The Cape of Good Homes: Exchange Rate Depreciations, Foreign Demand and House Prices*

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Abstract

Emerging markets are characterized by frequent periods of large and unexpected exchange rate depreciations. These events create opportunities for foreign investors to purchase domestic assets at a discount, especially if these assets have sticky prices. We show this to be the case in the housing market in Cape Town, South Africa. Using property transaction data, we find that foreign non-residents buy more properties following large exchange rate depreciations—in the lower quartile of month-on-month changes. We find no evidence of a similar effect for other buyers, suggestive of strong exchange rate-related motives. Using these depreciations as demand shocks to foreign non-resident buyers, we find that this increased demand leads to an increase in house prices of 3.39%. We find that foreign non-resident buyers pay 10.42% more than other buyers for otherwise identical properties and that this tendency to pay a premium accounts for around 27% of the observed causal impact of foreign demand on house prices.

Keywords: foreign housing demand; exchange rates; house prices
JEL Codes: R21; F31; G11

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1 Introduction

International capitals flows to emerging markets are sizable, volatile, and prone to large outflows and sudden stops.[1] Consequences of these volatile capital flows include volatile exchange rates, frequent episodes of large, sudden depreciations and painful macroeconomic adjustments for emerging markets.[2] Often, exchange rate depreciations are associated with foreign capital outflows. They can, however, as Aguiar and Gopinath (2004) point out, also stimulate foreign direct investment. These types of counter-cyclical foreign capital inflows are particularly important in stabilizing the local economy. Large and sudden depreciations can furthermore stimulate foreign purchases of domestic goods, especially if domestic prices are slow to adjust.[3] One example of this is the housing market, where depreciations are often associated with inflows of foreign capital to the domestic market.[4] The extant literature studies this channel for moderate exchange rate depreciations in advanced economies. But the phenomenon of large and sudden exchange rate depreciations is much more prevalent in emerging markets.[5] If these foreign inflows into emerging market real estate act counter-cyclically, this can have important stabilizing effects on house prices.[6] On the other hand, there are widespread concerns that foreign demand for local property is driving up house prices in cities around the world.[7]

In this paper, we study the effect of large and sudden exchange rate depreciations on property prices in Cape Town, South Africa, using detailed micro-level data on the universe of properties between 2011-2017. We obtain four results that shed light on whether the concerns about foreign capital inflows into the housing market are warranted. First, we show that foreign purchases of properties are sizeable, accounting for 6.91% of all transactions and 12.56% of all transaction volume. We also show novel evidence of foreign ownership of the total property stock, with foreigners owning around 5% of all property during this period. We, second, find that foreign non-resident transactions increase notably in the month following large and sudden exchange rate depreciations.[8] By contrast, foreign resident transactions are unchanged, in

[1] See for example, Calvo, Leiderman and Reinhart (1996) and Hannan (2018).

[2] See for example Mendoza (2010). In this context, exchange rate adjustments are an important mechanism to act as a buffer against negative economic effects associated with capital outflows, as in Edwards (2004).

[3] Depreciations and sticky domestic prices create a *"temporary window of opportunity for foreign buyers"*, as Froot and Stein (1991) note.

[4] See for example, Cvijanovic and Spaenjers (2020) and Ruf and Levi (2011).

[5] As noted by Burstein and Gopinath (2014), "Unlike episodes of regular sized exchange rate movements, large devaluations tend to be associated with large declines in output, consumption and imports"

[6] See for example, the IMF Global Financial Stability Report for April 2018 – "greater participation of foreign investors, especially those with long horizons, may be able to stabilize asset prices, including housing, if they behave counter-cyclically and take advantage of fire sale opportunities"

[7] See, for example: "Foreign buyers push up global house prices" – *The Economist*, 11 March 2017

[8] Defined as a lower quartile month on month change in real effective exchange rate. This corresponds to a month on month depreciation of over 2.39%.

line with exchange rate-linked purchasing motives.

Third, using large and sudden exchange rate depreciations as demand shocks to foreign non-resident buyers, we study the price effects of this surge in demand. Our identification strategy leverages persistence in the location of foreign non-resident transactions, specifically the tendency of these buyers to purchase property in suburbs with large pre-existing shares of foreign non-residents.[9] We compare quality-adjusted property prices in these suburbs to property prices in geographically close suburbs following a large exchange rate depreciation.[10] By studying the price spread between geographically close suburbs, our empirical approach controls for any confounding factors that are spatially correlated across treatment and control groups. This allows us to estimate price effects following large exchange rate depreciations based on the variation in pre-existing foreign ownership across geographically close and similar suburbs. Using this approach, we find the causal effect of foreign demand on house prices in neighborhoods with large pre-existing shares of foreign non-residents following a large and sudden exchange rate depreciation to be 3.39%.

Fourth, we find that foreign demand can be decomposed into an extensive margin aggregate demand effect and intensive margin effect: Conditional on entering the market, foreign non-resident buyers pay 10.42% more than other buyers for otherwise identical properties. Our results suggest that, while the extensive margin effects dominates, around 27% of the observed causal impact of foreign demand on house prices originates from their tendency to pay higher prices than locals would for otherwise identical property. With regards to the intensive margin, we highlight an important feature of foreign demand, so far overlooked by the existing literature—the tendency of foreign buyers to be cash buyers, and the sizeable price discounts associated with cash transactions. We find that a failure to account for financing understates the foreign buyer premium by 28%, suggesting that existing estimates of this premium in the literature are likely understated.

We collect novel transaction-level deeds data for Cape Town, South Africa, a major emerging market city popular with foreign buyers. We observe the universe of property transactions between 2011 and 2017 with information on the nationality status of each buyer and seller as well as detailed information on property characteristics. In addition to this, we also observe a record of ownership for the total property stock. As a result, we are able to observe both the flow and stock of foreign transactions. Furthermore, South Africa has one of the most volatile exchange rates in the world. While local institutional and economic conditions are not to be neglected,

[9] Defined as suburbs where the share of foreign non-resident owned properties is in the upper quartile of the distribution of foreign non-resident owned properties in surrounding suburbs.

[10] In our geographical hierarchy, this means comparing prices across suburbs called *sub-places* which are nested within a broader suburb classification, called *main-places*.

global conditions play a major role in the volatility of the rand.[11] This makes Cape Town the ideal setting for our analysis.

Our paper contributes to various strands of literature. One extensive strand of literature studies the relationship between foreign direct investment and exchange rate depreciations, such as Froot and Stein (1991), Harris and Ravenscraft (1991), Goldberg (1993) and Blonigen (1997). In our paper, we focus on foreign investment in real estate and the friction at the heart of why exchange rate depreciations create opportunities for foreign buyers owing to sticky house prices as opposed to factors such as imperfect capital markets. Cvijanovic and Spaenjers (2020) provide evidence on how the exchange rate affects foreign demand. The authors document the correlation between foreign demand and exchange rate depreciations in Paris but do not study resulting price effects. In a similar vein, Ruf and Levi (2011) study how changes in the exchange rate affects property prices in areas in the US and Canada which are likely to be attractive to foreign buyers relative to other areas, but do not directly study how foreign transactions respond. Ruf and Levi (2011) are unable to make the distinction between foreign resident and foreign non-resident demand and, as we show in our paper, this distinction matters because exchange rate depreciations only affect foreign non-resident demand. Furthermore, we focus on a very specific kind of large depreciation event, which is a distinctive feature of emerging markets and which has not been studied in the literature.

We also contribute more generally to the literature on international capital flows and house prices, such as Favilukis et al. (2012) and Aizenman and Jinjarak (2009). In particular, we provide novel evidence of this relationship in emerging markets, using granular transaction-based data, while the existing evidence, such as Cesa-Bianchi, Cespedes and Rebucci (2015), is largely based on aggregate data. In particular, our study of the impact of foreign demand and the implications for house prices links our paper closely to recent work by Badarinza and Ramadorai (2018), Cvijanovic and Spaenjers (2020), Favilukis and Van Nieuwerburgh (2018), Chinco and Mayer (2016), Gorback and Keys (2020) and Sá (2016). However, those papers focus on cities in advanced economies, whereas we are the first to show evidence of this foreign demand channel in an emerging market context. Our results indicate that foreign demand for real estate in an emerging market has counter-cyclical properties with foreign inflows into the property market occurring following large depreciations—periods which are typically associated with large outflows of foreign capital in the bond and equity markets. In this respect, while we find that foreign demand increases prices, it likely also has an important stabilizing effect on house prices.

Lastly, a range of papers study the investment performance of different buyers and sellers in the

[11] For example, the rand is the 20th most traded currency in the world, accounting for around 1% of all global foreign currency trading. See: "2016 Bank for International Settlements (BIS) Triennial Central Bank Survey".

housing market, including Cvijanovic and Spaenjers (2020), Chinco and Mayer (2016) and Bayer et al. (2017). We contribute to this literature by highlighting the role of buyer financing, linking to a literature which studies price discounts associated with property transactions involving a cash buyer, such as Bian, Lin and Liu (2018), Asabere, Huffman and Mehdiany (1992) and Lusht and Hansz (1994). Our results highlight that studies which quantify premia across different groups of buyers and sellers in the housing market can potentially under- or overestimate these premia by failing to control for the financing decision of the buyer. This holds in particular in a context where regulation constrains the ability of certain groups of buyers to freely choose how they finance their purchase. To the best of our knowledge, ours is the first paper to quantify this effect.

2 Data

While a range of papers examine foreign demand for real estate, these studies typically make use of aggregate data and proxy for foreign real estate demand.[12] In this paper, we use novel and granular housing data for Cape Town to provide a detailed account of foreign demand for property in a major emerging market.

We collect data on the full universe of residential property transactions in Cape Town, as recorded in the Deeds Registry, covering the period from January 2011 to December 2017. The deeds registry records information on the transaction price and date of sale of every property, along with information on the buyer and seller, which allows us to identify the nationality status of each party. We restrict our analysis to residential freehold and sectional title properties and filter out all property transactions involving the government and non-natural (or legal) persons.[13]

In addition to data on the flow of transactions, we also obtain novel data on the ownership of the property stock. We obtain a snapshot of the property registry as of 2011. This dataset contains ownership information on every property in Cape Town recorded as of 2011 and allows us to observe who owns every property in the city, the price they paid as well as their nationality status, irrespective of when the property was purchased. Using the flow of deeds registry transaction data, we are able to amend this table going forward to adjust ownership information for existing properties and append information about newly developed properties. This allows us to document the percentage of properties owned by foreigners at any point in time.

We complement our transaction data with detailed property characteristic information for each

[12] To the best of our knowledge, only Cvijanovic and Spaenjers (2020) and to some degree Ruf and Levi (2011), have been able to exploit transaction-level data to cleanly identify foreign ownership.

[13] We discuss our data cleaning process in the Online Appendix C.

property in Cape Town. This dataset is sourced from the local government, and is used to inform the calculation of property values used in the determination of property tax. The data are recorded as of 2015 and therefore time-invariant.[14] We append this dataset to the property transaction data given common property identifiers.

In this paper, we focus on three groups of individuals: (i) *South African residents*, i.e South African-born citizens who have a South African identity number (ii) foreign-born *South African residents*, or *Foreign residents*, i.e persons who have a South African identity number but were born outside of South Africa and (iii) *Foreign non-residents*, defined as individuals, who provide their passport as an identifying document when purchasing property and therefore represent individuals who are in South Africa on a visiting or temporary status. We identify the nationality and residence status directly from the identifying documentation provided by the buyer as opposed to other approaches in the literature which use the mailing address supplied by the owner to receive their tax assessment (e.g. Ruf and Levi (2011) and Chinco and Mayer (2016)) or the primary address of the buyer provided on the day the title deed is signed by the notary (e.g. Cvijanovic and Spaenjers (2020)).

One limitation of our data is that, while we are able to distinguish these foreign residents and non-residents from South African residents, i.e. while we have the buyer and seller residence *status*, we are unable to distinguish the exact nationality of these foreign resident and non-resident buyers and sellers.

3 Features of foreign housing demand

Table 1, panel (a) shows summary statistics across different buyer types between 2011 and 2017. Foreigners bought 6.91% of all property on the market, which made up 12.56% of the total local currency (South African Rand) value of all property transactions.[15] Foreign non-residents bought 32% more properties than foreign residents and invested more than twice as much (113%) in monetary terms. This is a difference to the extant literature which has typically studied cities with larger investment by foreign residents.[16] For each transaction we also observe

[14] We describe each variable in the Online Appendix C

[15] Throughout the paper, when we refer to 'foreigners', we mean foreign residents together with foreign non-residents.

[16] For example, Cvijanovic and Spaenjers (2020) show that in Paris, foreign residents made around 64% more transactions than foreign non-residents. This is possibly linked to stronger immigration motives in these settings. These motives could include (i) ease of immigration, especially within the Euro Area or (ii) policies which reward real estate investment with residency benefits through so-called 'Golden Visas'. These residency motives are arguably less pronounced in Cape Town and South Africa and as a result, the fact that foreign non-resident demand dominates foreign resident demand, suggests that buying motives in Cape Town likely reflect motives such as va-

how the transaction was financed: with a mortgage or using cash. Between 2011 and 2017, cash transactions accounted for 85.8% and 74.3% of all transactions made by foreign non-resident and resident buyers, respectively. Meanwhile, cash purchases among South African resident buyers account for less than half of all South African transactions. The feature that foreign buyers are typically cash buyers is consistent with global survey evidence.[17] To the best of our knowledge, ours is the first paper to document this feature using transaction data.

[Insert Table 1 about here]

From the seller's perspective, Table 1 panel (b) shows that foreign non-residents sell their property for more than other sellers. While foreign residents sell more properties than foreign non-residents, both buyer groups are net buyers. While South African residents and foreign residents make similar capital gains upon resale, foreign non-residents realize significantly lower capital gains than their counterparts and also have shorter holding periods. We explore this pattern in a later section.

In Table 2 we show summary statistics for select property characteristics across buyer types. Foreign buyers typically purchase larger properties than other buyers and also purchase a significantly higher share of sectional title properties (typically apartments). Together, this highlights that foreign buyers purchase very different types of property than local buyers.

[Insert Table 2 about here]

3.1 New evidence on the stock and flow of foreign demand

Figure 1 shows the time series patterns of foreign investment. Resident transactions are largely constant throughout the period, while non-resident investment is more volatile with sizeable net inflows. Figure 2 shows that as a share of total sales, foreign non-resident and foreign resident sales have increased throughout the period.

