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

Allan Davids†
University of Cape Town

Co-Pierre Georg‡
University of Cape Town
Deutsche Bundesbank

This version: March 9, 2019

Abstract

We study the discount foreign investors receive buying real estate in an emerging market following large sudden exchange rate depreciations using transaction level data for the city of Cape Town, South Africa. Foreign non-residents purchase properties in more expensive, coastal suburbs, and purchase more expensive properties within these suburbs. While foreign non-residents do not pay higher prices on average, they realize significantly lower capital gains than residents upon resale. Using historically large depreciations as positive shocks to foreign non-resident demand, we find that areas with large pre-existing populations of foreign born citizens experience notable quality-adjusted price increases relative to other geographically close areas in the month following the depreciations. Despite this, we find no evidence that this increase in demand leads to increases in prices for local buyers.

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

*We wish to thank Stijn van Nieuwerburgh, Marti Subrahmanyam, Johannes Stroebel, Adrian Carro, Marco Pangallo, Jesper Riedler, Emil Verner, Tarun Ramadorai, Christophe Spaenjers and seminar participants at the University of Oxford, the University of Cape Town and Waseda University for their helpful discussion and comments. The authors would also like to thank the Volkswagen Foundation and South African Reserve Bank for financially supporting this research and the Valuations department and the Property and Real Estate ERP Support Centre at the City of Cape Town, in particular Llewellyn Louw, Gaushal Meelun, Michael Smit and Andrew Gie for their generous assistance regarding data. The views expressed in this paper are the authors own and do not necessarily reflect the views of Deutsche Bundesbank or the City of Cape Town. All errors are our own.

†Email: allan.davids@outlook.com. Corresponding author.
‡Email: co-pierre.georg@uct.ac.za.

1 Introduction

Foreign non-resident investment in real estate is becoming an increasingly common feature of major cities. This has attracted a great deal of media attention around the world, with concerns raised regarding the effect of this global demand on property prices and affordability for local buyers.[1] In many regions, these concerns have led to policy action.[2] The increasingly global nature of real estate also poses concerns for financial stability. The International Monetary Fund (2018) notes that *"links across housing markets may transmit or amplify financial and macroeconomic shocks, increasing the exposure of local housing markets to global financial conditions or to shocks affecting foreign investors active in local markets."*

The prevailing literature has emphasized the importance of economic conditions in the home country of the buyer when explaining foreign demand inflows and prices in global property hotspots. Country-of-origin political and economic risk may push foreign buyers to purchase luxury real estate as a safe haven asset (Badarinza and Ramadorai, 2018) while positive country-of-origin economic conditions which increase wealth, may increase the demand and willingness of foreign buyers to purchase and pay higer prices for luxury property (Cvijanovic and Spaenjers, 2018).

Recent anecdotal evidence from Turkey, however, highlights the effect of large exchange rate depreciations on foreign demand for real estate. Following a historically large depreciation in the third quarter of 2018, where the Turkish Lira depreciated by around 30% year-on-year, real estate agents in Turkey have reported a doubling of web traffic on online listing sites[3] while foreign transactions increased by 142% year-on-year, for August and September, from 3,920 transactions to 9,481 transactions.[4] Many of the accounts focus on how the large depreciation offered opportunities to foreign buyers. Given that local prices remained largely unchanged (or were slow to change), foreign buyers enjoyed large discounts in their domestic currency.[5]

While a number of papers find that country-of-origin exchange rate appreciations (i.e. country-of-destination exchange rate *de*preciations) are associated with an increase in foreign transac-

[1] See for example "When the empty apartment next door is owned by an oligarch" – *The New York Times*, 21 July 2017; "Foreign buyers pump up U.S. home prices" – *The Wall Street Journal*, 18 July 2017; "Foreign investors snapping up London homes suitable for first-time buyers" – 13 June 2017 and "Foreign property buyers are pricing locals out of the market" – *The Australian Daily Telegraph*, 13 March 2017.

[2] See for example: "Vancouver slaps 15% tax on foreign house buyers in effort to cool market" – *The Guardian*, 2 August 2016; "Toronto to impose 15% tax on foreign home buyers to regulate housing costs" – *The Guardian*, 20 April 2017 and; "Australia targets foreign homebuyers with property tax rise" – *The Financial Times*, 1 June 2017.

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

[4] Authors' own calculations using data from the Turkish Statistical Institute, available here.

