000	11,200	2.27
40	792,000	11,100	1.4	526,000	11,200	2.13
45	852,600	11,300	1.33	558,000	11,400	2.04
50	912,000	12,500	1.37	590,000	12,100	2.05
55	984,000	13,200	1.34	623,000	12,800	2.05
60	1,065,000	13,200	1.24	658,000	13,400	2.04
65	1,162,000	13,000	1.12	696,000	13,400	1.93
70	1,270,000	12,400	0.98	738,000	13,800	1.87
75	1,379,200	11,500	0.83	789,000	14,800	1.88
80	1,502,000	11,200	0.75	851,000	15,800	1.86
85	1,645,000	10,900	0.66	929,000	16,900	1.82
90	1,880,100	12,000	0.64	1,035,000	18,700	1.81
95	2,358,000	13,800	0.59	1,216,000	22,200	1.83
100	3,761,000	15,800	0.42	1,812,000	30,700	1.69

Table 2: Medians: Under 65, resident non-corporate owners in 2018

%ile	Vancouver			Toronto		
	Value	Tax Paid	Tax/Value %	Value	Tax Paid	Tax/Value%
5	283,600	8,700	3.07	212,000	5,800	2.74
10	390,600	9,800	2.51	291,000	10,700	3.68
15	464,000	11,000	2.37	344,000	12,200	3.55
20	523,000	12,000	2.29	389,000	12,600	3.24
25	579,000	12,700	2.19	426,000	13,000	3.05
30	642,000	13,700	2.13	459,000	13,400	2.92
35	711,000	14,200	2	491,000	13,800	2.81
40	779,000	14,300	1.84	524,000	13,700	2.61
45	839,000	14,200	1.69	555,000	14,100	2.54
50	892,100	15,100	1.69	587,000	14,900	2.54
55	957,000	16,300	1.7	619,000	15,900	2.57
60	1,030,000	16,500	1.6	654,000	16,600	2.54
65	1,116,000	16,600	1.49	692,000	16,800	2.43
70	1,216,000	16,700	1.37	733,000	17,400	2.37
75	1,324,000	16,400	1.24	782,000	18,800	2.40
80	1,445,000	16,300	1.13	843,000	20,100	2.38
85	1,586,000	16,300	1.03	922,000	21,300	2.31
90	1,794,000	16,700	0.93	1,028,000	23,300	2.27
95	2,228,300	17,900	0.8	1,207,000	27,700	2.29
100	3,550,000	20,000	0.56	1,810,000	34,500	1.91

Canadian can reside outside of Canada, and a foreign buyer can reside in Canada. There is a striking difference between the two sets of jurisdictions when bin medians are considered. Property values are higher and income tax paid is lower at every quantile in the high-foreign share jurisdictions. Moreover, the elasticity of tax payments in property value is much greater in the low foreign share jurisdictions at .57 than in the high foreign share jurisdictions at .3. While Table 2 shows that confining the analysis to Canadian residents does not change the fact that Vancouver has a comparatively low elasticity of tax payments in owned property value, Table 3 suggests that non-residents do contribute to the magnitude of the issue.

An analog to Table 3 that replaces bin medians with bin means produces different results: the high non-resident jurisdictions exhibit a higher elasticity of tax paid with respect to income than the low non-resident jurisdictions. However, that result is driven largely by the high mean taxes paid by (presumably rental) property owners in the lowest value quantile. For quantiles 2-20, the bin-mean elasticity is greater for low foreign share jurisdictions.

2.3 Income tax on a hypothetical income-driven purchaser

An interesting comparison is between actual income tax paid by owners in Vancouver and the tax that would be paid by an owner financing 80% of the purchase price with a mortgage loan. We assume that the buyer just qualifies for an 80% loan-to-value mortgage under the federal stress test, such that the payment on a 25-year amortizing loan for 80% of the property value at a 5.25% stress-test interest rate plus property taxes would represent exactly 39% of income.

