Solving Wozny’s Puzzle
Foreign ownership and Vancouver’s “de-coupled” housing market

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1. Wozny’s Puzzle

Vancouver has been struggling with a major housing affordability problem in recent years. Housing affordability is typically measured by the relationship between house prices and local incomes. If housing prices are high relative to incomes, then a city is considered to have an affordability problem. This is usually captured in a ratio: the average house price to average household income ratio – or the “price to income ratio”, for short.¹

The price to income ratio is useful because it can tell us whether the average house price is beyond the reach of an average household. There is a limit to the amount banks are willing to lend buyers relative to their incomes, and this sets a range for what each household can afford. With low interest rates today, that range is usually between about 3 and 5 times a household income, depending on the down payment available, as well as a few other factors (property taxes, existing debt, etc.). Indeed, for most Canadian cities, that is the range for their house price to income ratios: for example, Calgary sits at 3.9, Montreal at 4.1, and Ottawa at 3.5.

Vancouver is an outlier in this respect. In early 2019, its ratio sat at roughly 11.4. The nearest other Canadian city was Toronto at 8.9. Clearly, the two cities have major housing affordability challenges, especially Vancouver.

None of this is news to Vancouverites, nor Torontonians. But what may be news is that these extreme ratios are not evenly found across each metropolitan region: certain parts of those cities have much higher price to income ratios than others. This was the interesting finding of the late Richard Wozny, a former consultant to developers in Vancouver. He presented this result in an April 2017 report titled Low Incomes and High House Prices in Metro Vancouver.

Wozny had seen enough after years of being an insider in Vancouver’s real estate market, and he wanted to sound the alarm over a unique pattern he had seen emerge: some of the areas of Vancouver with the lowest average incomes had some of the highest housing prices, while some of the areas with the highest average incomes had among the lowest housing prices.

This was completely backwards. We would normally expect that higher income areas would have higher house prices, since the residents of those areas could afford bigger mortgages. Indeed, in any typical North American housing market, this is what we find: the wealthy buy in the expensive areas, and those with lower incomes buy in less expensive areas. In short, we should see a strong positive correlation between housing prices and household incomes by sub-area in an urban region. Yet in Vancouver, the correlation was virtually non-existent. Figure 1 shows this unique pattern for 2016. In fact, if the outlier of West Vancouver is removed, then the correlation is actually negative. As Wozny (p. 1) put it: “This market cannot even support a proper supply and demand equation.”

The upshot of this peculiar pattern was that parts of Vancouver had, and continue to have, extremely high price to income ratios. This was the conclusion Wozny hammered home in the 2017

¹ Other measures take a slightly different approach, but those measures correlate very strongly with the price to income measure. The “housing affordability measure” developed by the Royal Bank of Canada, for example, calculates what proportion of an average income would go towards an average price house, subject to the typical mortgage rate at the time, a 20 percent down payment, and various maintenance costs and taxes. Across Canadian cities, the RBC measure correlates with a standard price-to-income ratio at around r = 0.98 (i.e., nearly perfectly).
report – the key chart of which is reproduced here, in Figure 2. Whereas for most Canadian cities the price to income ratio for detached houses hovers between 3 and 5, in some Vancouver municipalities the ratio was over 20. And in the City of Vancouver and West Vancouver, the ratio has been over 30 in recent years.

Something has clearly been amiss, then, in the Vancouver real estate market. In his report, Wozny did not really attempt to explain this strange pattern, except to note that it suggested that a substantial amount of income was not being properly declared to Canadian tax authorities. This hinted at the idea that much of the “de-coupling” of prices and incomes he documented was due to foreign ownership – since foreign income might be more easily concealed from the tax authorities – however that claim was never made explicit. Wozny also noted that varying rates of elderly households, where income may no longer coincide with previous purchasing power, could not account for the massive divergence between municipalities in their ratios.