[5] See for example: "For a Lucky Few, Luxury Is Suddenly a Lot Cheaper in Turkey" - *Bloomberg*, 12 August 2018 and "Property buyers dive in as Turkey's lira plunges" - *The Guardian*, 18 August 2018.

tions (Cvijanovic and Spaenjers, 2018) as well as an increase in the prices of "international" property (ski resorts and oceanfront estates) compared with more "local" property (Ruf and Levi, 2011), these have been in settings where the country-of-destination exchange rate is relatively stable, in contrast to cities in developing countries.[6] As a result, large exchange rate depreciations and subsequent large discounts for foreign buyers of domestic property, are likely to be a key feature of cities in emerging markets, as opposed to the settings the literature has typically studied.

In this paper, we provide the first detailed account of foreign demand for real estate in a city of one such major developing country, namely Cape Town in South Africa. Using detailed deeds registry data for the period from 2011 to 2016, we are able to cleanly identify the nationality and residence status of each buyer. Importantly, while we do not observe the country of origin, we are able to identify when a buyer is a foreign resident as opposed to a foreign non-resident and contrast these buyer groups with South African residents.

Cape Town presents an ideal location to study the effects of foreign property purchases, given that it boasts a large and established luxury secondary real estate market which consistently attracts foreign investment.[7] The South African rand has also consistently ranked as one of the most volatile currencies in the world.[8] Important for our study is that, while local institutional and economic conditions cannot be neglected, global conditions play a major role in the volatility of the rand. The rand is the 20th most traded currency in the world, accounting for around 1% of all global foreign currency trading.[9]

We find that foreign buyers make up a non-negligible proportion of the market, with foreign non-resident and foreign residents responsible for 6.24% of all transactions made by natural persons in the residential market between 2011-2016, making up 8.87% of the total rand transaction value.[10] Foreign transactions are concentrated in the South-East and South-West of Cape Town, popular coastal regions, especially among retirees. In terms of prices, foreign non-residents pay the highest unconditional average prices, followed by foreign residents and South African residents. Much of this variation can, however, be explained by foreign buyers sorting into more expensive suburbs and choosing comparatively more expensive property (with

[6] For example, between 2010 and 2016, the standard deviation of the year-on-year change in the euro, the US dollar and the Canadian dollar, was 0.056, 0.059 and 0.066, respectively. In three developing country settings, such as Turkey, South Africa and Brazil, the same standard deviation was 0.080, 0.11 and 0.14, respectively.

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

[8] See, for example: "Ruble Is Close to Unseating Rand as the World's Most Volatile Currency" - *Bloomberg*, 04 September 2018.

[9] See: "2016 Bank for International Settlements (BIS) Triennial Central Bank Survey", accessible here.

[10] We filter out any transactions made by non-natural persons and any transactions involving vacant land, institutional and commercial property.

higher amenities) within these suburbs. As a result, our evidence suggests that the premium paid by foreign non-resident and foreign resident buyers relates to purchasing higher quality properties (we confirm this using a repeat-sales specification) as opposed to paying higher prices for otherwise identical properties, when compared to South African residents. While foreigners do not appear to pay higher prices, *ceteris paribus*, they realize lower capital gains upon resale. Foreign residents realize 2.88% lower capital gains when compared to South African residents. The equivalent measure is 10.20% for foreign non-residents, which is an economically significant effect. We also find no economically significant difference in holding periods across buyer types. Lastly, we show that foreign transactions are tightly linked to the existing share of foreign born residents in a given suburb, with a stronger link existing for foreign non-residents than foreign residents. In other words, while both foreign residents and foreign non-residents tend to buy in areas with large pre-existing shares of foreign born residents, the tendency to do so is around 45% higher for foreign non-residents than for foreign residents.

Next, we find that the lagged changes in the rand Real Effective Exchange Rate (REER) have a significant negative correlation with changes in foreign non-resident transactions (i.e. larger REER depreciations correlate with more foreign non-resident transactions). We find no such relationship for transactions carried out by foreign residents. The specification using foreign resident transactions also has a significantly lower R-squared than the specification using foreign non-resident transactions. We also find that changes in foreign non-resident transactions are decreasing in the exchange rate distribution—only lower quartile exchange rate changes have a statistically and economically significant relationship with changes in non-resident transactions.[11] Once again, this relationship does not hold when considering transactions by foreign residents. This suggests that the effect the exchange rate may have on foreign demand relates to residence status and not to nationality status. Subsequently, these exchange rate effects appear to be linked to the likelihood a property is purchased in foreign currency.[12] Put differently, the exchange rate effect is linked to purchasing property in a foreign currency as opposed to a foreigner purchasing a property.

Lastly, we explore the effects of foreign demand on house prices. We find that changes in the net inflow of both sub-place foreign resident and non-resident transaction in the year preceding a transaction, has a positive conditional correlation with property prices. Nonetheless, these price effects represent conditional correlations as opposed to pure causal effects of foreign demand on prices given concerns regarding the endogeneity of foreign demand and prices. To address this, we follow a difference in differences approach where we study the quality adjusted

[11] These exchange rate events correspond to year-on-year depreciations in the REER of greater than 14.5%.