Figure 2 plots the tax paid on stress-tested income, based on the Federal and B.C. income tax schedules for 2018,¹⁵ with only personal credits taken, against actual taxes paid for each quantile. To calculate hypothetical income taxes, we assume that income is split equally between two homeowners. Due to the absence of credits such as pension adjustments, we likely overstate tax burdens. At the top quantile, actual median taxes paid are \$15,800 and stress test taxes are more than 20 times higher, at \$364,624.

3 2016 Canadian Census Data

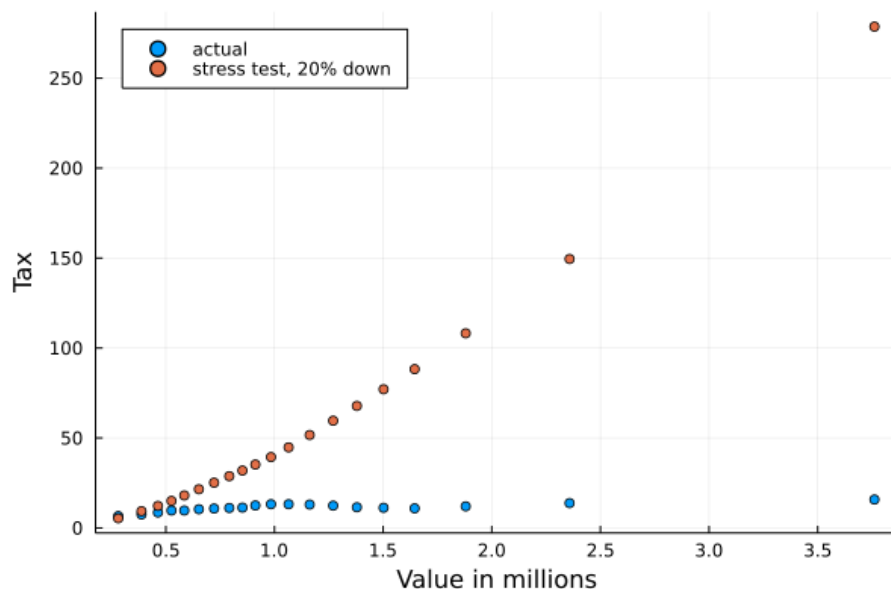
Public use microdata (PUMF) from the 2016 Canadian Census provide the opportunity to verify patterns seen in CHSP data and to further explore whether nationality or long tenure explain Vancouver’s low income tax elasticity in property value. In this data, only owner-occupiers are observed, not investment property owners. PUMF housing data are

¹⁵Taken from Deloitte.

Table 3: Quantiles of 2018 residential property value with median tax paid by owners. Non-corporate owners, only. Bottom (left side) and Top (right side) 25% of jurisdictions in Greater Vancouver by share of non-resident owners

quantile	Bottom 25% Foreign Medians			Top 25% Foreign Medians		
	Property Value	Income Tax Paid	Ratio	Property Value	Income Tax Paid	Ratio
1	232,500	7,100	3.05	340,300	5,700	1.67
2	319,000	7,500	2.35	442,000	6,800	1.54
3	394,000	8,400	2.13	510,000	8,000	1.57
4	469,000	10,500	2.24	571,000	8,000	1.40
5	535,700	11,000	2.05	631,000	8,800	1.39
6	608,000	12,200	2.01	696,000	8,700	1.25
7	670,000	12,500	1.87	776,000	8,200	1.06
8	719,000	13,500	1.88	873,000	8,700	1.00
9	769,000	14,300	1.86	1,019,000	10,000	0.98
10	810,500	13,800	1.70	1,198,300	10,100	0.84
11	846,900	13,300	1.57	1,317,900	9,300	0.71
12	876,100	13,500	1.54	1,411,000	8,400	0.60
13	908,000	14,700	1.62	1,504,000	8,500	0.57
14	944,000	15,200	1.61	1,598,100	8,500	0.53
15	985,700	16,100	1.63	1,706,000	9,100	0.53
16	1,033,900	16,100	1.56	1,872,000	9,500	0.51
17	1,092,000	17,100	1.57	2,126,200	10,700	0.50
18	1,174,000	16,600	1.41	2,536,600	12,500	0.49
19	1,299,000	17,400	1.34	3,239,000	14,200	0.44
20	1,714,000	20,400	1.19	4,833,000	16,100	0.33