[Insert Figure 1 about here]

[Insert Figure 2 about here]

cation homes as opposed to immigration.

[17] For example, a survey completed by the National Association of Realtors finds that in 2018, 72% of of all non-resident foreign buyers were cash buyers in the USA.

Next, we document the spatial distribution of foreign transactions, which we show in Figure 3. In panel (a), we see a strong concentration of foreign non-resident transactions in the South-West of Cape Town.[18] In many of the suburbs where foreign non-residents are present, they have purchased over 15% of all transactions between 2011 and 2017. In fact, 35.4% of sub-places see no foreign non-resident transactions during our sample with 69.3% of all transactions occuring in 10% of all suburbs, translating to a Gini coefficient of 0.808. Foreign non-residents not only concentrate in specific regions, but also make up a large percentage of transactions in these areas. In panel (b) however, there is much weaker evidence of concentration in the location of foreign resident transactions.

[Insert Figure 3 about here]

Property transaction data facilitates the study of the flow of foreign transactions. Using this type of data, increases in the relative share of foreign transactions are typically interpreted as a crowding out of local buyers. Whether or not this leads to an increase in the share of foreign owned properties with respect to the property stock is, however, an open question, given that the property stock is constantly changing as new properties are added. For example, increased relative foreign demand could only result in minor changes in the composition of ownership of the property stock if the existing stock of foreign-owned properties is low or if the rate of new property development outstrips foreign transactions.

Using the data on ownership of the property stock, we can study how the evolution of foreign ownership at a city level has changed over our sample period. In Figure 4 we show this ownership share between 2012 and 2018, with the share recorded as of 1 January each year. Foreign non-residents own around 3.2% of all residential property in Cape Town, while foreign residents own around 2.2%. As a result, foreign ownership is close to 5.5% of all residential property in Cape Town. Furthermore, this ownership share is remarkably flat over the six-year period we study.

[Insert Figure 4 about here]

In Figure 5 we show how this ownership is distributed across the city as of 1 January 2018. The patterns of foreign ownership are very similar to the flow of foreign transactions shown in Figure 3.

[Insert Figure 5 about here]

[18] The South-West of the city includes the central business district (CBD) and popular coastal areas.

On aggregate, while there is little change in the foreign ownership between 2012 and 2018, there is notable heterogeneity across suburbs. In Figure 6 we show the relationship between sub-place-level foreign ownership in 2012 and the same measure in 2018. For both residents and non-residents, there is a greater pattern of net outflows than net inflows across all sub-places. In fact, conditional on having a non-zero non-resident (resident) ownership share in 2012, 69.3% (69.5%) of sub-places see a decrease in the share of non-resident (resident) ownership by 2018. However, there appears to be substantial intensive margin changes in foreign ownership. For those sub-places which experience an increase in foreign ownership, the median non-resident and resident change in ownership is 22.4% and 28.7%, respectively.

[Insert Figure 6 about here]

All of the descriptive evidence presented suggests that foreign ownership is sizeable, both in terms of the share of transactions and in terms of the share of property ownership, and is also targeted to very particular suburbs within Cape Town. This suggests a highly segmented housing market (Piazzesi, Schneider and Stroebel, 2020).

4 Exchange rate depreciations and foreign demand

It is intuitive that the exchange rate affects foreign demand. In the most basic sense, the exchange rate determines the price of real estate for foreigners in their home currency. *Ceteris paribus*, the weaker the exchange rate, the more affordable a property is in a foreign investor's home currency. Thus, changes in the exchange rate should be associated with changes in foreign demand. Ruf and Levi (2011) and Cvijanovic and Spaenjers (2020) find evidence of this effect, and as we argue earlier, our setting is the ideal test bed for this mechanism due to the high volatility of the South African rand.

In most developed countries where foreign investment has been touted as a driver of real estate prices, exchange rate volatility is low. As a result, large depreciations and appreciations are rare, as are large exchange rate-induced price discounts for foreign buyers. Emerging markets are, however, characterized by greater exchange rate volatility. Recent anecdotal evidence from Turkey provided earlier suggests that these exchange rate swings can have a large impact on foreign demand for real estate, especially given that real estate prices tend to be slow-moving. Following a historically large exchange rate depreciation, real estate agents in Turkey reported a doubling of web traffic on online listing sites, while data from the Turkish Statistical Institute show that year-on-year foreign transactions increased by 142% for August and September from

3,920 transactions to 9,481 transactions—a period during which the value of the Turkish Lira dropped by about 30% in value.[19] Thus, large depreciations can induce substantial changes in foreign demand, especially in highly desirable residential areas. However, these large depreciations can also act as push factors, which decrease foreign demand, especially if these events are associated with political and economic uncertainty.[20]

Cape Town in particular and South Africa in general are ideal locations to study this effect due to the fact that South Africa has one of the most volatile exchange rates in the world.[21] While local institutional and economic conditions are not to be neglected, global conditions play a major role in the volatility of the rand.[22]

Figure 7 shows the evolution of the South African REER between 2011 and 2017. Since 2011, the South African rand has experienced a sustained depreciation with frequent episodes of large month on month depreciations.

[Insert Figure 7 about here]

To gain an understanding of the relationship between the exchange rate and foreign demand, we consider the following specification,

$$\Delta N_t^B = \alpha + \beta_1 \Delta ER_{t-1} + \varepsilon_t, \tag{1}$$

where ΔN_t^B represents the year-on-year change in transactions by a specific buyer group and ΔER_{t-1} represents the one-month lagged year-on-year change in the real effective exchange rate. We report the results in Table 3.

[Insert Table 3 about here]

We observe a strong negative relationship between changes in the REER and changes in foreign non-resident demand.[23] The conditional correlation is also significant from an economic point

[19] See for example: "Turkish lira plunge sees Gulf property investors flock to Istanbul - *Arab News*, 25 August 2018.

[20] See for example: "Where are the world's riskiest property buys?" - *The Financial Times*, 29 October 2015.

[21] In the Online Appendix C, we show that South African consistently ranks as one of the countries with the highest exchange rate volatility, as measured by the standard deviation of the change in the real effective exchange rate. See also, Maveé, Perrelli and Schimmelpfennig (2016) and in the media, "Rand Volatility Tops Global Peers as South Africa Risks Mount"–*Bloomberg*, 14 February 2019

[22] For example, the rand is the 20th most traded currency in the world, accounting for around 1% of all global foreign currency trading. See: "2016 Bank for International Settlements (BIS) Triennial Central Bank Survey", accessible here.

[23] The effect is also robust to inclusion of both a year fixed effect as well as a month time fixed effect, which helps to control for possible seasonality in foreign demand and the exchange rate.

of view. Furthermore, the effect is only economically and statistically significant at the one-month lag. We interpret this as evidence which supports our hypothesis that, in response to large depreciations, foreign demand is quick to materialize. This is especially important given the volatility of the South African currency and the potential that large short-term depreciations revert quickly. Interestingly, the effect is more modest for foreign residents and South African residents. This is understandable, because both groups are much more likely to earn in South African rand and thus benefit much less from a change in the REER. Notably, the regression also has a lower R-squared, suggesting that, while changes in the exchange rate have strong explanatory power for changes in the number of transactions by foreign non-residents, they are less apt at explaining foreign resident and South African resident transactions.

We then repeat the exercise, but regress on quartiles of the REER. We present the results in Table 4. Transactions by foreign non-residents increase with the magnitude of the depreciation. Similarly, there is no effect and very little explanatory power in the specifications using foreign residents while transactions by South African residents decrease with the magnitude of the depreciation.

[Insert Table 4 about here]

We are also interested in understanding if the foreign non-residents who purchase following large depreciations differ from other foreign non-residents who purchase during other periods. To do this, we compare high-level features of foreign buyers across the exchange rate distribution and find similar characteristics.[24] Foreign non-residents do not appear to change the location of their purchases following large depreciations. The correlation between the sub-place number of non-resident transactions following lower quartile exchange rate movements and the sub-place number of non-resident transactions during all other times is 0.92. This suggests that large exchange rate depreciations simply intensify existing non-resident demand, but change neither the type of properties purchased, nor the location thereof.

Together, these results show that changes in the exchange rate play a key role in explaining changes in non-resident demand for property. Depreciations, and in particular large depreciations, are associated with large increases in non-resident transactions. This highlights the fact that, in addition to the price of the underlying property, changes in the exchange rate play an important role in explaining non-resident demand for real estate, to the extent that it determines the price of a given property in the home currency of the foreign buyer. Hence, large exchange rate depreciations are effectively a discount on local property prices, denominated in foreign currency. The lack of evidence of a relationship between changes in the exchange

[24] We report these results the Online Appendix A

rate and changes in transactions by foreign residents is consistent with this view, assuming that foreign residents hold the majority of their wealth and capital in South African currency. In that sense, the exchange rate effect is linked to purchasing property in foreign currency and not to whether or not the buyer is a foreigner. These large depreciations do not, however, appear to change either the location or features of properties foreign non-residents purchase or the premium foreign non-residents pay.

5 Foreign demand and house prices

In this section we establish the relationship between foreign demand and house prices. To do so, we proceed in two steps: we create a house price index for sub-place and then we study the relationship between this house price index and foreign demand inflows.

To create a quality-adjusted house price index for each sub-place, we use a hedonic regression:[25]

$$\ln P_{i,t} = \alpha + \boldsymbol{X}_i^{2015} + \gamma_s + \rho_{s,t} + \varepsilon_{i,t}, \tag{2}$$

where $\ln P_{i,t}$ represents the transaction price of property i and $\boldsymbol{X}_i^{2015}$ a vector of property characteristics as of 2015. We then include two additional variables: γ_s^k is a sub-place fixed effect, where ρ_s denotes the sub-place where the property is located. This controls for persistent price differences across sub-places. We then include $\rho_{s,t}$ a sub-place by time fixed effect, which captures time-varying differences across sub-place prices. $\rho_{s,t}$ therefore represents the sub-place by time variation in property prices, holding property characteristics and sub-place location fixed, which we interpret as our quality-adjusted house price index for each sub-place. Importantly, as mentioned earlier, we only observe property characteristics at one point in time and therefore make the explicit assumption that these characteristics are constant over time. Given the relatively short time frame of our sample, this assumption is not outlandish.[26] We define a sub-place level house price index $HPI = \rho_{s,t}$

We then study the relationship between the quality-adjusted sub-place house price index and the cumulative foreign non-resident and resident inflows in the same sub-place over the prior

[25] Since the seminal work of Rosen (1974), hedonic regression techniques have been used widely to control for differences in property prices which can be attributed to observable differences in property prices. Recent examples include Campbell, Giglio and Pathak (2011) and Adelino, Schoar and Severino (2013).

[26] As a robustness check, we include a property level dummy variable which captures whether a property has undergone formal structural renovations.

12 months.[27] Formally,

$$HPI_{s,t} = HPI_{s,t-1} + \beta_1 \sum_{j=1}^{12} FNR_{s,t-j} + \beta_2 \sum_{j=1}^{12} FR_{s,t-j} + FNR_{s,2012} + FR_{s,2012} + \rho_t + \nu_m + \varepsilon_{i,t}, \quad (3)$$

where $HPI_{s,t}$ is our sub-place house price index; $HPI_{s,t-1}$ a lagged sub-place house price index to control for persistence in the price level; $\sum_{j=0}^{12} FNR_{s,t-j}$ represents the cumulative inflow of transactions by foreign non-residents into the sub-place in the year preceding the transaction while $\sum_{j=0}^{12} FR_{s,t-j}$ represents the same measure for foreign residents; $FNR_{s,2012}$ represents the share of all properties in the sub-place that are owned by foreign non-residents as of 1 January 2012 and $FR_{s,2012}$ is the equivalent measure for foreign residents. Lastly, we also add a time fixed effect, ρ_t and a main-place fixed effect ν_m.

In this specification, we expect β_1 and β_2 to be positive if the inflow of foreign demand leads to increases in house prices. Our main-place fixed effect helps to control for any location-specific permanent differences across house prices that sub-places may be exposed to. Lastly, by including a control for the extent of ownership of the existing property stock by foreign non-residents and foreign residents we also control for any sub-place specific price effects associated with areas with different shares of pre-existing foreign ownership.

We report the results in Table 5. The inflow of foreign non-resident transactions has a positive conditional correlation with transaction prices—in the specification with both month of the year and year fixed effects, a one transaction increase in the sub-place foreign non-resident inflow in the year preceding a property transaction is associated with a 0.09% increase in sub-place level property prices. There is, however, evidence of a negative price effect with respect to foreign resident inflow, however this effect is imprecisely estimated.

To put these numbers into context, the mean sub-place monthly non-resident transaction inflow in the 12 months preceding a transaction is 1.07 with a standard deviation of 3.18. This suggests that large increases in non-resident transaction inflows are necessary for economically significant price effects.

[Insert Table 5 about here]

[27] We consider the same sample as earlier, but filter out transactions occurring in or before January 2012, to give us a year of foreign transactions between January and December 2011.

5.1 Using large exchange rate depreciations to establish the causal relationship between foreign demand and prices

These results suggest that while increases in the number of foreign non-resident buyers in a given sub-place are associated with higher sub-place prices for all other buyers, only large increases in the number of foreign non-resident buyers are associated with economically significant price effects.

Earlier, we show that large exchange rate depreciations can induce these types of large increases in foreign demand. Importantly, while this relationship holds strongly for foreign non-residents, the evidence is far weaker for foreign residents, suggesting that the exchange rate effect is not linked to being born outside of South Africa but to the residence status of the foreign buyer and therefore the likelihood that the purchase is made using foreign currency. This suggests that the mechanism driving increases in demand by non-residents relates to the extent to which exchange rate depreciations effectively discount the price of property in the buyer's (foreign) currency.[28]

These large exchange rate depreciations therefore provide a rare demand shock to only one segment of the market, especially in the short run. However, it is not clear if these increases are sizeable enough to induce economically significant price effects. Under the current specifications we can only measure conditional correlations as opposed to pure causal effects of foreign demand on prices. Potential endogeneity arises from two sources. Firstly, foreign non-resident buyers could choose to purchase in areas that are experiencing price increases, and use the price increases as a positive signal to buy, inducing reverse causality. Secondly, there could be omitted variables. For example, new developments or amenities could arise, which simultaneously push up prices and increase foreign demand.