[12] Our assumption here is that foreign residents hold the majority of their savings in South Africa and are more likely to purchase property in South African rand.

suburb price spread between areas that have large pre-existing foreign born communities (our first difference) in the month following lower quartile year-on-year changes in the exchange rate (our second difference).[13]

We calculate the price spread between suburbs that are geographically close. In the paper's geographic hierarchy, this means comparing sub-places which are located within the same main-place.[14] As a result, we calculate the spread between sub-places with large shares of existing foreign residents (our treatment group) and suburbs with the lowest shares of existing foreign residents *within the same main-place*. This reduces concerns that our treatment and control suburbs are not directly comparable and eliminates any common effects that large exchange rate depreciations may have across suburbs which are geographically close. We then use large exchange rate depreciations as a shock to foreign non-resident demand and study the impact of this shock on within-main-place price spreads between suburbs which differ in the extent to which they are exposed to the within-main-place allocation of existing foreign residents.

We find that in the month following a large exchange rate depreciation, that the within-main-place price spread increases. There is, however, little evidence to suggest that these increases in demand lead to aggregate price increases for local buyers. We provide evidence that these exchange rate depreciations can have heterogeneous effects, with price spreads increasing more in areas where households have lower average income and education levels.

Overall, we interpret this as the effect of foreign demand on house prices following a large exchange rate depreciation. In doing so, we show that, in addition to the many ways exchange rates may affect house prices in general, given various interlinkages with the exchange rate and local macroeconomic variables, large depreciations can have a specific effect on property prices in areas popular with foreign non-residents through a rise in foreign non-resident demand for property amidst a reduction in foreign-currency adjusted property prices.

This paper contributes to a growing literature examining foreign demand for real estate and the implications for prices.

Firstly, this paper relates to existing work which studies the behaviour of foreign buyers in the housing market. Chinco and Mayer (2016) illustrate how out-of-town[15] second home buyers in a range of US cities realized lower capital gains upon resale when compared to local second home buyers. The authors show that this is linked to out-of-town buyers mistiming the market, highlighting the role of information asymetrries which lead out-of-town buyers to be misinformed about the local market. Agarwal, Sing and Wang (2018) find similar effects in the

[13] This is the equivalent of an exchange rate depreciation of more than 14.5%.
[14] sub-places are smaller suburbs which are located within a given, larger, main-place.
[15] Non-resident investors from other cities within the US.

commercial property market, where foreign buyers pay a premium when compared to local buyers. Cvijanovic and Spaenjers (2018) show that in the residential property market in Paris, out-of-country (non-resident) foreign buyers pay higher prices and realize lower capital gains upon resale. Importantly, the authors show that foreign residents realize substantially better investment outcomes. This highlights that the factors which lead foreign non-resident buyers to realize poorer outcomes, relate to these buyers being non-residents as opposed to them being foreign. We provide complimentary evidence, showing that non-resident sellers realize lower capital gains upon resale. We however find that the premium foreign non-residents pay, relates to unobserved property characteristics, as opposed to these buyers paying more for otherwise identical property. In addition to investment outcomes, a few papers also highlight the tendancy of out-of-country buyers to purchase in areas with large pre-existing shares of residents from the same country. Cvijanovic and Spaenjers (2018) show this persistence using transaction level data for Paris. Badarinza, Ramadorai and Shimizu (2018) show that, in the global commercial real estate market, out-of-country buyers have a strong tendency to transact with sellers from the same country. This "nationality bias" is especially pronounced when foreign buyers transact abroad and in countries where the rule of law is weak, highlighting the role of contracting frictions and trust in international property transactions. In this paper, we provide the first accounting of foreign non-resident and resident demand for property in a major emerging market city. While we do not observe the exact nationality of foreign non-resident buyers, we are still able to show that these foreign non-resident buyers buy property in areas with a large pre-existing share of residents born outside of South Africa. We however find that foreign non-residents pay higher prices even after controlling for suburb and time fixed effects, with this effect related to foreigners purchasing properties of a higher quality along a dimension unobserved in our range of extensive property level controls, suggestive that the property-level preferences of foreign non-residents are very different from those of other buyers. Furthermore, by matching buyer and seller pairs in our dataset, we show that foreign non-residents transact more frequently with other foreign non-residents, as opposed to foreign residents. While we remain agnostic on the cause of this, it at least suggests that on an aggregate level, a channel through which out-of-country buyers may be linked to out-of-country sellers in the residential property market reflects a correlation in property level preferences among buyers, over and above the tendency to buy in the same areas as their counterparts.