Figure 2: Actual median income tax paid by property value quantile versus stress test payments at 39% of income qualifying at an 80% loan-to-value ratio, Greater Vancouver, all non-corporate owners



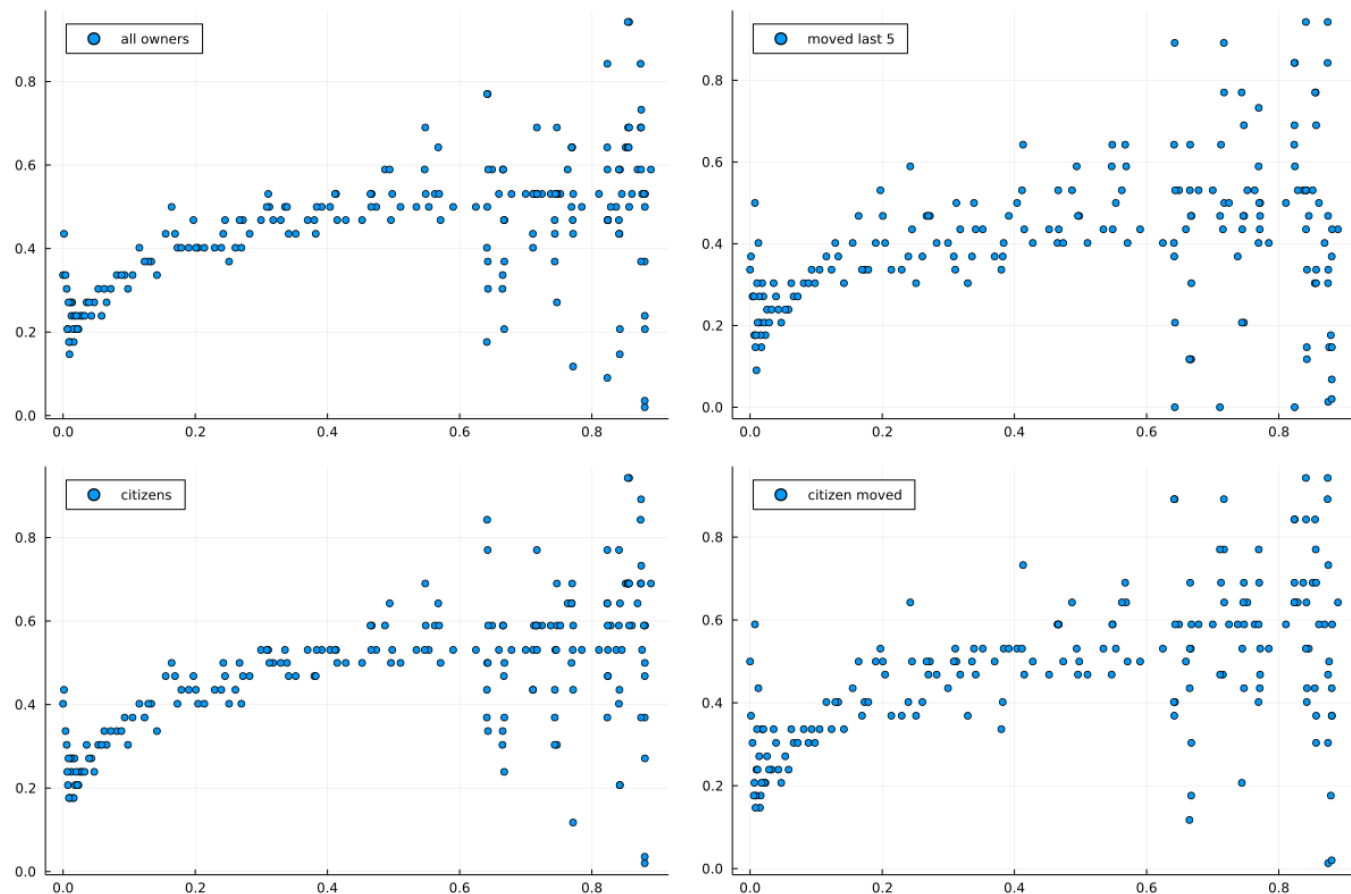
subject to topcoding of property values. Income tax for families is not directly reported, but family income is, in categorical bins.¹⁶ Figures 3 (for Vancouver) and 4 (for Toronto) present plots of housing value and family income among different groups of property owners, with each variable transformed to percentiles. Each point is an observation. Property value is transformed into the fraction of respondents in the same metropolitan area with lower property value. Median family pre-tax income by property value is transformed into the fraction of all PUMF owners with lower pre-tax income regardless of region.