Ideally, we need a source of feasibly exogenous variation in the location of foreign transactions. To do that, the literature has typically used the share of foreign residents residing in a given suburb, seeing as there is a strong tendency for foreign buyers to purchase in areas where their counterparts are over-represented.[29]

In this paper, we follow a similar strategy and use the sub-place share of foreign non-resident owned properties as of 2011.[30] To define our treatment and control suburbs, we use the native

[28] Another key feature of these depreciations is uncertainty regarding how long they are likely to persist. This is especially true in a country like South Africa with an extremely volatile exchange rate. In this regard, the fact that foreign non-resident buyers typically purchase property in cash means that foreign non-resident buyers have the ability to react faster to these depreciations, given they do not need to rely on mortgage financing which would take some time to acquire.

[29] See, for example, Badarinza and Ramadorai (2018).

[30] Other papers typically use census data to measure foreign ownership. However, given that we observe owner-

suburb hierarchy in Cape Town. For every main-place, we split the sub-places contained in the main-place into two groups: a treatment group, which was in the upper quartile (top 25%) of all sub-places in the respective main-place with regards to our instrument, $Share_s^F$, and a control group, of all other sub-places within the same main-place. Our treatment group then represents sub-places with the greatest shares of foreign born citizens as of 2011, *relative* to other sub-places *within a given main-place*.

Figure 8 plots the sub-place share of foreign non-resident and resident transactions throughout our sample against deciles of $Share_s^F$. Both foreign resident and non-resident transactions are increasing in $Share_s^F$, but the rate of increase is much higher for foreign non-residents especially in the upper two deciles. Put differently, our instrument for foreign non-residents, which picks up sub-places with high shares of existing foreign non-resident ownership in 2011, is unlikely to be confounded by resident foreign demand, which typically occurs in different sub-places.

[Insert Figure 8 about here]

Our empirical strategy then uses this share to select treatment and control suburbs and study quality-adjusted price spreads across these suburbs following large exchange rate depreciations. Similar studies have also used price spreads across suburbs to study the price effects of foreign demand.[31] Our approach differs from these papers in that we incorporate physical proximity to the determination of treatment and control suburbs. By conditioning that treatment and control sub-place groups occur within the same main-place, we effectively select suburbs that are geographically close. The advantage of this approach is that we can ensure that the suburbs we compare are more likely to share similar characteristics, to the extent that geography and proximity influences this. From an econometric perspective, this approach allows us to control for any effects which are spatially correlated when calculating price spreads. Our ultimate goal then is to attribute cross-sub-place price effects following these large exchange rate depreciations to foreign demand.

In empirical terms, we proceed in two steps. Firstly, for each main-place, we split sub-places into treatment and control groups based on their share of foreign ownership in 2011 and calculate the house price spread between these two groups using the sub-place house price indices we obtain from (2), formally,

ship directly, we do not have to make use of census data.

[31] For example, Badarinza and Ramadorai (2018) study price spreads across suburbs with large shares of foreign born residents and suburbs with small shares of foreign born residents *from the same country* while Ruf and Levi (2011) study price spreads between suburbs which they define as "international" markets popular with foreign buyers and "local" markets which hold less appeal.

$$\gamma_{m,t} = \rho_{s,t}^{treat} - \rho_{s,t}^{control}. \tag{4}$$

We then use this spread in our final specification,

$$\gamma_{m,t} = \gamma_{m,t-1} + \beta_1 \Delta ER_{t-1}^{Q1} + \eta + \varepsilon_{m,t}, \tag{5}$$

where $\gamma_{m,t-1}$ is a lagged dependent variable, ΔER_{t-1}^{Q1} is a dummy variable which takes the value of one if a lower quartile exchange rate movement (equivalent to a month on month depreciation greater than 2.39%) occurred in the previous month and where η represents a month of the year fixed effect. If the cross-group price spread has increased following a large depreciation, we expect our coefficient of interest, β_1, to be positive.

A few features of this approach are worth nothing. First, we include a lagged dependent variable to control for persistence in house price spread.[32] Second, by defining treatment and control groups within main-places, we ensure our groupings are geographically close. By doing so, we eliminate any common trends and developments among our groups that are spatially correlated. Furthermore, we also eliminate any common effects that are correlated across time in both of our treatment and control groups. Together, this allows us to exploit suburb by time variation across our main-place treatment and control groupings. Third, given the way we construct treatment and control groups, the within-main-place price outcomes are likely to be correlated and our prices likely to be correlated across time. We therefore double-cluster our standard errors at the main-place and year level. Lastly, given that our analysis covers a relatively short time frame, the month of the year fixed effect, η, controls for differences in the price spread which are driven by monthly seasonality.

Our major concern in interpreting β_1 as causal is variation in our treatment and control sub-places that may be correlated with foreign demand. In this regard, the sub-place treatment fixed effect, γ_s, in our first step, controls for any time-invariant differences in prices across sub-places. Nonetheless, there could be an omitted variable which varies by sub-place and time. In this regard, given that we focus on within-main-place price spreads, these concerns are mitigated to the extent that the treatment and control sub-places are homogeneous, conditional on being in the same main-place. However, given we study how price spreads change following

[32] To address any concerns regarding possible persistence in the house price spread driving our results, we report the results from an alternative specification using changes in the house price spread in the Online Appendix A. All coefficients of interest show the correct sign and are statistically significant.

large exchange rate depreciations, we only need to be concerned about an omitted sub-place level variable correlated with *both* large exchange rate depreciations and property prices. It is important to note that any general effects of these depreciations that are common to all sub-place in a given main-place are removed in the first difference in (4). Our coefficient of interest β_1 is therefore estimated in terms of sub-place by time variation and the identifying assumption is that the within-main-place distribution of foreign non-residents in 2011 is correlated to the within-main-place price spread following large exchange rate depreciations between 2011 and 2016 *only* through its ability to predict variation in non-resident inflow following these depreciations.

We present the results in Table 6. We see that following a large lower quartile depreciation, the within-main-place price spread increases by around 3.39% in the following month. Following a lower decile depreciation the price spread in the following month increases by 5.77%. We interpret this as the causal effect of foreign demand on house prices following large exchange rate depreciations.

[Insert Table 6 about here]

We then repeat this exercise, however instead of using a dummy to indicate a lower quartile depreciation, we use a quartile dummy, leaving out the upper quartile dummy as a reference group. We plot these coefficients in Figure 9. We only see positive and precisely estimated price effects following lower quartile exchange rate movements. This is promising evidence that suggests the price effect we measure is strongly linked to large depreciations and not present in other parts of the exchange rate distribution.

[Insert Figure 9 about here]

5.2 Mechanisms by which foreign demand affects prices

What are the channels that drive the increase in prices? Do foreigners merely increase aggregate demand or are there also intensive margin effects? For example, foreign or out-of-town buyers may pay higher prices than local buyers given differences in wealth, bargaining power and/or information asymmetries as in Cvijanovic and Spaenjers (2020) and Chinco and Mayer (2016). To explore this mechanism, we augment our hedonic specification from before to include two additional dummies—one which captures the nationality status of the buyer and another which captures that of the seller. These dummy variables capture differences in transaction prices across different types of buyers and sellers, keeping property characteristics, location and time of sale, fixed. We report these results in Table 7. In column (2) we see that

transactions involving foreign buyers are associated with higher transactions prices. Foreign non-residents pay 8.12% more than local buyers conditional on property characteristics and location-by-time fixed effects, while the accompanying measure for foreign residents is 4.35%. This suggests that transactions involving foreign buyers involve a price premium. We also find evidence that transactions involving foreign non-resident sellers are associated with a 4.44% higher transaction price than transactions involving local sellers. In addition to foreign buyers paying higher prices, we also find that foreign sellers also make lower returns than local sellers upon resale.[33] Foreign non-residents make 8.51% lower returns upon resale when compared to local sellers, an economically significant effect. While paying higher prices upon purchase can explain some of this variation, it cannot account for the lower return result entirely, suggestive that other factors may be at play.[34]

[Insert Table 7 about here]

The large foreign premia we find could arise for various reasons. Given our hedonic specification, foreign buyers could have a preference for higher-quality properties measured on a dimension not captured in our data. In this case, our estimates capture any premium involving foreign buyers and sellers as well as any unobserved property characteristics which are correlated with both foreign preferences and property prices. If this is true, we could reasonably assume that these preferences are consistent across foreign non-resident buyers and sellers. In that case, we would expect properties between foreign non-resident buyers and foreign non-resident sellers to sell at a premium above transactions between non-resident buyers and all other sellers. Following this logic, we repeat our specification with interacted buyer and seller dummy variables. All interactions, including that between non-resident buyers and non-resident sellers, are statistically and economically insignificant. As an additional robustness check, we also re-specify our price equation as a repeat-sales specification, comparing prices holding the property fixed. We also find similar results.[35] This suggests that unobserved property characteristics are unlikely to be driving the premium we find. We find similar results for the foreign resident premium as well.

Another overlooked aspect of buyer and seller premia relates to how purchases are financed. In particular, buyers who pay in cash typically receive a discount relative to buyers with a mort-

[33] We report these results in the Online Appendix A.

[34] Our setup does not allow us to convincingly distinguish between possible factors driving this result, but for example, (Chinco and Mayer, 2016) highlight the fact that out-of-town sellers may mistime the market and sell after prices start falling, while (Cvijanovic and Spaenjers, 2020) find that lower returns are related to higher levels of wealth and a lower bargaining intensity.

[35] We report both sets of results in the Online Appendix A.

gage.[36] Such a discount could arise for a number of reasons. However, the most frequently mentioned motivation is the mortgage-contingency clause standard in all sales contracts—if a buyer is unable to obtain mortgage finance for a transaction, they are allowed to back out of the deal and receive a refund of their deposit. Cash transactions typically reduce the risk to a seller that a deal may fail to materialize. While cash purchases tend to make up a smaller share of transactions compared to mortgaged transactions, in Cape Town, foreign buyers make an overwhelming share of their purchases in cash. Between 2011 and 2017, cash transactions accounted for 85.8% and 74.3% of all transactions made by foreign non-resident and resident buyers, respectively, while cash purchases among South African resident buyers only accounted for 40.3% of all South African transactions.[37] As a result, while the literature has typically associated foreign and out-of-town buyers with a price premium, they are also typically cash buyers, which are typically associated with price discounts.

To investigate how financing interacts with the buyer and seller premia we estimate, we add a dummy variable capturing whether the buyer purchased a property using cash or a mortgage. We report the results in column (3) of Table 7. A transaction involving a cash buyer is associated with a transaction price that is 8.37% lower than a transaction involving a buyer using a mortgage, controlling for property characteristics, buyer and seller nationality and location-by-time fixed effects. Furthermore, we see the foreign buyer premia increasing notably when controlling for buyer financing. The premia increases by 28% for foreign non-residents and 41% for foreign residents.

This highlights the fact that studies which quantify premia across different groups of buyers and sellers in the housing market can potentially under- or overestimate the premia by failing to control for the financing decision of the buyer. This holds in particular in a context where regulation constrains the ability of certain groups of buyers to freely choose how they finance their purchase. To the best of our knowledge, ours is the first paper to quantify this effect.

With these insights, we then proceed to re-estimate our main specification in the paper, this time controlling for buyer, seller and financing in the construction of our house price indices, in order to study how this affects the price effects we measure. We report these results in Table 8. We see that even after controlling for buyer, seller and financing, we still estimate a positive

[36] See for example: Bian, Lin and Liu (2018), Asabere, Huffman and Mehdiany (1992) and Lusht and Hansz (1994).

[37] The decision to purchase a property in cash may reflect a number of factors, including the wealth of foreign buyers relative to South African buyers or whether or not the property is purchased as an investment. However, for foreign non-resident buyers, local mortgage regulation restricts the ability to raise funding locally. If foreign non-resident buyers choose to make use of a local mortgage, they are only allowed to borrow a maximum of 50% of the value of a property. As a result, while foreign resident buyers are unconstrained by regulation in their financing decision, foreign non-residents are subject to legislation which ensures that a minimum of 50% of the value of the property purchases is financed with cash.

price effect. The effect is however around 17.7% smaller than our main specification which excludes buyer and seller controls. We interpret this as evidence of extensive and intensive margin effects. In our main specification, we capture both the extensive margin aggregate demand effect of foreign non-resident buyers and the intensive market effect—conditional on entering the market, foreign non-resident buyers pay higher prices than other buyers for otherwise identical properties. Our measured effect decreasing after we control for intensive margin effect through using buyer and seller dummies is consistent with such an interpretation. Our results therefore suggest that while the extensive margin effects dominated, around 27% of the observed causal impact of foreign demand on house prices originates from their tendency to pay higher prices than locals would for otherwise identical property.

Furthermore, in the second column, we re-estimate our specification on a South African subsample of buyers and sellers. We find no statistically significant price effect, suggesting little spillovers in prices to the South African sub-segment of the market.

[Insert Table 8 about here]

5.3 Robustness

Earlier, we show that the price effects we measure occur only following large lower quartile exchange rate movements highlighting the link between observed price effects and large exchange rate depreciations. We may however also be concerned about our mapping of treatment and control groups. Put differently, our identification strategy relies on demand increasing in areas with large pre-existing shares of foreign non-resident home owners relative to other geographically close areas. We now investigate how important this identification strategy is to the observed price spreads we measure.

To do this, we follow recommendations in Bertrand, Duflo and Mullainathan (2004) to study whether or not the accurate mapping of these sub-places is a precondition for our results. We repeat our estimation from before, however we implement a set of 2,500 random draws (with replacement) of treatment sub-places within each main-place and calculate price spreads, formally

$$\widetilde{\gamma}_{m,t} = \widetilde{\rho}^{treat}_{m,t} - \widetilde{\rho}^{control}_{m,t} \tag{6}$$

We then implement our main specification 2,500 times using each of the placebo main-place

price spreads, formally

$$\widetilde{\gamma}_{m,t} = \widetilde{\gamma}_{m,t-1} + \beta_1 \Delta ER^{Q1}_{t-1} + \eta + \varepsilon_{m,t}, \tag{7}$$

This gives us a distribution of our coefficient of interest, β_1 over random draws of treatment and control groupings. We do this in order to test if the effects across a range of different treatment groups is 0. This would help provide evidence that the correct definition of the treatment group, is a necessary condition for the price spreads we witness in the month following a large exchange rate depreciation. We plot this distribution in Figure 10.

[Insert Figure 10 about here]

The figure shows that, on average, the effect of our coefficient of interest is 0 and that our estimate in our main specification lies in the upper right tail of the distribution with an associated p-value of 0.0256. This means that we can reject the hypothesis that the effect we measure is random with a high degree of confidence. Put differently, if we selected treatment and control groups and random and studied price spreads between these groups following large exchange rate depreciations, we would find on average no effect.