The pattern Wozny identified has thus remained something of a puzzle. And it is a crucial puzzle when it comes to understanding Vancouver’s affordability problem: a big part of what drives the outlier status of Vancouver in price to income ratio comparisons among Canadian cities is the major de-coupling found in a few municipalities, such as Burnaby, Richmond, City of Vancouver and West Vancouver. If we can understand and account for these extreme ratios, then we will have a much better sense of the causes of Vancouver’s affordability crisis. (And the same is arguably true for Toronto.)

**Figure 1: Vancouver’s strange housing market, 2016**

Source: REBGV; Canada Revenue Agency. Uses data from Wozny (2017).
This report seeks to account for these extreme ratios. It is important, then, to step back and grasp which factors could not account for this pattern, or are very unlikely to do so. Consider a few factors that have been offered up in the housing debate to account for Vancouver’s affordability woes: development charges and other “supply constraints”, lax mortgage lending, and low interest rates. None of these causal factors could plausibly explain the divergence in ratios between municipalities.

If lax mortgage lending or interest rate differences were driving the divergence, then we would expect that mortgage lending policy and interest rates varied sharply across municipalities. But the idea that Burnaby has a different mortgage lending regime than Surrey, say, or has much lower interest rates, is implausible and not supported by any available evidence.

The idea that development charges or restrictions (e.g., permit times) could account for the pattern is similarly implausible. Development charges do not typically apply to building (or rebuilding) a detached house, which is the most that could be at play given that almost none of the municipalities can build any net new detached houses (due to the Agricultural Land Reserve). Thus it’s hard to see how
development charges could have a substantial effect on detached house prices. Differing permit times are also unlikely to have any substantial effect: buyers are not going to pay massively more if the permit time for a new build is 6 months instead of 3. In fact, it is unlikely to be a significant factor at all.

In short, some of the common refrains in the debate are of no use in understanding one of the key empirical patterns in the Vancouver housing market.

What might account for the divergence then? If substantial amounts of foreign money were used to purchase housing, then that might generate such a pattern, since the declared Canadian incomes of this international elite might have little relationship to buyers’ purchasing power. In this case, the municipalities with the highest levels of foreign buying would see the highest price to income ratios, while those with least foreign buying would experience the lowest ratios.

This has in fact long been my suspicion, based on my own research and the work of David Ley and others. For some time, however, this has had to remain a hunch, or an inference, based on what we knew to that point. Thanks to new Statistics Canada housing data, it no longer needs to remain a hunch – it can now be compellingly documented.

2. Foreign ownership and de-coupling

Consider the typical pattern of a “satellite family”. A wealthy businessperson earns abroad, while the rest of the family resides in Canada, yet the family does not declare their global income in Canada for tax purposes. This would mean that a family with a low declared Canadian income might live in a multimillion dollar mansion.

This particular situation would represent “de-coupling” on steroids. The house price to (domestic) income ratio of that one house would be massive. Suppose they declared $20,000 – which is actually close to the typical gross declared income of those who entered through the Investor Immigration Program (IIP) – and they lived in a $2 million house, which is the average house value in Vancouver of IIP families. In that case, the ratio would be a whopping 100. It’s fairly easy to see how that situation, multiplied over many households, could start to generate a high price to income ratio.

But the impact of foreign ownership is likely more complicated, and subtle, than that. That is because when it comes to a housing market, we must distinguish between “stock” and “flow”. The “stock” refers simply to the ownership patterns of all existing housing. “Flow”, on the other hand,

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2 They don’t typically have an impact on condo prices either, but that’s a different debate. See Coriols (2014) “CAC Policy and Housing Affordability: Review for the City of Vancouver.” Available at: https://vancouver.ca/files/cov/CAC-coriols-consultancy-final-report-december-2014.pdf.