Comparing figures 3 and 4, the top left corner plots all PUMF owners. We can confirm visually that in PUMF as in CHSP, Toronto’s pre-tax incomes grow more quickly in property value than Vancouver’s.

The top right panel of figures 3 and 4 confine the data to households that have moved in the last five years. In this way, we can see if Vancouver’s odd pattern of income in property value can be explained by the presence of long-time owners who were able to buy in at low prices with modest incomes. The answer to that question is clearly “no.” Recent movers’ incomes are highly inelastic with respect to property value in both Vancouver and Toronto. The bottom right panels show that pattern holds among Canadian citizens who have moved in the past five years, too. Notably, that inelasticity of income with respect to property value is not seen in Montreal (not shown), or in U.S. metropolitan areas. IPUMS data show

¹⁶Individual and family pre-tax income and after-tax income are reported categorically, so their difference would be a coarse approximation of tax paid. Individual income, but not household income is available.

Figure 3: 2016 census data: percentiles of family income value and property value for Vancouver. Horizontal axis is percentile of property value within metropolitan area. Vertical axis is Canadian income percentile for median family income among owners with a given property value. Top left: all homeowners in 2016. Top right, owner moved within the past five years. Bottom left: data restricted to Canadian citizens. Bottom right: data restricted to Canadian citizens who moved in the past five years.