This presents additional strong evidence that (i) our identification is plausible (ii) that the correct assignment of treatment and control suburbs is a necessary condition for our results and that (iii) the exchange rate effects we measure are very likely to represent the causal price effects of foreign demand.

A further concern to credible identification of price effects due to foreign demand relates to potential sub-place by time confounders which may affect local buyers in our treatment suburbs differently when compared to local buyers in our control suburbs. For example, if local demand in our treatment suburbs also responds positively to large exchange rate depreciations then we may mistakenly attribute or overstate price movements as a result of foreign demand.[38] We present two pieces of evidence which suggest local demand does not respond following large exchange rate depreciations, both on the extensive and intensive margin.

[38] We are primarily concerned about local demand which is positively correlated with large exchange rate depreciations as this leads to an overstatement of the foreign demand price effect. Two potential channels for this positive correlation could be a wealth effect, where local home buyers in our treatment group have significant savings abroad see the value of these savings increase following a depreciation, and a safe haven effect, which would see increased investment in real estate in the months following a large exchange rate depreciation, if these large depreciations are seen as a negative economic shock to local buyers and property is viewed as a safe haven for investment.

Firstly, we find that the share of transactions made by local buyers in our treatment suburbs does not increase following large exchange rate depreciations. Rather, the share decreases. In the month following a large depreciation, South African buyers account for 87.8% of all transactions in our treatment suburbs while they account for 88.4% of transactions in all other periods. Additionally, there is no change in the difference between the share of transaction made by local buyers in our control suburbs in the month following a large depreciation and all other times, with this share constant at 94.2%. In other words, local buyers do not increase their relative share of transactions in our treatment suburbs following a large exchange rate depreciation, nor do local buyers in our treatment suburbs become more important relative to our control suburbs. If anything, local buyers become slightly less important in our treatment suburbs, as foreign buyers increase their share of transactions.

Secondly, we repeat our hedonic specification from before, but restrict the sample to transactions in our treatment suburbs. We then include a dummy variable when a buyer is a local and we interact this with a dummy variable indicating if the month prior to the transaction being made was a large exchange rate deprecation, as in our main specification. This interaction variable tells us the premium paid by South African buyers in months following large depreciations relative to all other months, holding property characteristics, location and time (we use month fixed effects) fixed. We report these results in Table 9. The coefficient sign is negative and estimate is statistically insignificant. As such, South African buyers do pay higher prices for otherwise identical properties, following large depreciations.

[Insert Table 9 about here]

Local buyers do therefore not appear to be increasing their relative share of transactions nor do they appear to be paying higher prices for otherwise identical property, in the month following a large exchange rate depreciation, suggestive that local demand is unlikely acting as a confounder for our identification.

6 Conclusion

In this paper, we show that foreign non-resident investors are very responsive to large exchange rate depreciations and increase their demand for real estate, an asset with sticky prices. These large exchange rate depreciations appear less important for other buyers, consistent with motives related to exchange rate price discounts for foreign non-residents. This demand leads to increases in house prices due to an increase in aggregate demand but also due to the tendency

for foreign non-resident buyers to pay higher prices than other buyers for otherwise identical properties. We also highlight that how buyers choose to finance their purchases has important implications for the price discount they may receive, and a failure to control for this financing when estimating a non-resident buyer premium can lead to biased estimate of this premium given the tendency for non-resident buyers to also be cash buyers.

Our results provide novel evidence of foreign investment in the housing market in an emerging market context, whereas the extant literature has focused on developed countries where buyers' motives are likely very different. Amidst many concerns about the impact of foreign investment on house prices and affordability for local buyers, our results suggest that this demand may have important stabilizing effects on house prices in emerging markets during periods of exchange rate instability which are typically associated with adverse macroeconomic conditions.

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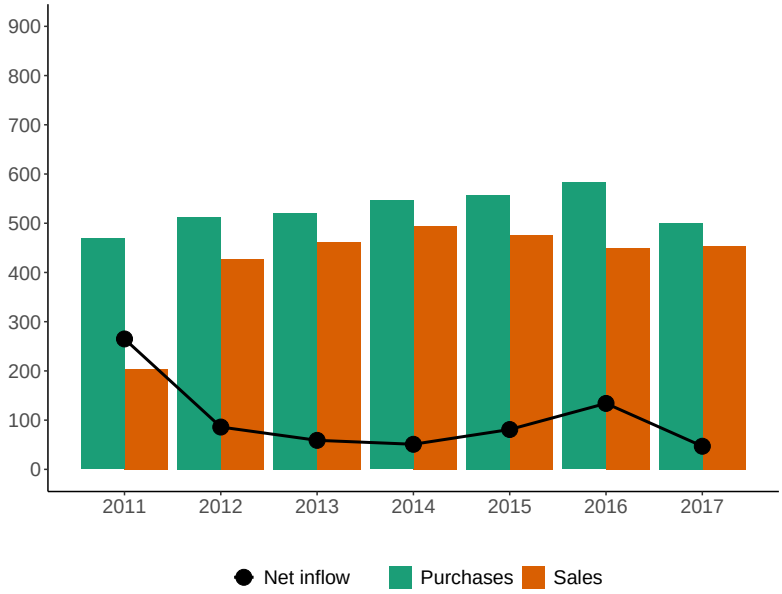
Figures

Figure 1: Foreign inflow and outflow

This figure shows the number of (i) properties bought (ii) properties sold and the (iii) net purchases of property for foreign residents and foreign non-residents. For readability, we keep the same y-axis across both figures.

(a) Foreign non-residents



(b) Foreign residents

Figure 2: Foreign property purchases and sales as a share of the total market

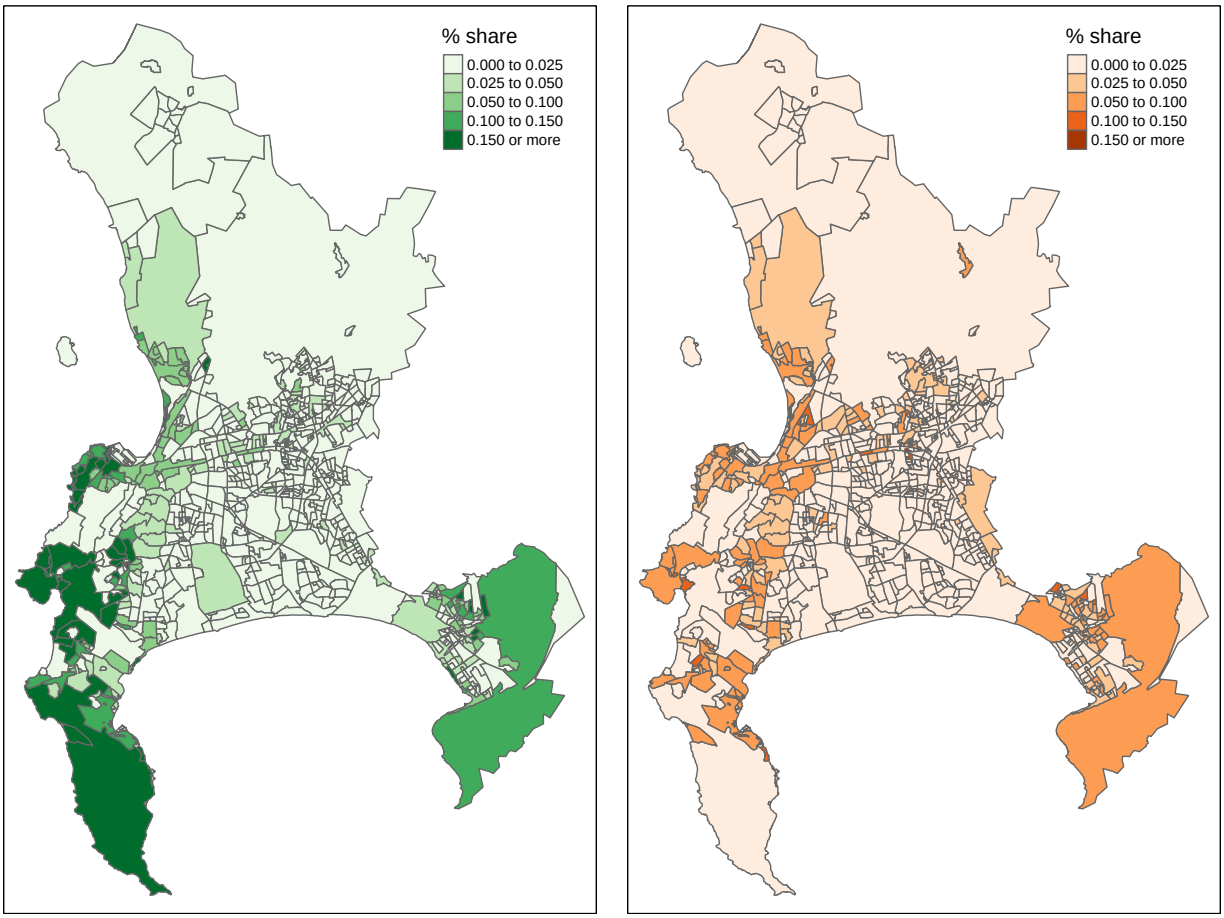
This figure shows the foreign resident and foreign non-resident share of total properties bought and sold as a share of the total market. For readability, we keep the same y-axis across both figures.

(a) Foreign non-residents

(b) Foreign residents

Figure 3: Spatial distribution of foreign transactions

This figure shows the number of transactions by foreign residents and foreign non-residents as a share of total transactions between 2011 and 2017 across sub-places in Cape Town.



(a) Foreign non-residents

(b) Foreign residents

Figure 4: Foreign ownership as a percentage of the total property stock

This figure illustrates the percentage of all properties in Cape Town owned by foreign non-residents and foreign residents between 2012 and 2018. Each bar corresponds to a snapshot of the total residential ownership stock as of 1 January in that specific year.

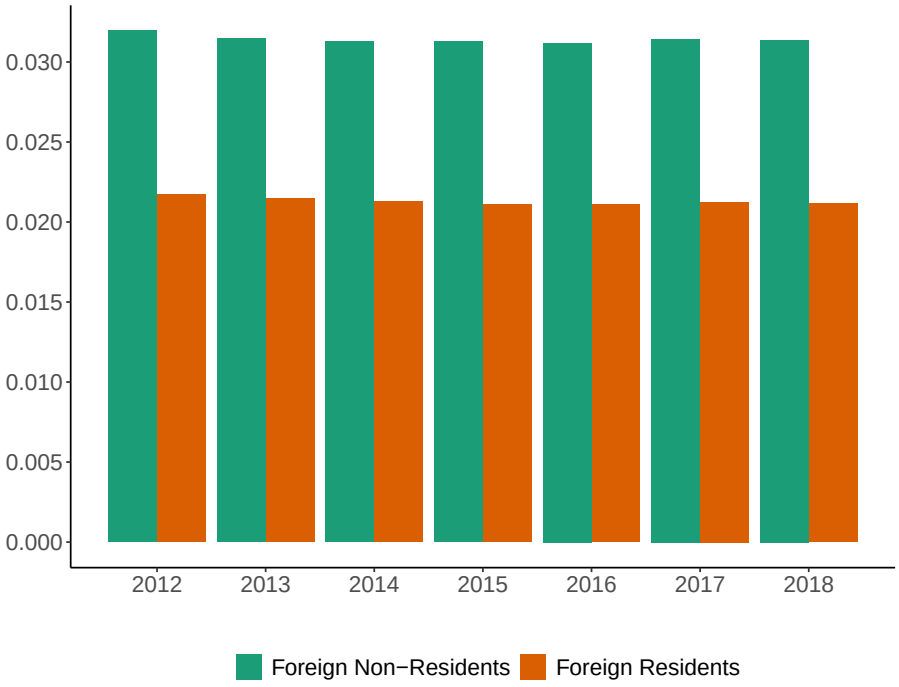
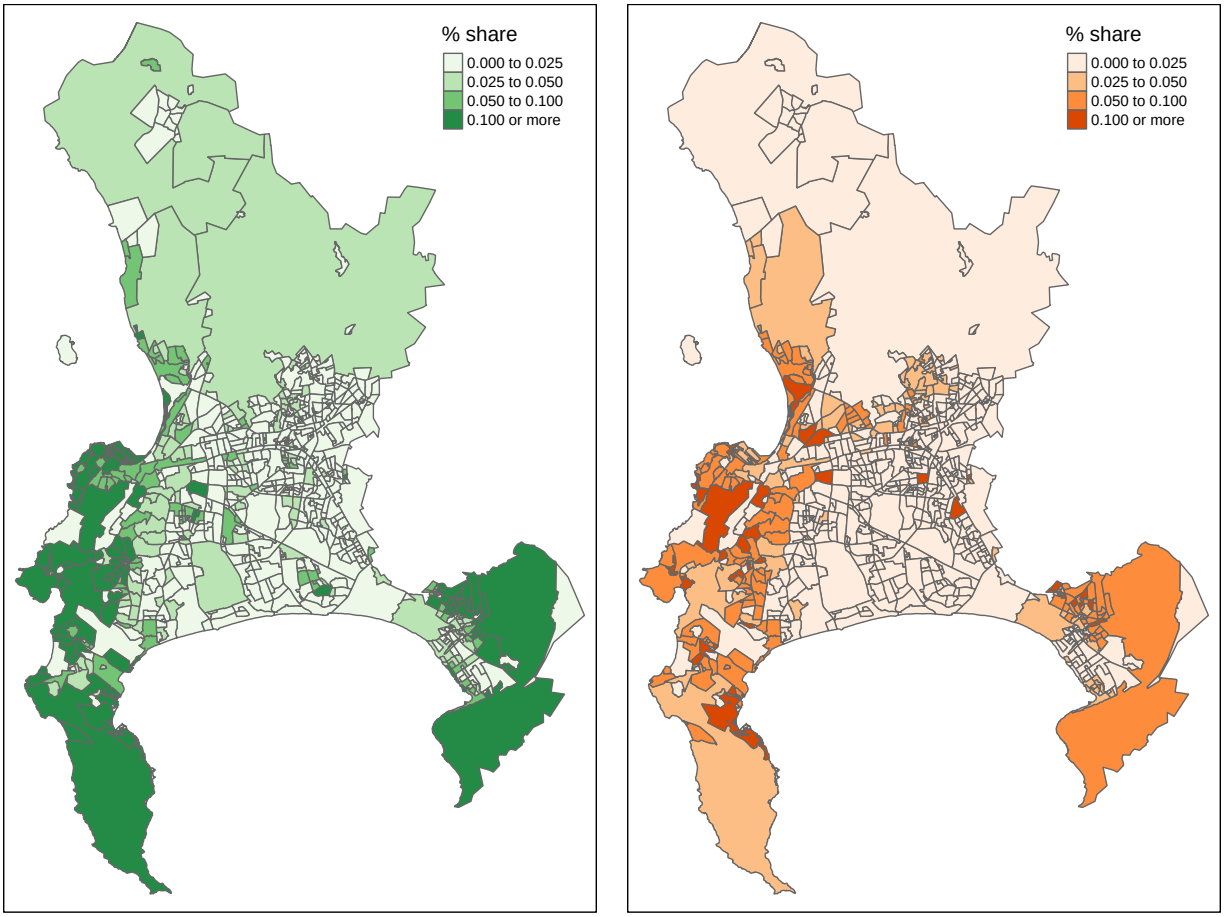


Figure 5: Spatial distribution of foreign ownership

This figure illustrates the percentage of all properties owned by foreign non-residents and foreign residents in as of 1 January 2018 across all sub-places in Cape Town.