Secondly, this paper relates to a group of papers which link foreign demand to variation in macroeconomic conditions. Badarinza and Ramadorai (2018) show how negative economic and political conditions in a country-of-origin leads to a higher number of transactions and higher property prices in areas of London with historically large shares of residents from that country. The authors attribute these effects to rising foreign demand, highlighting how prop-

erty in London acted as a safe-haven for investment. These results are also given credence by Sá (2016). Cvijanovic and Spaenjers (2018) show that on the extensive margin, positive country-of-origin economic conditions positively affect the number of non-resident transactions in Paris, and on the intensive margin, increases the prices non-residents pay. This highlights a complimentary channel for foreign demand, namely the global market for luxury property. Ruf and Levi (2011) show how changes in the relative prices between areas popular with international buyers and other more local areas are affected by changes in the exchange rate. Using data from two states on either side of the US border with Canada the authors find that depreciations (appreciations) are associated with a rising (falling) price spread between these two areas. Cvijanovic and Spaenjers (2018) find similar evidence for Paris. We contribute to this literature by illustrating the effect large exchange rate depreciations can have on foreign demand and property prices in a setting with one of the world's most volatile currencies. Furthermore, by considering within-city local price effects between geographically close suburbs as opposed to price effects across geographically distance locations, our identification strategy allows us to control for many spatial confounders which could potentially bias our estimates.

Lastly, a range of papers link foreign demand to local house prices. Badarinza and Ramadorai (2018) find that safe-haven motives strongly affect prices in London, leading to higher prices in areas with large pre-existing shares of foreign residents. While Cvijanovic and Spaenjers (2018) find no evidence that foreign investment increases average house prices, they find that increases in foreign demand lead to price increases in less desirable areas of Paris. Favilukis and Van Nieuwerburgh (2017) develop a spatial equilibrium model to study the effect of an inflow of out-of-town home buyers on housing market outcomes. The authors show how an increase in non-resident investment can lead to a decrease in overall welfare. The decrease in welfare is driven by a reduction in the housing stock for local buyers, when out-of-town buyers do not rent their properties to locals. We contribute to this literature by showing that following large depreciations, areas with large pre-existing populations of foreign born citizens experience notable quality-adjusted price increases relative to other geographically close areas in the month following the depreciations. Despite this, we find no evidence that this increase in demand leads to increases in prices for local buyers.

2 Data

There is little empirical research on cities using granular transaction level data. This is especially true of emerging markets. 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. To

the best of our knowledge, only Cvijanovic and Spaenjers (2018) and to some degree Ruf and Levi (2011), have been able to exploit micro-level transaction data to cleanly identify foreign ownership.

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, a coastal city in South Africa, covers over 2,400 square kilometers with a population of around 3.7 million people as of 2011. Given South Africa's colonial history, the relationship between foreigners and Cape Town, also known as *The Cape of Good Hope*[16] has historical precedence.[17] More recently, the Financial Times documents property 'swallows'—Northern Hemisphere foreign investors who buy luxury property in Cape Town to use in their winter months (the summer months in Cape Town).[18] Internationally, Cape Town also represents one of the most affordable luxury property locations and one of the best performing global markets. 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, and the 14th best performing property market in terms of returns, ahead of cities like New York, Singapore, Hong Kong and Paris.[19] Accounts like these are important as they illustrate that Cape Town has been a desirable destination for foreign real estate investment, not only in recent times, but since as early as the 1800s.

2.1 Property transactions

We collect data on the full universe of residential property transactions in Cape Town, as recorded on the Deeds Registry, covering the period from January 2011 to September 2016. We are provided access to the data by the City of Cape Town, the local government. The deeds registry records information on the transaction price and date of sale of every property in Cape Town, along with information on the buyer and seller which allows us to identify the nationality-status of each party. In this paper, we focus on three groups of individuals: (i) *South African resident*, i.e South African born residents 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

[16] 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 half-way stop for voyagers which facilitated travel to the West to India and East for the first time

[17] 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."

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

[19] See: "Knight Frank 2017 Wealth Report" - *Knight Frank*, 2017.

provide their passport as an identifying document when purchasing property.[20] 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.[21] 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 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 with 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.

This is an important distinction from the literature which has typically identified the nationality of buyer (Ruf and Levi, 2011) using the mailing address supplied by the owner to receive their tax assessment and the residence status (Cvijanovic and Spaenjers, 2018) of buyers using the primary address of the buyer provided on the day the title deed is signed by the notary. We, on the other hand, identify the nationality and residence status directly from the identifying documentation provided by the buyer.