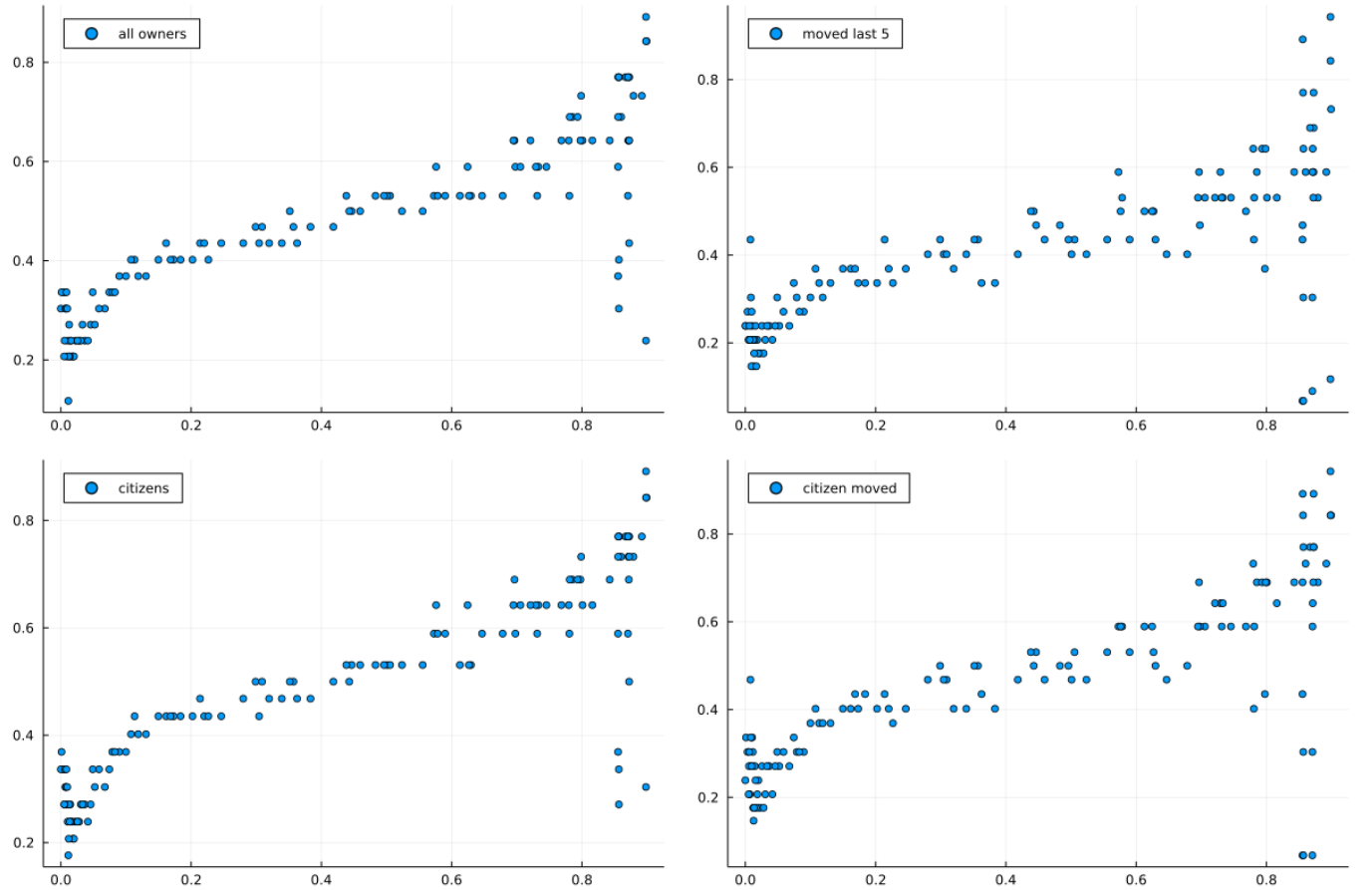


that in the U.S. overall as well as in the New York and San Francisco metropolitan areas, the elasticity of pre-tax income is greater for recent movers than for long-time owners.

The bottom left panel of figures 3 and 4 confine the data to Canadian citizens. As most owners are citizens, it is not surprising that this subsetting does not visually affect the relationship between pre-tax income and property values. It is true in both cities that non-citizen homeowners exhibit very low income elasticities in property value, but it is not the case, for example, that banning non-citizen buyers would restore Vancouver's income elasticity in property value to a level such as Toronto's.

The quantiles of the level of income bins for Toronto and Vancouver are nearly identical, so the weak progression of income in Vancouver home prices relative to Toronto's is not attributable to a very different income distribution, at least outside of the topcoded quantiles.

Figure 4: 2016 census data: percentiles of family income value and property value for Toronto. Horizontal axis is percentile of property value within metropolitan area. Vertical axis is Canadian income percentile for median family income among owners with a given property value. Top left: all homeowners in 2016. Top right, owner moved within the past five years. Bottom left: data restricted to Canadian citizens. Bottom right: data restricted to Canadian citizens who moved in the past five years .



4 Revenue Significance

A question of policy interest is whether addressing the weak income-home price relationship would have significant revenue impacts. A simple back of the envelope calculation suggests so. There are roughly 60,000 properties in each property quantile. The median tax payment in the top quantile is \$15,800. A rough rule of thumb is that under the mortgage stress test, income must be 25% or more of a property’s purchase price.¹⁷ At a 40% average tax rate at high incomes, this implies 10% of property value in income tax. Asking 10% of the tax required by an income-based purchaser in taxes for owners of properties, or 1% of value seems reasonable, if arbitrary.¹⁸ At a median value of roughly \$4 million in the top quantile, this is a \$40,000 requirement, or \$25,000 above the median tax payment. Over \$25,000 on 30,000 properties (half of 60,000 per quantile in Greater Vancouver) is over \$750 million just from the top 5% of properties. As benchmarks, the B.C. Speculation and Vacancy Tax raised \$88 million in its first year and \$80 million in Fiscal 2021/22. The foreign buyer tax raised \$181 million in fiscal 2018/2019, and \$105 million in 2021/2022.¹⁹ Vancouver’s vacancy tax raised \$39.1 million in 2018 and \$27.8 million in 2021.