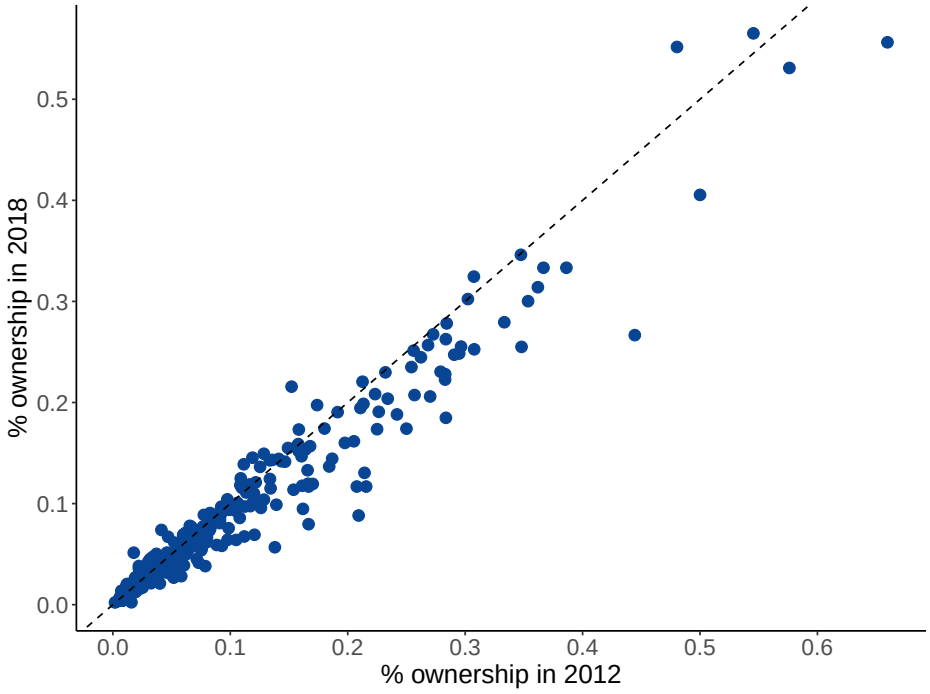


(a) Foreign non-residents

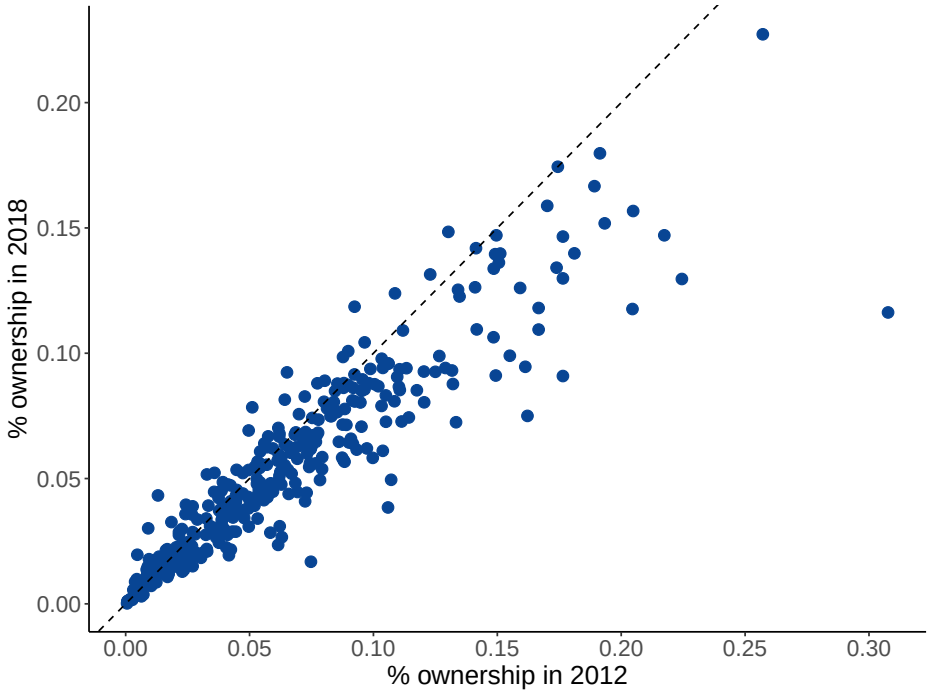
(b) Foreign residents

Figure 6: Change in sub-place level foreign ownership

This figure shows the share of sub-place foreign resident and foreign non-resident-owned properties as of 1 January 2012 plotted against the same share in 2018. A 45 degree dotted line is added for reference. For readability, we remove any sub-place with fewer than 5 foreign non-resident- (resident-)owned properties as of 2012.



(a) Foreign non-residents

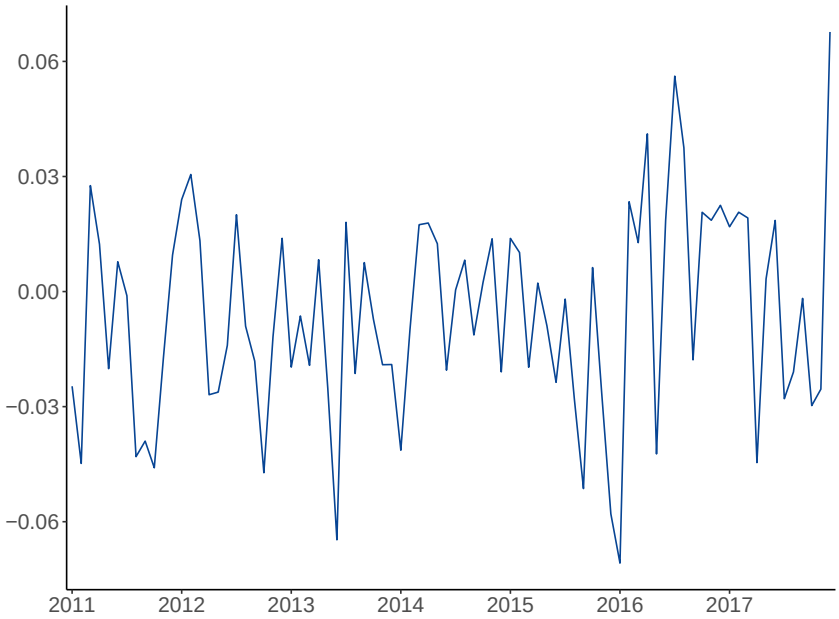


(b) Foreign residents

Figure 7: Rand Real Effective Exchange Rate

This figure shows the evolution of the South African Rand Real Effective Exchange Rate between 2011 and 2016 in (a) levels and (b) as a month-on-month change.

(a) Levels



(b) Month-on-month change

Figure 8: Foreign transaction deciles and the 2011 share of foreign-born household heads

This figure illustrates the relationship between the sub-place share of foreign non-resident and foreign resident transactions between 2011 and 2017 on the y-axis, against deciles of sub-place share of foreign non-resident-owned property in 2011 on the x-axis.

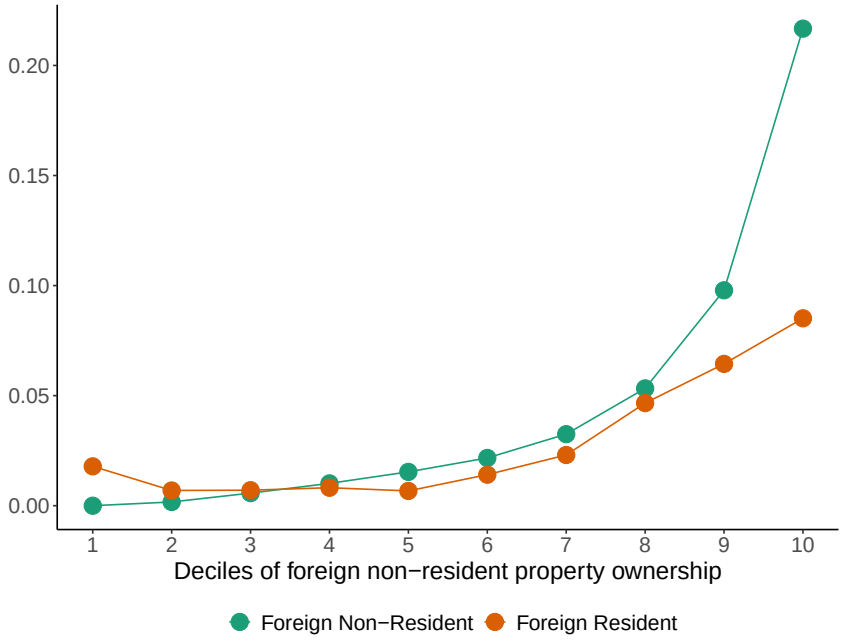


Figure 9: Exchange rate effects on house price spreads

This figure illustrates the coefficient of interest from our main specification, implemented using quartile dummies of the exchange rate distribution with the upper quartile used as the reference group, and omitted from the figure. Quartiles increase in the exchange rate distribution, i.e $Q1$ represents the largest depreciations. Lines indicate the 90% confidence interval. All coefficients can be interpreted relative to upper quartile exchange rate movements.

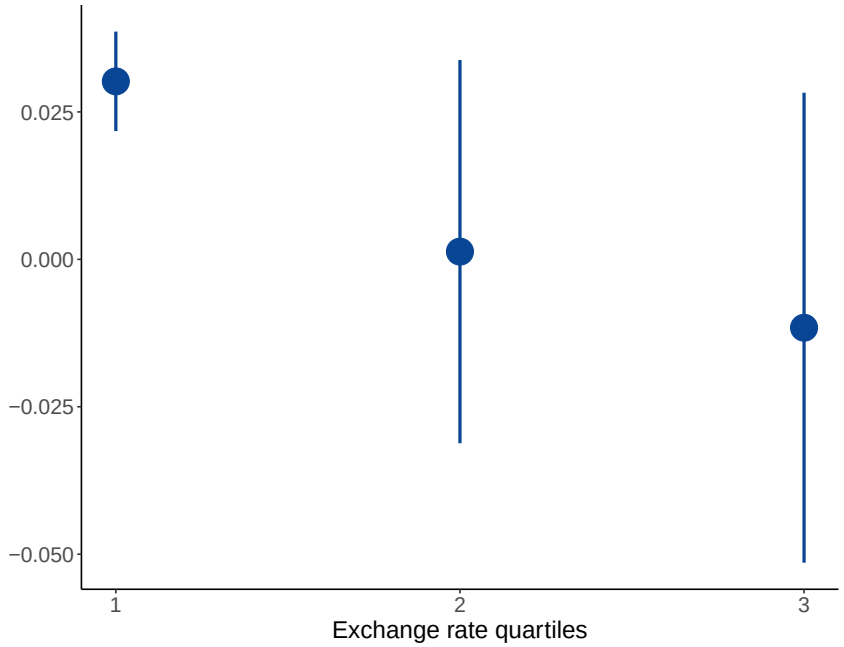
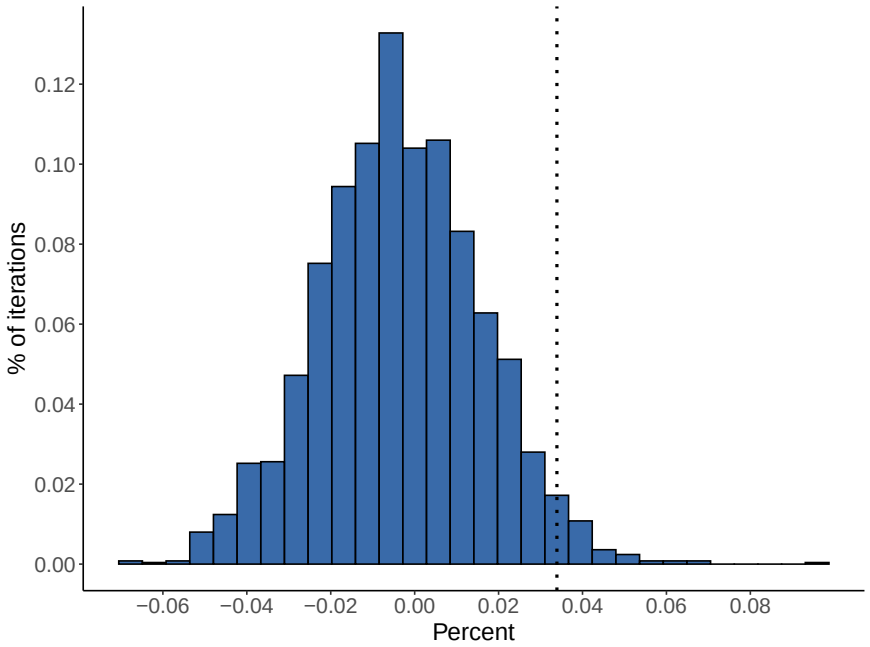


Figure 10: Placebo test across sub-places

This figure illustrates the coefficient of interest from a bootstrap implementation of our main specification. We implement a set of 2,500 random draws (with replacement) of treatment sub-places within each main-place and re-run our main specification using each of these groupings to obtain a distribution of our coefficient of interest. The figure shows this distribution, with a dotted line indicating our estimated coefficient from the main specification. The associated p-value of this coefficient is 0.0256.