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. Furthermore, we assign properties bought and sold in community of property and fractional ownership to a nationality status, if, and only if, all participants in the joint ownership structure have the same nationality status. We discard all other transactions to ensure an accurate mapping of nationality status. One limitation of our data relates to the nationality of foreign residents and non-residents. While we are able to distinguish these foreign residents and non-residents from South African residents, we are unable to distinguish the exact nationality of these foreign resident and non-resident buyers and sellers.

Figure 1 shows mean transaction prices for the different buyer types. Prices increase by 51.1% for South African residents, 31.1% for foreign residents and 37.2% for foreign non-residents between 2011 and 2016. Price trends are also very similar, with foreign non-residents consistently paying higher prices, followed by foreign residents and then South African residents.

[Insert Figure 1 about here]

Table 1 shows that between 2011 and 2016 foreigners bought 6.24% of all property on the market, which made up 8.87% of the total Rand value of all property transactions. Foreign non-

[20] We are able to identify nationality status among individuals who have a South African identity number using the underlying structure of identity numbers. The 11-th digit of every South African identity number takes a value of "0" for South African residents and "1" for (foreign born) permanent residents.

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

residents bought 20.44% more properties than foreign residents and invested 39.8% more in terms of the rand amount. Figure 2 shows the time series patterns of foreign investment—resident transactions are largely constant in their relative share throughout the period, while non-resident investment is more volatile.

[Insert Table 1 about here]

[Insert Figure 2 about here]

We are also able to construct information on the seller of each property, their nationality status and the price they had bought the property for, even if the original transaction occurred before the beginning of our sample (pre-2011). As with the buyer information, we also remove any transaction where the seller is the government or a non-natural person. Table 2 shows that while South African residents and foreign non-residents tend to hold property for a similar time period, foreign residents hold properties for an average of one year longer. Foreign non-residents realize the lowest capital gains upon resale, while foreign residents realize higher returns than their counterparts. Naturally, these number represent unconditional averages, and much of the variation in capital gains could be attributable to differences in holding periods or the timing of purchases and sales. We explore this in a later section.

[Insert Table 2 about here]

We are also able to establish some high-level facts regarding the frequency at which different buyer types transact with one another, as presented in Table 3. Foreign non-residents buy 6.55 percentage points more properties from other foreign non-residents than they buy from foreign residents. Conversely, however, the rate at which non-residents buy from residents is actually higher than the rate at which they buy from non-residents, albeit the difference being much less pronounced than in the case of foreign non-resident buyers. Moreover, foreign non-residents tend to buy more properties from foreigners (non-resident and resident) than foreign residents.

[Insert Table 3 about here]

2.2 Property characteristics

Every municipality in South Africa is required to produce a valuation roll at regular intervals, typically every four years. The valuation roll involves the collection of detailed information of

each property to inform the calculation of property values used in the determination of property tax. We obtain accesss to the 2015 Valuation Roll from the Property Valuations department within City of Cape Town. The dataset contains a range of hedonic information for each property and we append this dataset to the property transaction data given common property identifiers. The valuation roll also contains a range of qualitative variables populated by a team of professional valuers and data collectors at the City of Cape Town during site visits and using aerial photography.[22] We describe each variable in the appendix. It is important to note that we only observe the data at one point in time, namely 2015. In that sense, our hedonic information is time-invariant.

Furthermore, we receive address information for each property. This allows us to accurately locate each property within the broader suburb in which the property is located. In this paper we make use of the suburb definitions as used in the 2011 South African national census, conducted by Statistics South Africa. We make use of a GIS shape file from Statistics South Africa to link every property to it's relevant suburb. We make use of two aggregations throughout the paper, main-place and sub-place. We show these suburb boundaries in Figure 3. All sub-places are self-contained in a single main-place. In Cape Town there are 51 main-places which can then be further disaggregated into 792 sub-places.

[Insert Figure 3 about here]

Using this data we can establish some initial characteristics of the types of property that foreign buyers purchase. When compared with South African residents, foreign residents and non-resident buyers purchase larger properties, which are generally located closer to a coastline, as reflected in Table 4. Foreigners also buy a higher share of sectional title properties (typically apartments).

[Insert Table 4 about here]

3 Results

We want to answer three questions in this paper. Firstly, what are the characteristics of foreign property demand in Cape Town? Secondly, how does foreign demand respond following large exchange rate depreciations? And lastly, what is the effect of foreign demand on local property prices?