Table 4 presents a more detailed calculation. For each of the property value quantiles among non-corporate owners in Greater Vancouver, we assume that the distribution of income tax paid is lognormally distributed, with the parameters of the distribution those implied by the mean and median observed in the CHSP data.²⁰ We then integrate probabilities (1/99) and positive differences between implied tax payment and 1% of property value for each of the 1st-99th percentiles of the lognormal distribution. For the bottom 19 quantiles, we assume each taxpayer has the mean property value in the relevant quantile. For the top quantile, we consider a lognormal distribution of values and integrate over both values and taxes paid (assuming no correlation in this bracket between property value and income tax paid). The calculation excludes corporate owners but includes landlords.²¹

We find that revenue raised could exceed \$2 billion from the top two quantiles alone, and over \$3 billion total for Greater Vancouver. A similar calculation for Greater Toronto yields a smaller total of roughly \$2 billion despite many more properties, with the tax shortfall very highly concentrated in the top quantile. Of course, in practice, revenues would be reduced

¹⁷This required percentage has increased with mortgage rates recently.

¹⁸This was the amount set in the B.C. Housing Affordability Fund proposal.

¹⁹Per taxnote.ca

²⁰The mean of the underlying normal distribution is the log of the median value, and the variance is twice the difference between the log observed mean and log observed median.

²¹The treatment of rental properties would be a non-trivial problem to solve. The B.C. Housing Affordability Fund took the approach of replacing income tax paid with declared gross rental income for rental properties. Presumably the income tax burden for vacation homes would be added to primary residences.

Table 4: Potential revenue from a minimum income tax of 1% of property value in Greater Vancouver, all non-corporate owners. Calculations as described above.

Quantile	Number of properties	Expected value: max(1% of property value- income tax paid,0)	Revenue (\$million)
1	58,980	52	3
2	592,20	96	6
3	58,440	131	8
4	59,345	108	6
5	58,535	240	14
6	58,960	306	18
7	59,125	364	22
8	58,560	464	27
9	59,010	565	33
10	59,065	524	31
11	58,590	624	37
12	58,690	894	52
13	58,895	1407	83
14	58,870	2160	127
15	59,085	3273	193
16	58,715	4262	250
17	58,920	5508	325
18	58,775	6644	390
19	58,915	9327	549
20	58,840	27453	1615

by the need to exempt or provide lower value bases for groups such as seniors who purchased their homes long ago. Also, a minimum tax would create an incentive for low tax payers to leave, reducing revenue but enhancing supply available for local earners, consistent with existing policy goals.

5 Conclusion

Household pre-tax incomes in Greater Vancouver and Toronto are similar, but these metropolitan areas exhibit very different patterns of income tax paid in housing wealth. Income tax paid has an elasticity similar to typical U.S. metropolitan areas in property value in Greater Toronto. By contrast, Vancouver appears to have a weaker relationship between income tax and owned property value than any U.S. metropolitan area. Most luxury homes in Greater Vancouver appear to be purchased with wealth derived from sources other than earnings taxed in Canada. To the extent that housing is a good proxy for total wealth, total taxation in Vancouver may be only weakly progressive.

Data provide mixed evidence as to whether taxes on buyer nationality would restore a tighter link between taxes and property value. Census data indicate that purchase price in Greater Vancouver was particularly “decoupled” from income between 2011-2016, a period in which anecdotal evidence suggests a relatively high foreign buyer share. Also, the elasticity of income tax paid with respect to property value is roughly twice as large in jurisdictions with high foreign buyer shares than those with low shares based on bin medians. However, restricting the data to owners who are working-age Canadian residents does not change the relationship between property value and income tax paid in CHSP and the relationship between income and property value is much weaker in Vancouver than Toronto whether or not data are confined to Canadian citizens.

Large increases in government revenue and improvements in overall tax progressivity might be achieved by establishing minimum income taxes as a function of property value. It will be useful to observe 2021 census microdata to determine if foreign buyer and empty homes taxes served to strengthen the relationship between income and property value, or if further measures are required to do so.