Tables

Table 1: Summary statistics

Summary statistics across different types of buyers, in panel (a), and sellers, in panel (b), for the entirety of the sample. We exclude all non-natural (or legal) persons. South African residents are defined as individuals holding South African citizenship who were born in South Africa; foreign residents are defined as individuals who are permanent residents but were born outside of South Africa; foreign non-residents are defined as individuals who do not hold a South African residence permit and hold either (i) a residence visa, (ii) a work visa, (iii) a study visa, or (iv) a travel visa.

	Mean Price	Median Price	N	% N	% Rand value	% cash transactions
Foreign Non-Residents	R3.31M	R1.95M	4,871	3.93	8.55	85.80
Foreign Residents	R2.05M	R1.45M	3,690	2.98	4.01	74.30
South African Residents	R1.43M	R0.98M	115,326	93.10	87.40	40.30

(a) Buyers

	Mean Price	Median Price	N	% N	% Rand value	Median Capital Gain	Median Holding Period
Foreign Non-Residents	R3.19M	R2.09M	1,818	2.34	4.95	0.60	6.79
Foreign Residents	R2.27M	R1.70M	2,859	3.67	5.54	1.27	9.52
South African Residents	R1.43M	R1.02M	73,130	94.00	89.50	1.03	8.29

(b) Sellers

Table 2: Summary statistics: property characteristics

This table reports summary statistics across different types of buyers for the entirety of the sample. *Plot size* refers to the size of the underlying land upon which the residential structure is build. *Floor size* refers to the size of the residential dwelling. Sectional title dwellings refer to dwellings with a separation between the ownership of the residential dwelling and the underlying parcel of land. For the purposes of this study, we set the plot size of sectional title units equal to the dwelling size. South African residents are defined as individuals who hold South African citizenship who were born in South Africa; foreign residents are defined as individuals who are permanent residents but were born outside of South Africa; foreign non-residents are defined as individuals who do not hold a South African residence permit and hold either (i) a residence visa, (ii) a work visa, (iii) a study visa, or (iv) a travel visa.

	Plot size (m^2)	Floor size (m^2)	Bedrooms	Bathrooms	% Sectional Title
Foreign Non-Residents	561	162	2.76	2.27	36.00
Foreign Residents	444	139	2.68	2.06	31.80
South African Residents	429	121	2.75	1.89	18.00

Table 3: Exchange rate depreciations have an impact on foreign demand

This table shows the coefficient results from the estimation of equation 1. Standard errors are White heteroskedasticity-robust and are reported in parentheses. *, **, *** represents significance levels of 0.1, 0.05 and 0.01, respectively.

	Foreign Non-Resident	Foreign Residents	South African Residents
ΔER_{t-1}	-4.93***	-1.21	0.11
	(1.69)	(1.48)	(0.38)
ΔER_{t-2}	-1.32	-1.41	1.04**
	(1.48)	(1.56)	(0.41)
ΔER_{t-3}	-1.25	-0.97	-0.06
	(1.44)	(1.41)	(0.42)
Year fixed effects	✓	✓	✓
Month fixed effects	✓	✓	✓
N	72	72	72
R^2	0.443	0.184	0.305

Table 4: Large exchange rate depreciations are correlated with increased foreign demand

This table reports the coefficients results from the estimation of equation 1, where we replace the contemporaneous exchange rate with quartiles of the exchange rate distribution. Quartiles increase in the exchange rate distribution, i.e $Q1$ represents the largest depreciations. Standard errors are White heteroskedasticity-robust and are reported in parentheses. *, **, *** represent significance levels of 0.1, 0.05 and 0.01, respectively.

	Foreign Non-Resident	Foreign Residents	South African Residents
ΔER_{t-1}^{Q3}	-0.86	0.06	0.04
	(0.110)	(0.099)	(0.035)
ΔER_{t-1}^{Q2}	0.05	0.11	0.04
	(0.126)	(0.107)	(0.036)
ΔER_{t-1}^{Q1}	0.29***	0.07	0.00
	(0.109)	(0.114)	(0.029)
Year fixed effects	✓	✓	✓
Month fixed effects	✓	✓	✓
N	72	72	72
R^2	0.451	0.147	0.262

Table 5: Conditional correlations of foreign demand and property prices

This table reports the coefficients results from the estimation of equation 3. Coefficients are multiplied by 100 to facilitate their interpretation as percentage changes. Standard errors are clustered at the main-place level and are reported in parentheses. *, **, *** represent significance levels of 0.1, 0.05 and 0.01, respectively.

	(1)	(2)	(3)
Foreign non-resident inflow	0.15***	0.17***	0.09**
	(0.000)	(0.000)	(0.000)
Foreign resident inflow	-0.10	-0.08	-0.12*
	(0.001)	(0.001)	(0.001)
Main-place fixed effect	✓	✓	✓
Month of the year fixed effect	×	✓	✓
Year fixed effect	×	×	✓
N	10,838	10,834	10,834
R^2	0.335	0.341	0.492

Table 6: Foreign demand and property prices

This table captures coefficients results from the estimation of equation 5. Coefficients are multiplied by 100 to facilitate their interpretation as percentage changes. Standard errors are double clustered at the main-place and year level and are reported in parentheses. *, **, *** represent significance levels of 0.1, 0.05 and 0.01, respectively.

	(1)	(2)	(3)	(4)
Lower quartile	3.81**	3.39**		
	(0.013)	(0.010)		
Lower decile			5.32***	5.77***
			(0.014)	(0.013)
Month fixed effects	×	✓	×	✓
N	1,368	1,368	1,368	1,368
R^2	0.056	0.058	0.056	0.060

Table 7: Foreign buyer, seller and cash premia

This table captures coefficients results from three alternative estimates of equation 2. In the first column, we include a buyer dummy. In the second column, we include a buyer and seller dummy. In the third column, we include an additional dummy variable capturing whether the buyer financed the purchase using cash. Coefficients are multiplied by 100 to facilitate their interpretation as percentage changes. Standard errors are clustered at the sub-place level and are reported in parentheses. *, **, *** represent significance levels of 0.1, 0.05 and 0.01, respectively.

	(1)	(2)	(3)
Foreign non-resident buyer	8.50***	8.12***	10.42***
	(0.015)	(0.015)	(0.015)
Foreign resident buyer	4.35***	4.18***	5.90***
	(0.008)	(0.008)	(0.009)
Foreign non-resident seller		4.44***	4.68***
		(0.014)	(0.014)
Foreign resident seller		1.47	1.70*
		(0.009)	(0.009)
Cash buyer			-8.37***
			(0.010)
N	90,223	90,223	90,223
R^2	0.847	0.850	0.852

Table 8: Foreign demand and property prices: alternative

This table captures coefficients results from two alternative estimates of equation 5. In the first column, we include a buyer, seller and cash buyer dummy in our specification to create the house price index. In the second column, we include only transactions between South African buyers and South African sellers. Coefficients are multiplied by 100 to facilitate their interpretation as percentage changes. Standard errors are double clustered at the main-place and year level and are reported in parentheses. *, **, *** represent significance levels of 0.1, 0.05 and 0.01, respectively.

	Controlling for buyer and seller type	South African buyers and sellers
Lower quartile	2.79**	1.29
	(0.012)	(0.008)
Month fixed effects	✓	✓
N	1,368	1,084
R^2	0.035	0.041

Table 9: Local buyer premia following large exchange rate depreciations

This table captures coefficients results from a hedonic regression where we subset our dataset to include only transactions from our treatment group. The coefficient of interest is an interaction term which takes a value of 1 if the buyer of a property is a South African resident and if the month in which the property was bought was preceded by a lower quartile exchange rate movement, i.e a large depreciation. In the first column, we use use a lower quartile exchange rate movement and in the second column we use a lower decile exchange rate movement. Coefficients are multiplied by 100 to facilitate their interpretation as percentage changes. Standard errors are double clustered at the main-place and year level and are reported in parentheses. *, **, *** represent significance levels of 0.1, 0.05 and 0.01, respectively.

	(1)	(2)
Lower quartile	-2.13	
	(0.029)	
Lower decile		-3.14
		(0.035)
Month fixed effects	✓	✓
N	18,449	18,449
R^2	0.818	0.819

Appendix A Tables

Table 1: Coefficients from hedonic regression

This table reports all of the coefficients results from a hedonic regression of property prices on a range of property, buyer and seller information and fixed effects. The reference property is a freehold studio dwelling, smaller than 50 square meters, with 1 bathroom, built before 1985, which has never been formally renovated, and was bought by a South African resident using a mortgage, from a South African seller. We multiply all coefficients by 100 to facilitate their interpretation as percentage increases. We include a sub-place by time fixed effect. Standard errors are clustered at the sub-place level. *, **, *** represent significance levels of 0.1, 0.05 and 0.01, respectively. Adjusted R^2 is .883.

Bedrooms		**Bathrooms**		**Year Built**	
Two	12.91***	Two	11.49***	1985 - 1995	-1.19
Three	17.72***	Three	19.04***	1995 - 2005	2.09
Four or more	19.04***	Four or more	26.75***	> 2005	1.92
Dwelling Size		**Plot size**		**Buyer financing**	
< 100m^2	19.36***	< 100m^2	12.67***	Cash	-8.20***
100m^2 - 250 m^2	35.69***	100m^2 - 250m^2	38.84***		
250m^2 - 500m^2	64.15***	250m^2 - 500m^2	53.59***		
> 500 m^2	1.01***	> 500 m^2	67.89***		
Buyer		**Seller**		**Property Type**	
Foreign resident	5.43***	Foreign resident	1.27	Sectional Title	6.07
Foreign non-resident	10.97***	Foreign non-resident	4.03***		
		New property	-15.04***		
Renovated					
Yes	8.20				

Table 2: Prices paid by different types of buyers

This table exhibits the results from the estimation of the following specification: $\ln P_{i,t} = \alpha + \boldsymbol{X}_i^{2015} + \beta_1 B_i + \beta_2 S_i + \rho_t + \nu_s + \varepsilon_{i,t}$. $\ln P_{i,t}$ represents the log transaction price of property i in time t; $\boldsymbol{X}_i^{2015}$ a vector of time-invariant property level controls observed in 2015; B_i a dummy variable capturing the residency status of the buyer; S_i a dummy variable capturing the residency status of the seller; ρ_t a time fixed effect, and lastly; ν_s, a suburb fixed effect. All coefficients are multiplied by 100 for ease of interpretation in the form of percentage changes. Model (4) has a smaller sample as singleton observations are dropped. Standard errors are clustered at the sub-place level and are reported in parentheses. *, **, *** represent significance levels of 0.1, 0.05 and 0.01, respectively.

	(1)	(2)	(3)	(4)
Foreign non-resident buyer	35.45***	24.99***	12.81***	10.97***
	(0.032)	(0.025)	(0.013)	(0.014)
Foreign resident buyer	21.78***	12.28***	6.00***	5.43***
	(0.019)	(0.014)	(0.008)	(0.008)
Foreign non-resident seller	32.56***	21.02***	6.11***	4.03***
	(0.025)	(0.022)	(0.012)	(0.013)
Foreign resident seller	25.02***	11.22***	1.89**	1.27
	(0.016)	(0.013)	(0.008)	(0.009)
Year-month fixed effect	✓	✓	✓	×
Main-place fixed effect	×	✓	×	×
Sub-place fixed effect	×	×	✓	×
Sub-place by time fixed effect	×	×	×	✓
N	123,887	129,456	129,441	110,119
R^2	0.594	0.719	0.846	0.881

Table 3: Prices paid by different types of buyers and sellers

This table exhibits the results from a more detailed hedonic estimation of the specification in Table 2 including interacted buyer and seller groups. All coefficients are multiplied by 100 for ease of interpretation in the form of percentage changes. Standard errors are clustered at the sub-place level and are reported in parentheses. *, **, *** represent significance levels of 0.1, 0.05 and 0.01, respectively.

	(1)
Foreign non-resident buyer	11.04***
	(0.012)
Foreign resident buyer	6.08***
	(0.010)
Foreign non-resident seller	6.34***
	(0.012)
Foreign resident seller	2.42***
	(0.009)
Foreign non-resident buyer & Foreign non-resident seller	-0.04
	(0.032)
Foreign non-resident buyer & Foreign resident seller	-3.30
	(0.026)
New build: Foreign non-resident buyer	5.74**
	(0.027)
Foreign resident buyer & Foreign non-resident seller	-0.16
	(0.031)
Foreign resident buyer & Foreign resident seller	-3.15
	(0.030)
New build: Foreign resident buyer	0.84
	(0.029)
Year-month fixed effect	✓
Sub-place fixed effect	✓
N	123,887
R^2	0.846

Table 4: Capital gains realized by different types of buyers

This table captures the results from the estimation of the specification $R_{i,u\to t} = \alpha+\beta_1 B_{i,t}+\beta_2 S_{i,u}+\beta_3 X_i + H_{i,u\to t} + \rho_t + \phi_u + \nu_s + \varepsilon_{i,t,u}$. $R_{i,u\to t}$ is the difference between the log of the price at which a property was sold in year t and the log of the price at which a property was originally bought in year u as our dependent variable. In addition to the dummy variable indicating buyer type, we include an additional dummy variable indicating seller type, $S_{i,u}$. We include a dummy variable X_i which takes a value of one if the property has been formally renovated and $H_{i,u\to t}$ is a fixed effect which controls for the seller's holding period. We include two year fixed effects, one for the year a property was bought, ρ_t, and another for the year it was sold, ϕ_u, to capture any purchase or timing effects that may affect capital gains. Lastly, as before, we include a suburb fixed effect, ν_s. We winzorize our dataset to remove outliers in capital gains and holding periods at the 1% and 99% level. All coefficients are multiplied by 100 for ease of interpretation in the form of percentage changes. Standard errors are clustered at the sub-place level and are reported in parentheses. *, **, *** represent significance levels of 0.1, 0.05 and 0.01, respectively.

	(1)	(2)
Foreign non-resident buyer	3.75**	5.93***
	(0.011)	(0.010)
Foreign resident buyer	-0.40	2.67***
	(0.011)	(0.010)
Foreign non-resident seller	-8.06***	-8.51***
	(0.014)	(0.012)
Foreign resident seller	-4.89***	-3.93**
	(0.010)	(0.010)
Cash purchase		-11.32***
		(0.008)
Year of purchase fixed effect	✓	✓
Year of sale fixed effect	✓	✓
Month of purchase	✓	✓
Month of sale	✓	✓
Sub-place fixed effect	✓	✓
Holding period fixed effect	✓	✓
N	81,030	81,030
R^2	0.757	0.780

Table 5: Exchange rate depreciations are correlated with increased foreign demand

This table shows the coefficient results from an alternative specification of equation 3 in the main paper. We replace the contemporaneous exchange rate with with three different dummy variables which take a value of 1 in the following events (1) the one-month-lagged month-on-month change in the REER was in the lowest decile of the REER distribution (2) the one-month-lagged month-on-month change in the REER was a depreciation (3) the one-month-lagged month-on-month change in the REER was in the bottom 50% of the REER distribution. The labels "FNR", "FR" and "SAR" correspond to the following buyer types, respectively: Foreign non-residents; foreign residents; South African residents. Standard errors are White heteroskedasticity-robust and are reported in parentheses. *, **, *** represent significance levels of 0.1, 0.05 and 0.01, respectively.