5 See for example Guy Gellatly and Rene Morissette (2019) Immigrant ownership of residential properties in Toronto and Vancouver, Statistics Canada. The figures in that document relate to detached houses, and the figures are even higher: the average assessed value for detached houses owned by investor immigrants in Metro Vancouver is roughly $3.2 million. When condos are also considered, the average drops to around $2 million.
refers to the participants in the housing market *at a particular moment* in time – usually the present. This is relevant because the *current* proportion of buyers using foreign money might matter more than the overall ownership patterns, since the price for an asset is determined by the demand and supply conditions *in the present*, not demand and supply in the past. So a surge in buying by wealthy individuals might send prices skyrocketing in the present, even if they only represent a modest share of the total ownership picture.

A hypothetical example may help to illustrate the point. Suppose that there are 10,000 houses in a community. Every year, around 200 houses are bought and sold. If we did a “census” of ownership and found that 5 percent of houses were owned by non-residents, then we might be tempted to think that foreign ownership was not driving changes in the housing market. But 5 percent of 10,000 houses is 500. So if we started at a 3 percent ownership share five years ago (i.e., 300 houses), then the “flow” of non-resident buying would be significant. That would entail the purchase of 200 houses by non-resident buyers over five years (500 – 300), or 40 houses every year. So moving from the 3 percent ownership share to 5 percent share would mean that non-resident buyers were 20 percent of the buyer pool over those years (40/200 = 20 percent).

In fact, we already know that the “stock” data understates the “flow” data, because recent data from Statistics Canada shows this. To take one example, the share of condos owned by non-residents in Burnaby in 2018 was about 12.5 percent – however the share of condos that were built in 2016-17 that were owned by non-residents was 25 percent. The latter figure is the closest we have to “flow” data, and it shows roughly double the rate of non-resident participation than the “stock” data suggests. This share of non-resident buying is likely to have a significant impact on housing prices, as economic studies attest. Chinco and Mayer (2015) found, for instance, that for each extra percent share of out-of-town buyers, prices were predicted to rise nearly 2 percent the next year in American cities during their 2000s housing boom.

The influential role played by these buyers is partly a product of the fact that they are typically the buyers willing to pay the most (the so-called “marginal buyer”). This means that their purchases set new “benchmarks” in the market, which affect the buying and selling behavior of other market participants.

Moreover, their purchasing will have potent “knock-on effects” in the market. To see this, consider the purchase of a detached house on Vancouver’s westside by a buyer using substantial foreign wealth. In this case, perhaps the house is bought for $4 million, and it was owned by a longtime resident, who purchased it in the 1980s for $250,000. So, all of a sudden, that longtime resident is now a very wealthy person: that $3.75 million capital gain is tax-free. What happens next? Suppose that the longtime owner is a grandmother who wants to downsize. First, she takes some of the money and buys a pricey condo in Kits, pushing up prices in that segment – she is now “setting the pace” in that market. Next, she generously shares some of her windfall with her three children and their spouses, who live in East Vancouver. Two of the couples choose to move up in the market, using their newfound money to purchase at a higher price than they could have otherwise, even

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though they stay in the same neighborhood. The house prices in that neighborhood are then pushed up. One of the couples also has a 27 year old son and a 25 year old daughter, both looking to get into the market. The windfall gets shared with them, too, in the form of down payment help.

Now all of a sudden, one expensive house purchase has turned into five other house purchases, all transacted at higher prices than would have otherwise occurred. Now repeat that process a few thousand times in the span of a couple of years. Your housing market is going to quickly become divorced from local earning power: it will reflect the purchasing power of wealthy buyers abroad, and cease to match local incomes.

You can thereby arrive at a radically de-coupled housing situation, and this will be witnessed most intensely in the areas that are most affected by foreign-sourced buying – in part because some of the “up-market” moves done by those with access to a “windfall boost” may happen within their existing municipalities (e.g., the children in the example above), where they have established social communities and/or career connections.

In sum, if a significant share of existing purchases – the “flow” – is made by those with foreign wealth then house prices will reflect the purchasing power of these foreign-sourced buyers, even if the “stock” of foreign ownership is modest. And this decoupling of house prices will be most pronounced in the areas affected by foreign ownership.