[22] See "Property valuations: Frequently asked questions" - *City of Cape Town* and "How and why the City conducts a general valuation of your property", *City of Cape Town* for more information

3.1 Characteristics of foreign property demand

3.1.1 Spatial distribution of foreign demand

Earlier, we showed that foreigners pay higher unconditional average prices than South African residents. This could be because foreigners have a preference for the types of property which have higher average prices. In addition to property-level preferences, foreign demand typically also differs from local demand in terms of the areas in which foreigners choose to buy. We show the spatial distribution of foreign transactions in Cape Town in Figure 4. Foreign transactions are concentrated in the South-East and South-West of Cape Town. The South-East of the city includes the central business district (CBD) and popular coastal areas. The South-West of the city is another popular coastal region, especially amongst retirees. The purchasing patterns are largely similar for foreign residents and foreign non-residents.

[Insert Figure 4 about here]

In Table 5 we show a range of sub-place level measures from the 2011 South African census, arranged in deciles of sub-place level share of total transactions made by foreign non-residents in panel (a) and foreign non-residents in panel (b). Foreign non-residents tend to purchase property in suburbs where the average age, income and share of the population with a superior education level is higher. The pattern is similar for foreign residents. As a result, the suburbs in which foreigners invest tend to be wealthier on average. We also see that both foreign non-resident and resident demand is higher in suburbs which have higher shares of residents born outside of South Africa. However, we see that while foreign non-resident transactions occur in areas with higher shares of secondary residences, the pattern is much less pronounced for foreign residents.

[Insert Table 5 about here]

As a result, while foreign non-residents and residents both tend to purchase property in areas with large pre-existing share of foreign residents, foreign non-residents seem to prefer areas with a higher share of secondary residences than foreign residents. This suggests that, while both groups buy property in wealthier suburbs with large communities of foreigners, non-resident demand is linked to the purchase of secondary property, or holiday homes, which is consistent with local anecdotal evidence[23] and also with the findings in Cvijanovic and Spaenjers (2018).

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

3.1.2 Prices paid by foreign buyers

Is it possible, against this backdrop, to explain the premium in prices paid by foreigners with the help of (i) property-level and (ii) suburb-level characteristics? This can be formally explored using a hedonic regression, in the context of which we examine the prices paid by foreigners, relative to locals, controlling for property observables, location and time fixed effects. Formally,

$$\ln P_{i,t} = \alpha + \boldsymbol{X}_i^{2015} + \beta_1 B_i + \rho_t + \nu_s + \varepsilon_{i,t}, \tag{1}$$

where $\ln P_{i,t}$ represents the log transaction price of property i; $\boldsymbol{X}_i^{2015}$ represents a vector of property level controls observed in 2015; B_i represents a dummy variable capturing the nationality and residency status of the buyer; ρ_t a time fixed effect, specifically the year in which a property was sold, and lastly; ν_s, a sub-place fixed effect. 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, this assumption is reasonable. However, as a robustness check, we include a property level dummy variable which captures whether a property has undergone formal structural renovations.[24] This allows us to control for properties whose hedonic characteristics have changed, without directly observing the results of the change. Lastly, under this specification, the inclusion of a time fixed effect controls for common price effects across all areas in Cape Town while the location fixed effect controls for time-invariant differences in prices across locations.

The difference in the price paid for a property by (i) foreign non-residents and (ii) foreign residents relative to South African residents is captured by β_1. We report the β_1 coefficient in Table 6 in columns (1) - (4).[25] In column (1), we see that both foreign non-residents and residents pay noticeably higher prices on average than locals, controlling for property characteristics and a time fixed effect. Foreign non-residents also pay higher prices than foreign residents. However as illustrated by columns (2) and (3), we find that much of this premium can be explained using location fixed effects, indicating that foreigners sort into suburbs with higher than average property prices. However, even under the most restrictive specification in column (4), with a sub-place fixed effect and additional qualitative controls[26], we see sizeable within-suburb variation—even after sorting into more expensive suburbs, foreign non-residents (residents) pay around 5.91% (2.86%) more than South Africans controlling for observables. As a result,

[24] In our dataset, we observe a property's date of construction and additionally we also observe if any formal structural renovation has taken place, which would cause the building plan of a property to be altered. Importantly, we observe the date of the building plan alteration.

[25] We report the coefficients on all hedonic coefficients in the appendix of the paper.

[26] We discuss these qualitative variables in Table 1.

while foreigners buy property in more expensive suburbs, they also buy more expensive property *within* these suburbs, when compared to locals, indicating sizeable within-sub-place variation in the prices paid by different buyer groups.

This is most likely indicative of two effects. Firstly, foreigners may pay higher prices than locals due to information asymmetries, which reflect a lack of understanding of the local market compared with residents, an effect outlined in Chinco and Mayer (2016). The fact that foreign non-residents pay higher prices than foreign residents is consistent with this view. Secondly, foreigners 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 foreigners may pay as well as any unobserved property characteristics which are correlated with both foreign preference and property prices.