	(1) Upper decile			(2) Depreciation			(3) Below median month-on-month change		
	FNR	FR	SAR	FNR	FR	SAR	FNR	FR	SAR
	0.34**	0.14	-0.04	0.22***	0.31	-0.00	0.24***	0.01	0.01
	(0.147)	(0.149)	(0.028)	(0.079)	(0.067)	(0.023)	(0.079)	(0.070)	(0.022)
Year fixed effects	✓	✓	✓	✓	✓	✓	✓	✓	✓
Month of the year fixed effects	✓	✓	✓	✓	✓	✓	✓	✓	✓
N	72	72	72	72	72	72	72	72	72
R^2	0.377	0.157	0.242	0.394	0.138	0.227	0.411	0.135	0.227

Table 6: Foreign non-resident transaction features across exchange rate quartiles

This table reports a range of measures capturing features of non-resident transactions arranged by quartiles of the lagged one month month on month change in the REER. Quartiles increase in the exchange rate distribution, i.e $Q1$ represents the largest depreciations. We show the (i) percentage share of foreign non-resident transactions to total transactions (ii) the percentage of cash foreign non-resident transactions to total foreign non-resident transactions (iii) the mean number of bedrooms (iv) the mean number of bathrooms and (v) the mean dwelling size, in square metres.

Quartile	% N	% Cash	Beds	Baths	Dwell. Size
1	0.041	0.843	2.76	2.28	161
2	0.039	0.858	2.81	2.33	164
3	0.036	0.859	2.77	2.29	163
4	0.042	0.870	2.71	2.20	159
Mean	0.039	0.858	2.77	2.27	162

Table 7: Foreign demand and property prices

This table captures coefficients results from an alternative version of the main specification from our paper, using level changes in our dependent variable, as opposed to levels. Formally, $\Delta\gamma_{m,t} = \Delta\gamma_{m,t-1} + \beta_1 \Delta ER^{Q1}_{t-1} + \eta + \varepsilon_{m,t}$ Coefficients are multiplied by 100 to facilitate their interpretation as percentage point changes. Standard errors are double clustered at the main-place and year level and are reported in parentheses. *, **, *** represent significance levels of 0.1, 0.05 and 0.01, respectively.

	(1)	(2)	(3)	(4)
Lower quartile	3.73*	3.04*		
	(0.016)	(0.014)		
Lower decile			5.03***	5.24***
			(0.012)	(0.013)
Month fixed effects	×	✓	×	✓
N	1,173	1,173	1,173	1,173
R^2	0.187	0.190	0.187	0.188

Appendix B Figures

Figure 7: House prices across different buyer groups

This figure illustrates the quarterly unconditional mean transaction price in Cape Town across three buyer types: South African residents; foreign residents; foreign non-residents.

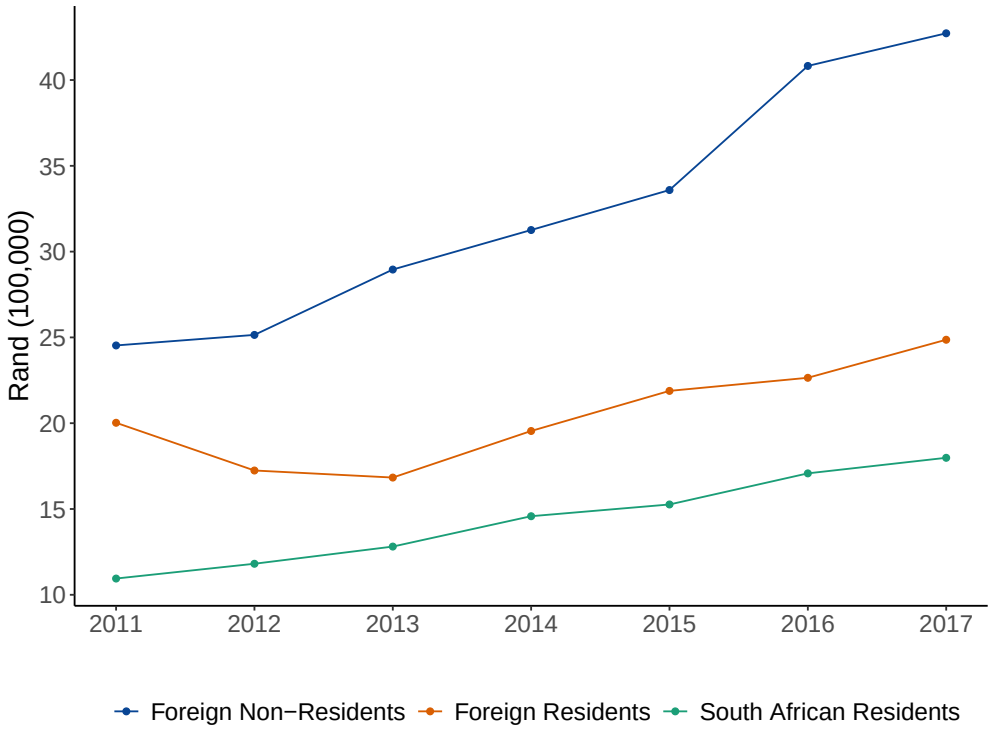


Figure 7: Distribution of transaction prices across buyer type

This figure plots the distribution of transaction prices across three buyer types: South African residents; foreign residents; foreign non-residents. We truncate our figure to exclude transactions prices in the 99th percentile for readability.

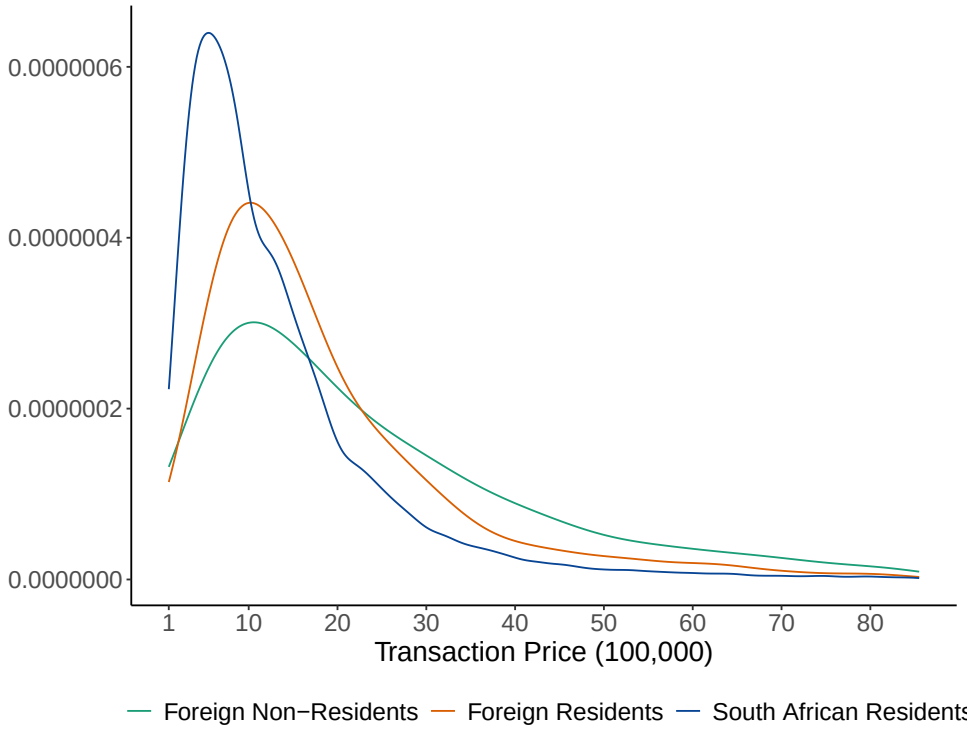


Figure 7: Distribution of transaction prices across seller type

This figure plots the distribution of transaction prices across three seller types: South African residents; foreign residents; foreign non-residents. We truncate our figure to exclude transactions prices in the 99th percentile for readability.

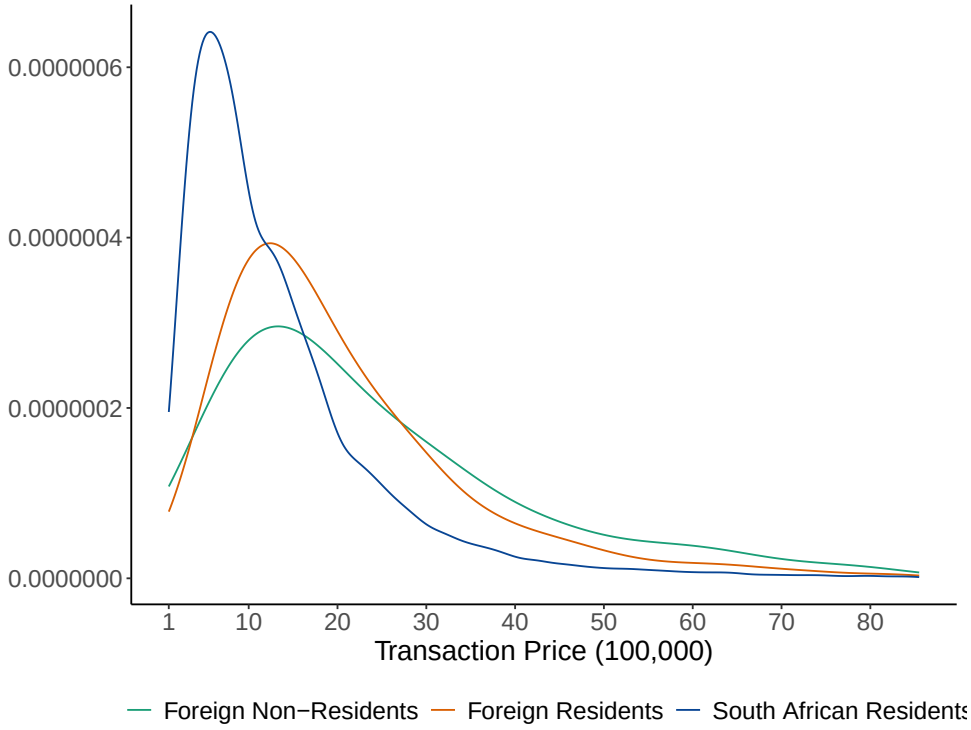


Figure 7: Distribution of returns across buyer type

This figure plots the distribution of log returns across three buyer types: South African residents; foreign residents; foreign non-residents. We truncate our figure to exclude returns in the 1st and the 99th percentile for readability.

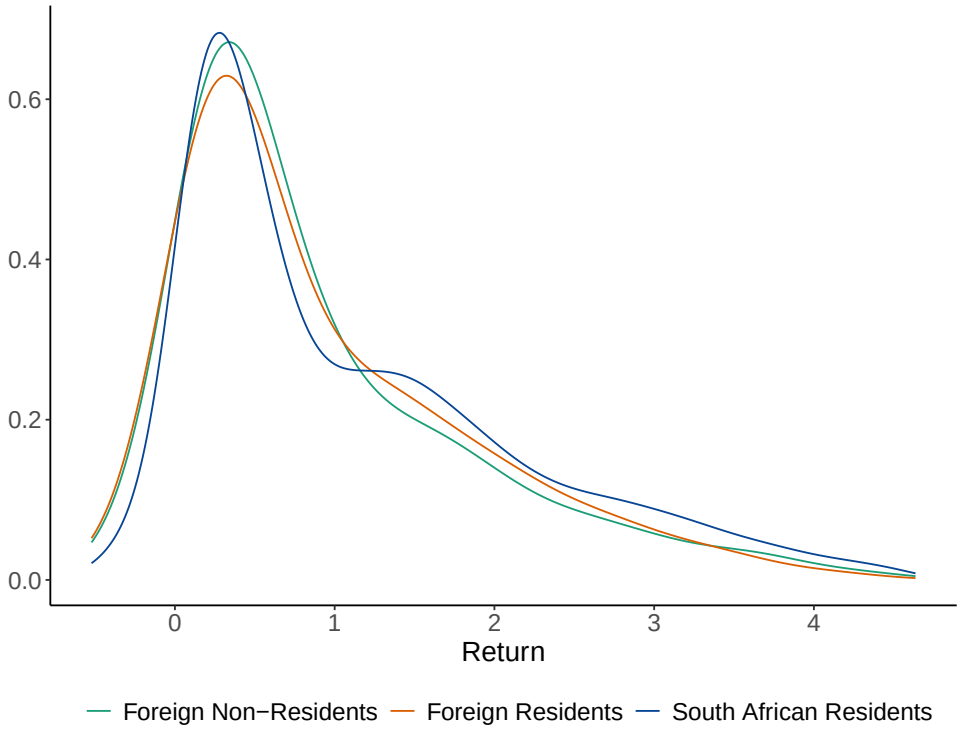
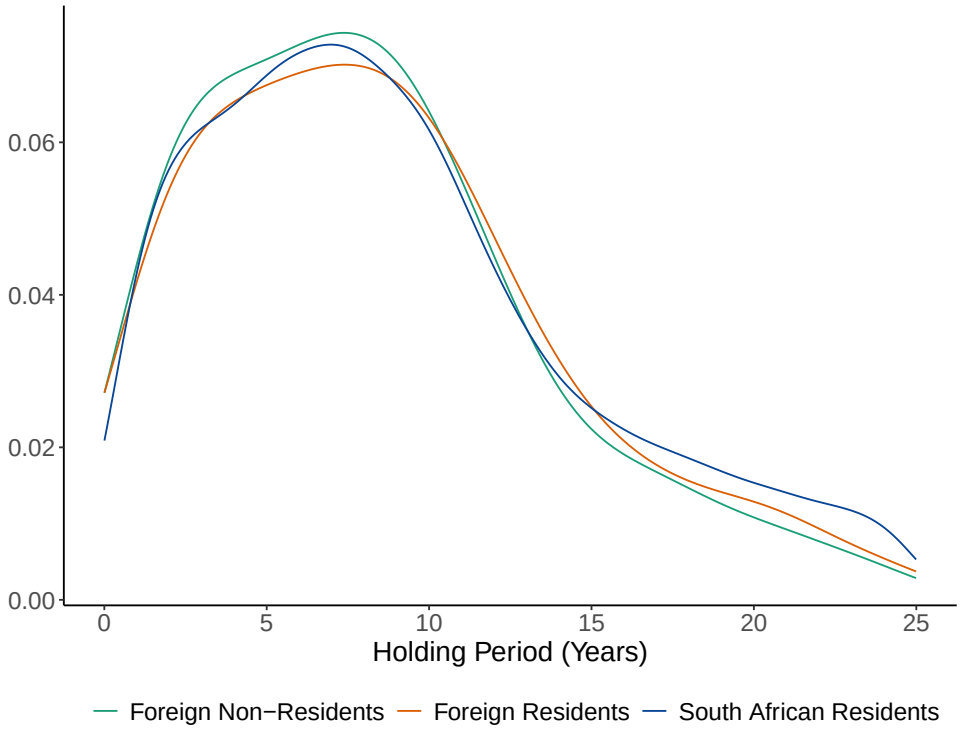


Figure 7: Distribution of returns across buyer type

This figure plots the distribution of holding periods across three buyer types: South African residents; foreign residents; foreign non-residents. We truncate our figure to exclude holding periods greater than 25 years for readability.