3. Examining the hypothesis

If the above is true, then we should see a strong (positive) relationship between the degree of decoupling (i.e., high price to income ratios) and levels of foreign ownership in a municipality. Do we find this? Yes, we do. In fact, the relationship is extremely strong.

To test the hypothesis, I looked at the non-resident ownership data generated by Statistics Canada and CMHC through the Canada Housing Statistics Program (CHSP). The measure I present below defines non-resident ownership as a situation where there is at least one individual on title that has an address abroad as their primary residence (i.e., they do not typically reside in the country). Non-resident ownership is not exactly the same thing as foreign ownership. Foreign ownership is best defined as “ownership primarily based on foreign income or wealth”, and this is distinct from residency. Nevertheless, non-resident ownership usually entails foreign ownership, since non-resident owners are likely to be using foreign money to purchase or maintain ownership – otherwise they’d be working and living in Canada. So these data are still informative in relation to foreign ownership. That said, non-residency doesn’t capture all foreign ownership, because resident owners may be using foreign income or wealth too, as in a “satellite family”, yet the breadwinner may not be listed on title. So the “non-resident ownership” figures from the CHSP are likely conservative in

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7 This in fact understates the case, since those who sell their units at higher prices to the buyers with “windfall equity” (i.e., the children) now have more in the bank that they can take to their next purchase. So the knock-on effects are even broader than the five transactions in this hypothetical case.

8 There is another possible definition in the CHSP: properties are considered non-resident owned only if a majority of owners on title have a primary residence abroad. These definitions are very similar, clearly. The one I use produces estimates of non-resident ownership that are slightly higher than the other definition, however they correlate extremely closely (r = 0.98). The conclusions presented below therefore do not change materially if we use a different definition.
terms of the overall amount of foreign ownership, properly defined. The data are also limited since it only describes the ownership “stock” in 2017.

Despite these limitations, these data are useful for current purposes because they are likely to reflect longstanding patterns of foreign buying (i.e., where those with foreign money are most likely to purchase housing). As a result, the figures for non-resident ownership can be taken as reliable proxies for the relative amount of foreign buying taking place in different municipalities.

The second type of data that we need is that found in Figure 2, which measures the price to income ratio in different municipalities. The variation that we see in “de-coupling” in Figure 2 is what we are trying to explain here (i.e., it is our dependent variable). This data was gathered by Wozny from the Canada Revenue Agency, for household income, and the Real Estate Board of Greater Vancouver, for house prices. I have reproduced his charts here, and stick to using the years he selected for his analysis.9

So, what does the relationship between these variables look like? The relationship between foreign ownership and de-coupling is depicted in Figure 3 for 2016. The correlation is 0.96. (1 is a perfect correlation, 0 is the absence of any correlation.) This is a remarkably strong relationship: the vast majority of the variation in price to income ratios can be accounted for by foreign ownership.10

Figure 3: Non-resident ownership vs. “de-coupling” in 2016, Metro Vancouver

9 Using household income figures from the Census did not change the results significantly. The charts use Wozny’s data.
10 If we run a simple regression of these two variables, the R squared is 0.93 — which means that 93 percent of the variation in de-coupling is “explained” or “predicted” by foreign ownership, in a simple linear model. The relationship is statistically significant at z = 0.001.
A common rejoinder is that “correlation is not causation”, but that is unlikely to be a valid critique here. We have a good causal theory for the relationship to exist, and there does not seem to be any other plausible contending factors that might account for the pattern, as noted above.\(^{11}\) Indeed the strength of this relationship is striking; it is rare in social science research to see a relationship this strong. This is compelling evidence that when it comes to the extreme “de-coupling” seen in the Vancouver housing market, foreign ownership is the primary culprit.