[Insert Table 6 about here]

3.1.3 Capital gains realized by foreign buyers

If our previous estimates on the premium paid by foreigners were biased by unobserved property level characteristics which are positively correlated with both prices and foreign demand, then the premium we measure relates to foreigners preferring higher quality property, as opposed to paying for more otherwise identical property. Using information on the seller and sale price of each transaction, we are able to disentangle the causes of the premium paid by foreigners.

We consider the subsample of transactions where the seller was either a South African resident, foreign resident or foreign non-resident, thereby removing any transactions in which the seller was a non-natural person. We then eliminate all transactions which probably represent new transactions. While many of these transactions will have non-natural persons as sellers (i.e developers) and will therefore be eliminated in the previous step, we take one additional step to remove cases with no seller information, as these represent new registrations of newly built property. This leaves us with a dataset of transactions between our three buyer types of interest. We then calculate the return on each property, calculated as the difference between the price a property was bought for, versus the price a property was sold for. Using this dataset, we consider the following specification:

$$(\ln P_{i,t} - \ln P_{i,u}) = \alpha + \beta_1 B_{i,t} + \beta_2 S_{i,u} + \beta_3 Ren_i + \rho_t + \phi_u + \nu_s + \varepsilon_{i,t,u}, \tag{2}$$

where, $(\ln P_{i,t} - \ln P_{i,u})$ is the difference between the price for which a property was sold for in

year t and the price for which a property was originally bought for 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 Ren_i which takes a value of one if the property has been formally renovated. 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 effects that may affect capital gains related to the timing of the purchase or sale. Lastly, as before, we include a suburb fixed effect, ν_s. If foreigners pay higher prices for properties, we could expect β_1 to be positive and if foreigners realize lower capital gains upon resale, we would expect β_2 to be negative.

By using returns, we effectively consider a repeat-sales specification. Given that we are concerned about unobserved property characteristic, the repeat-sales specifications, represents a robust way of controlling for this. Under the assumption that the underlying property-level characteristics are unchanged, controlling for any structural renovation, then our estimation of our coefficients of interest should capture effects solely related to buyer characteristics and any unobserved property level variation is eliminated under the assumption that this variation is constant over time for the property. However, this comes at a reduction in sample size, from 113,047 to 64,273 transactions and the elimination of any transactions that represent new developments.[27]

We present the results from this specification in Table 7. We see no statistically significant evidence that non-resident or foreign residents pay higher prices than local buyers for otherwise identical property. This suggests that the premium we captured earlier in the hedonic specification, to a large extent, captures unobserved property level characteristics that are positively correlated with foreign demand. Nonetheless, this only holds for properties in the repeat sale subsample and that have transacted between either South African resident, foreigner residents or foreign non-residents. We find, however, that foreign buyers do, indeed, realize lower capital gains than South Africans. While foreign residents realize 2.88% lower capital gains, foreign non-residents realize lower capital gains of around 10.20%, a substantial effect in economic terms. In this regard, while foreign buyers do not appear to pay more for otherwise identical property, they realize significantly lower capital gains than local buyers upon resale.

[Insert Table 7 about here]

[27] We also trim our dataset to remove outliers in holding periods and capital gains at the 1% and 99% level.

3.1.4 Holding periods

A popular narrative surrounding foreign property investment relates to the use of the property, with many accounts that foreigner purchase property in order to speculate and make quick returns upon resale.[28] While we do not observe how buyers choose to use their property, we are able to calculate holding periods for each property sold. Holding periods may shed light of the motives of buyers, to the extent that motives like speculation are associated with different holding periods compared to other transactions. In table 4 we showed that unconditional mean holding periods differ among buyers. We formally examine this by estimating the following equation:

$$HP_{i,u\to t} = \alpha + \beta_1 S_{i,u} + \phi_u + \nu_s + \varepsilon_{i,t,u}, \tag{3}$$

where $HP_{i,u\to t}$ represents the difference in time between the year a property was originally bought in, u, and the year it was sold in, t; $S_{i,u}$ represents our seller-type dummy as above; ϕ_u is a fixed effect capturing the year in which a property was bought, to control for any factors related to the timing of the original purchase and lastly, ν_s represent a suburb fixed effect.

We report the results in table 8. Foreign non-residents tend to hold property for shorter periods of time than South African residents. While the effect is statistically significant, it is economically insignificant – foreign non-residents hold property for only 0.010 to 0.089 years less (between four days and around a month). Furthermore, the effect is statistically insignificant for foreign resident sellers. As a result, there is no systematic difference in the holding periods of properties across buyer types, especially when we include the more restrictive sub-place fixed effects. This provides convincing evidence against motives of pure property price speculation or flipping, which are sometimes associated with foreign buyers.