Appendix C Data and institutional setting

C.1 Dataset construction and cleaning

We make use of a detailed database of property characteristics collected by the local government in Cape Town for the purposes of property valuation/assessment, current as of 2015. In addition to quantitative variables collected from building plan information, the dataset also contains a number of qualitative variables collected by property valuers at the City of Cape Town. We discuss these variables in Table 8.

Table 8: Property characteristics - 2015

Variables	Description
Use code	Zoning rights of a parcel of land
Address	Street name, street number, suburb, GPS coordinates
Plot size	Size of plot of land
Dwelling size	Size of dwelling
Bedrooms	Number of bedrooms
Bathrooms	Number of bathrooms
Year of construction	Year property was built
Year of most recent renovation	Year property was last formally renovated
Quality	Qualitative variable indicating quality of property
Condition	Qualitative variable indicating condition of property
View	Qualitative variable indicating view associated with property
2012 valuation	Property's valuation as of 2012
2012 valuation contested	Was original 2012 valuation challenged by owner?
2015 valuation	Property's valuation as of 2015
Pool	Size of pool
Garage/Carport	Size of garage/carport

In addition to the original variables contained in the dataset, we also generate four additional variables, as indicated in Table 9.

Table 9: Derived property characteristics - 2015

Variables	Description
Renovated	Takes a value of one if *Year of most recent renovation > Year of construction*
Sub-place	Obtained using the GPS co-ordinate of a property and Census sub-place GIS shape file
Main-place	Obtained using the GPS co-ordinate of a property and Census main-place GIS shape file

We obtain the full universe of property transactions for Cape Town, containing residential and commercial transactions. We perform a range of data cleaning and filtering operations to construct the final dataset used in the paper.

Zoning

We make use of information provided on the zoning of each property to subset all residential properties. These properties correspond to properties zoned "Residential" and "Sectional Title".

Buyer and seller types

The original dataset contains a range of buyer and seller types. For the purposes of this paper we only consider transactions made by three buyer types:

- South African residents: individuals born in South Africa who have a South African identity number
- Foreign residents: individuals who have a South African identity number but were born outside of South Africa
- Foreign non-residents: individuals, who provide their passport as an identifying document when purchasing property

Foreign non-residents would, therefore, include any individual holding a (i) a work visa (ii) a study visa (iii) a travel visa or (iv) a temporary retirement visa.[39] While we are unable to distinguish between these visa types, the defining characteristic that distinguishes these identity types is that they are allowed residence for a specified time period, 3 months for a travel visa or

[39] Those individuals with a permanent retirement visa are issued a South African identity number.

typically the duration of a study program or a work contract, lasting up to a maximum of five years. Foreign residents are, however, granted permanent residency, the only requirement being that they visit South Africa at least once every three years. In that sense, while the reason for foreign non-residents being in South Africa may differ, their stays are all of a temporary nature. We are able to identify nationality status among individuals who have a South African identity number using the underlying structure of identity numbers. The 11th digit of every South African identity number takes a value of "0" for South African residents and "1" for (foreign born) permanent residents.

We filter out all property transactions involving the government and non-natural (or legal) persons, including companies, trusts and close corporations

Community of property and fractional ownership

A number of properties involve multiple buyers and multiple sellers. These transactions typically involve properties bought in community of property and fractional ownership.

In cases like this, we assign properties bought and sold in community of property and fractional ownership to a buyer group, if, and only if, all participants in the joint ownership structure have the same buyer group. We discard all other transactions to ensure an accurate mapping of buyer groups.

Price

Once we complete all previously mentioned cleaning operations, we filter our dataset to exclude property transactions below R100,000. South Africa has a large government-sponsored housing programme which involves low-cost properties under R100,000. We bottom-filter our dataset to remove the effect of these properties.

Holding Periods

We filter out all repeat transactions with a negative holding period as this likely represents an error in the data. We then filter our dataset to exclude property transactions with holding periods below the 1st percentile and above the 99th percentile.

Returns

In all of the regression specifications that make use of repeat sales, we winzorize our dataset to remove outliers in capital gains at the 1% and 99% level.

Mortgage information

In all of the regression specifications that make use of mortgage information we remove all transactions where the mortgage amount is R0 or negative, cases which likely represent errors. We furthermore filter out all transactions with multiple mortgages that likely represent cases

where mortgages are refinanced.

In this paper, we use novel and granular housing data for Cape Town to provide a detailed account of foreign demand for property in a major emerging market. Cape Town is a coastal city in South Africa, covers over 2,400 square kilometers and had a population of around 3.7 million people as of 2011. Two features make Cape Town an apt location for this paper.

Firstly, Cape Town represents an attractive destination for foreigners. Given South Africa's colonial history, the relationship between foreigners and Cape Town, also known as *The Cape of Good Hope*,[40] has a historical precedent.[41] More recently, Cape Town has become popular as a destination for the purchase of vacation homes. As a Southern Hemisphere city, Cape Town represents an attractive destination for Northern Hemisphere buyers, who seek a summer vacation home for the winter months, a group of buyers the Financial Times refers to as property 'swallows'.[42] Together with this, Cape Town also represents one of the most affordable luxury property locations.[43]

Secondly, given the legacy of Apartheid which involved racial segregation, Cape Town remains highly segregated. Under Apartheid, different races were permitted to live and own property in racially segregated zones, with any digression representing a criminal offense. Importantly, the Apartheid government had the power to decide these racial zones and as a result, areas with highly desirable residential characteristics (proximity to employment, weather etc.) were reserved for White South Africans. These patterns have persisted until today, with sharp discrepancies in infrastructure and amenities across suburbs. This effectively limits the number of suburbs in which buyers with strong preferences for certain amenities can operate.[44] In this context, positive demand shocks to groups of buyers who have strong location specific preferences, such as foreign non-residents, are likely to result in spatially correlated demand shocks.

This likely contributes to the degree of concentration of foreign transactions. In Figure 9 we show the Lorenz curve for foreign non-resident transactions across sub-places in Cape Town. In many of the suburbs where foreign non-residents are present, they have purchased over 15% of all transactions between 2011 and 2017. In fact, 35.4% of sub-places see no foreign non-

[40] The name, *The Cape of Good Hope*, reflects the optimism that voyagers attributed to Cape Town, as a result of the Cape's importance as a half-way stop for voyagers which facilitated travel to the West to India and East for the first time.

[41] Various authors give vivid testimony of this. See for example Twain (1821) and also Morris (1958), who in 1922 describes Cape Town as "A little bit of San Francisco … and a whisper of France."

[42] See "Cape Town: why foreign 'swallows' are swooping on homes in suburbs"—*The Financial Times*, 18 July 2016.

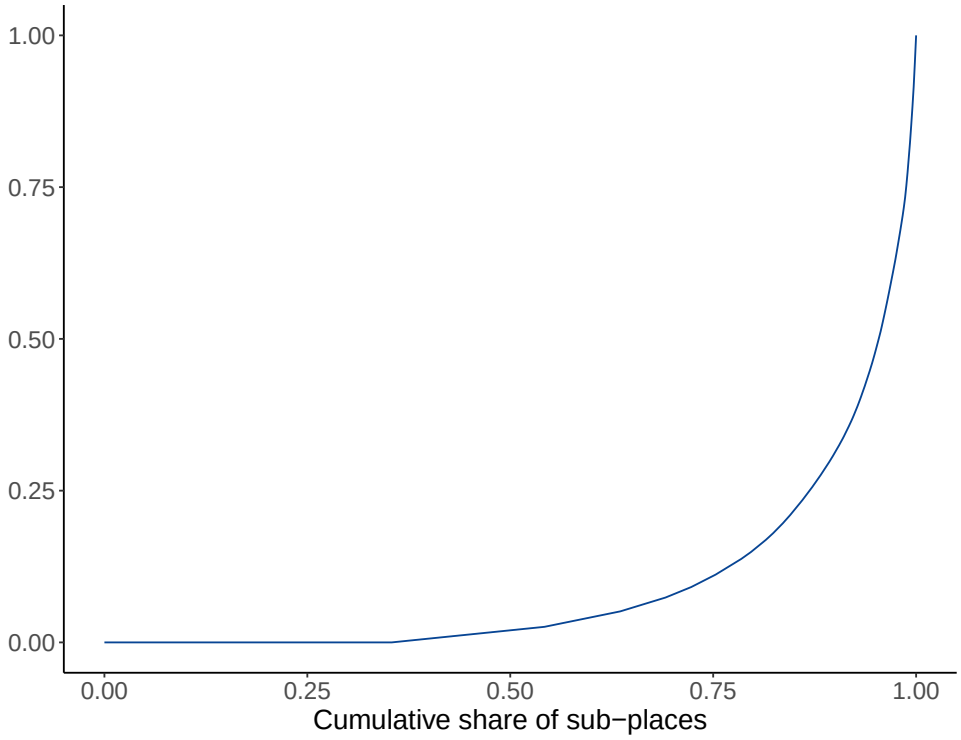
[43] In their *2017 Wealth Report*, the real estate agency Knight Frank shows that, across luxury property markets around the world, Cape Town represents the most affordable city, based on average price per square meter.

[44] In that sense, greater financial freedom in a context where the number of highly attractive locations is small, likely leads to smaller number of potential properties.

resident transactions during our sample with 69.3% of all transactions occurs in 10% of all suburbs, translating to a Gini coefficient of 0.808.

Figure 9: Lorenz curve showing concentration of foreign non-resident transactions

This figure shows the Lorenz curve for the concentration of foreign non-resident transactions across sub-places in Cape Town, where we show the cumulative share of foreign non-resident transactions on the y-axis and the cumulative share of sub-places on the x-axis. The associated Gini coefficient is 0.808.



Furthermore, the suburbs foreign buyers sort into are very different from the average suburb in Cape Town. In Table 10 we show that foreigners purchase property in areas which the houshold heads have higher income levels, are more likely to have a higher education qualification and where there are greater shares of secondary residences.

Table 10: Sub-place household characteristics and foreign demand

This table shows the sub-place average (i) age, (ii) income, (iii) share of the population that has completed higher education, and the (iv) share of individuals who reported their South African address as being a secondary residence for each decile of the sub-place share of transactions made by foreign non-residents between 2011 and 2017 in panel (a) and foreign residents in panel (b). Deciles are increasing in the foreign share of transactions, which means that decile 1 (10) represents sub-places where the foreign share of transactions was below the 10th (above the 90th) percentile of the total sub-place foreign transaction distribution. The underlying data was taken from the 2011 South African national census.

Decile	Age	Income	% higher education	% secondary residence
1	41.21	R200,124	0.15	0.09
2	39.19	R223,713	0.19	0.11
3	39.70	R192,776	0.15	0.11
4	39.63	R274,875	0.27	0.10
5	38.58	R268,231	0.23	0.05
6	39.91	R291,319	0.28	0.05
7	39.99	R370,263	0.34	0.06
8	41.30	R402,550	0.38	0.07
9	40.11	R407,133	0.36	0.09
10	39.11	R432,544	0.45	0.13

(a) Foreign non-residents

Decile	Age	Income	% higher education	% secondary residence
1	38.23	R213,204	0.18	0.05
2	40.78	R205,966	0.19	0.11
3	38.92	R173,200	0.12	0.11
4	38.93	R320,988	0.28	0.06
5	40.37	R255,746	0.21	0.09
6	39.84	R341,580	0.31	0.09
7	40.47	R405,904	0.37	0.06
8	42.37	R425,166	0.36	0.07
9	41.42	R378,081	0.37	0.07
10	37.42	R350,117	0.41	0.14

(b) Foreign residents

C.2 Geography

Throughout the paper we make use of two suburb definitions for Cape Town: main-places and sub-places. All sub-places are self-contained in a unique main-place and there are 58 main-places and 921 sub-places. We plot these boundaries in Figure 10.

Figure 10: Main-place and sub-place map of Cape Town

This figure depicts both the main-place and sub-place suburb boundaries for Cape Town. All sub-places are self-contained in a unique main-place. There are 58 main-places and 921 sub-places.

(a) Main-place

(b) Sub-place

C.3 Exchange rate volatility

As discussed in the paper, the South African Rand is one of the most volatile currencies in the world. In Table 11, we show the standard deviation of the month-on-month change in the real effective exchange rate (REER) for a group of countries. South Africa consistently ranks high.

Table 11: Exchange rate volatility across a range of countries

This table reports the standard deviation of the month-on-month change in the real effective exchange rate (REER) for a group of countries. The results are broken down into four time periods and are shown for the sample as a whole in the final column. REER data was obtained from the Bank for International Settlements.

Country	1995-2000	2000-2005	2005-2010	2010-2015	1995-2015
Brazil	3.52	2.32	2.79	2.32	2.82
Euro area	1.30	1.56	1.45	1.49	1.44
Russia	4.63	1.04	1.96	2.90	3.14
Singapore	0.94	0.78	0.78	0.81	0.84
Turkey	1.68	4.17	2.99	2.00	2.82
UK	1.62	1.50	2.02	1.30	1.75
USA	1.33	1.42	1.43	1.09	1.33
South Africa	2.82	3.26	3.27	2.11	2.85