It is also telling to look at the relationship in 2013. Figure 4 does this. Here again the relationship is extremely strong. What is different, though, is the slope of the predicted linear relationship. Put simply, in 2013 the share of foreign ownership predicts less extreme price to income ratios than in 2016 (Figure 3). What this suggests is that the “flow” of foreign money was less pronounced in 2013 than it was in 2016. In both years, the relative amount of foreign ownership (or foreign interest) accounts very well for the price to income ratios; however, in 2016, foreign interest drove the ratios to unprecedented levels, since Vancouver was experiencing a surge in foreign buying during that period. Indeed, this matches up with the empirical evidence.\(^{12}\)

**Figure 4:** Non-resident ownership vs. “de-coupling” in 2013, Metro Vancouver

\(^{11}\) Differing patterns of elderly households, for example, don’t account well for the variation. We might think that areas with a larger elderly population might have higher price to income ratios, because the incomes of elderly households might be relatively low compared to their purchasing power in the past. A simple regression on de-coupling that included both elderly and non-resident ownership share found that only the latter was statistically significant.

\(^{12}\) See Josh Gordon (2017) “Housing price lunacy moves east”, *Inroads*, No. 41 (Summer/Fall 2017): 25-37. We would also expect that as foreign buying slowed, then the slope will drop again, which we may be able to soon test.
Using the CHSP data, we can also see other corroborative evidence: we can look at the current state of the detached housing market in different municipalities as foreign buying has slowed in the past two years, due to policy measures (e.g., the Foreign Buyer Tax, Speculation and Vacancy Tax, etc.) and to limits on capital flight imposed by China, previously the primary source of foreign buying. If foreign money has been playing a big role in the market, then we would expect that the softest detached markets would be those found in the areas traditionally most exposed to foreign demand. Do we see this? Yes, again we do.

Figure 5 shows this by plotting the foreign ownership share in 2017 against the state of the detached housing market in early 2019, as captured by the sales-to-active listings ratio. The sales-to-active listings ratio is widely used in real estate circles, since it is seen as an indicator of future price trends. It compares monthly sales with the amount of listings for sale in that month. In other words, it furnishes analysts with a simple indicator that relates supply (inventory/active listings) to demand (sales). Typically, below 0.12, a market is considered a buyer’s market, with prices falling – i.e., low sales, high inventory – while above 0.20 constitutes a seller’s market, with prices rising – i.e., high sales, low inventory. The markets that have been most exposed to foreign buying are the deepest in buyer’s market territory, despite (still) low interest rates and low unemployment, which should otherwise support a buoyant market. This is yet more evidence of the central role played by foreign buying in the Vancouver housing market.

**Figure 5: State of detached market in early 2019 vs. non-resident ownership, select cities**

![Graph showing sales to active listings ratio and non-resident ownership share for select cities in Vancouver.](image)

Source: REBGV; CHSP.
In the face of all this evidence, a skeptic might reply: “Well sure, you’ve found the relationship in Vancouver, but it might be spurious – maybe there’s something else driving that relationship.” As explained above, this is highly unlikely, given the strength of the relationship and the absence of any plausible alternative factors. But another piece of evidence might be invoked to convince the skeptic: data for the same relationship in Toronto, another market that has been subject to strong foreign demand in recent years.\(^{13}\) Does the Toronto market display the same pattern, with foreign ownership shares associated with higher price to income ratios? Yes, it does. Figure 6 shows this.

The relationship is somewhat weaker \((r = 0.76)\) than in Vancouver, likely due to the weaker relative influence of foreign ownership in Toronto, but the connection remains strong and unmistakable. The City of Toronto is also an outlier.\(^{14}\) If the City of Toronto is removed from the scatterplot, the correlation increases to \(r = 0.88\).

**Figure 6: Non-resident ownership vs. “de-coupling” in detached houses, Greater Toronto**

![Graph showing the relationship between non-resident ownership share and price to income ratio in detached houses in Greater Toronto, with the City of Toronto as an outlier.](source: CHSP; Statistics Canada).

\(^{13}\) We could consider this a test of the theory’s “external validity”, to use social science jargon. There is strong evidence for the hypothesis in Vancouver (i.e., “internal validity”), but if we can show the same relationship holding in another context, then this provides extra confidence in the theory.

\(^{14}\) This may reflect amalgamation, which has the effect of pooling many lower income renters (who typically live in apartments) with higher income detached homeowners, thus boosting the price to income ratio. This will happen in all municipalities, but it may be more pronounced in City of Toronto due to amalgamation and the density of the city (relative rarity of detached houses). Detached houses in the City of Toronto may also be considered to have significant rezoning potential, which will boost land values – again pushing up the price to income ratio relative to other municipalities.
Note also that the shares of non-resident ownership are lower than in Metro Vancouver (the x-axis). These relatively low figures have been used in the debate to discredit the notion that foreign ownership is playing a big role in the Toronto market. What Figure 6 shows, however, is that even modest amounts of overall foreign ownership – as proxied by “stock” figures based on “residency” – can be very powerful in accounting for a substantial divergence in price-to-income ratios. This is likely because both the “stock” figures significantly understate the “flow” figures, and because non-resident buying is a decent proxy of the much more influential phenomenon of “residents” using foreign money in housing purchases.

Another way of making the point is as follows: if foreign demand is playing as small a role as some pundits maintain, then how do we account for these strong relationships? Until these pundits offer up a compelling alternative account, then there is very strong evidence that foreign ownership is having a major impact.

Lastly, I should simply note that this document has focused on detached houses to keep the story simple, and to try to illuminate the most extreme examples of “de-coupling”. Foreign ownership has also affected the condo market, however. It has done so in part by pushing some higher-income Vancouverites, who might otherwise have bought a detached house, to buy a condo, or by fostering the “windfall boosts” described above, which serve to push up condo prices. But its impact is also reflected in differing price to income ratios for condo prices across municipalities, which accords to the same logic spelled out earlier. As Figure 7 shows, using Wozny’s reference year again (2016), the correlation between price to income ratios for condos and non-resident ownership shares remains strong ($r = 0.75$). With the outlier of West Vancouver removed, the correlation is $r = 0.88$.

**Figure 7: Non-resident ownership vs. “de-coupling” in the condo market, Metro Vancouver**
4. Moving forward

Some in the housing debates in Toronto and Vancouver have sought to downplay the role of foreign demand or ownership. We now have reliable data from the Government of Canada and it is telling us plainly that foreign ownership has been central to “de-coupling” and thereby central to housing unaffordability in Toronto and Vancouver.

We should be thankful that this data has been gathered, so that we can cut through some of the misinformation that has surrounded the topic. Those who have cited modest “stock” figures for foreign or non-resident ownership, in order to allege its “minimal role”, have been leading us astray. If foreign ownership or demand was truly playing such a minor role, then the relationships uncovered in this report simply would not exist. The likelihood of these strong correlations – in two cities, no less – existing just by “chance” is not plausible.

The question then is “what next?” My hope in writing this document is partly to support the views of most Torontonians and Vancouverites, who have long recognized the prominent role of foreign demand or foreign ownership in their housing markets. What is needed is an evidence-based discussion about how to move forward towards affordability.

Another hope is that this document will prompt a rethink among the leadership of the CMHC. The leadership of the organization has got this issue consistently wrong, as their own data now shows. The report that they released in 2018, *Examining escalating home prices in large Canadian metropolitan centres*, was gravely flawed, and its conclusions highly misleading. Moving forward, they should distance themselves from its conclusions, especially their misplaced emphasis on supply-side factors.

Lastly, this document is testament to Richard Wozny’s instincts and character. He saw what was going on and how it threatened the long-term social and economic viability of Metro Vancouver, and he saw how the existing policy framework harmed especially young Vancouverites. He spoke up, and risked alienating long-time colleagues in doing so. We should be thankful for his candor and insight, we need more of that today.