[Insert Table 8 about here]

3.1.5 Historical persistence in foreign demand

A major feature of foreign demand for property in the literature relates to historical persistence in foreign residential patterns. Areas which have historically had large shares of foreign residents tend to attract a disproportionate share of subsequent foreign investment. This feature has two implications. Firstly, as noted by Badarinza and Ramadorai (2018), foreigners may choose to invest in areas with high shares of foreigners given immigration motives or as a way

[28] See for example "The Observer view on the need for a crackdown on non-resident property owners" – *The Guardian*, 19 August 2018

of reducing information asymmetries. Secondly, foreign residential preferences are likely to be driven by time-invariant suburb specific features, such as distance to the coast, Central Business District (CBD) etc. To explore this, we use data from the 2011 national census produced by Statistics South Africa. Specifically, we use the number of household heads in sub-places who report being born outside of South Africa, Pop_s^F.[29].

Using this data, we are able to test for persistence in the location of foreign demand,

$$N_s^{FNR} = \alpha + \beta_1 Pop_s^F + DistCoast_s + \rho_m + \varepsilon_s, \tag{4}$$

where N_s^{FNR} represents the total sub-place level transactions made by foreign non-residents; Pop_s^F represents the sub-place number of foreign born household heads in 2010; $DistCoast_s$ represents the distance from the midpoint of sub-place s to the nearest coastline and ρ_m a main-place fixed effect. The results are shown in Table 9.

As can be seen, the 2010 sub-place foreign population in 2010 is positively correlated with the sub-place number of transactions made by foreign non-residents between 2011 and 2016. In other words, relatively speaking, foreign non-resident buyers carried out more transactions in areas that had a higher number of foreign born residents as of 2010. The effects are robust to controls for the sub-place distance to the coast and a main-place fixed effect. Through columns (4) - (6), we re-estimate the specification using the number of foreign resident transactions from 2011 to 2016. The effects are also highly significant but around 45% smaller than in the specification using foreign resident transactions, indicating that the tendency to purchase property in areas with a large pre-existing population of foreign born household heads is stronger for foreign non-residents than for foreign residents.

[Insert Table 9 about here]

3.2 Foreign property demand and the exchange rate

Next, we investigate the relationship between the exchange rate and foreign demand. It is intuitive that the exchange rate affects for 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 lower the level of the exchange rate, the more affordable a property is in the foreign investor's

[29]The respective question in the census asks - "In which country were you born?". We use the share of individuals who reported a country other than South Africa.

home currency. In that sense, changes in the exchange rate should be associated with changes in foreign demand. Ruf and Levi (2011) and Cvijanovic and Spaenjers (2018) find evidence of this effect, and as we argue earlier, our setting is the ideal testbed for this mechanism due to the volatility of the South African rand.

In most of the 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 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.[30] Following a historically large exchange rate depreciation, real estate agents in Turkey have 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.[31] Thus, large depreciations can induce substantial changes in foreign demand, especially in highly desirable residential areas.

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.[32] Table 10 shows the standard deviation of the change in the Real Effective Exchange Rate (REER) across a group of countries.[33] South Africa consistently ranks as one of the countries with the highest exchange rate volatility across all time periods. While local institutional and economic conditions are not to be neglected, global conditions play a major role in the volatility of the rand. The rand is the 20th most traded currency in the world, accounting for around 1% of all global foreign currency trading.[34]

[Insert Table 10 about here]

Figure 5 shows the evolution of the South African (REER) between 2011 and 2016. Since 2011, the South African Rand has experienced a sustained depreciation. Figures 6 and 7 highlight this, showing multiple periods of month-on-month and year-on-year depreciations in excess of 4% and 15%, respectively.

[30] See for example: "For a Lucky Few, Luxury Is Suddenly a Lot Cheaper in Turkey" - *Bloomberg*, 12 August 2018 and "Property buyers dive in as Turkey's lira plunges" - *The Guardian*, 18 August 2018.

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

[32] See for example: Maveé, Perrelli and Schimmelpfennig (2016), Ramachandran et al. (2007), and in the media, "Ruble Is Close to Unseating Rand as the World's Most Volatile Currency"–*Bloomberg*, 4 September 2018.

[33] Throughout the paper, all of our REER data is obtained from the Bank of International Settlements (BIS)

[34] See: "2016 Bank of International Settlements (BIS) Triennial Central Bank Survey", accessible here.

[Insert Figure 5 about here]

[Insert Figure 6 about here]

[Insert Figure 7 about here]

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

$$\ln \Delta N_t^B = \alpha + \beta_1 \Delta ER_{t-1} + \beta_2 Sov_t + \beta_2 Sov_{t-12} + \varepsilon_t, \tag{5}$$

where $\ln \Delta N_t^B$ represents the log 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. Here, we include the sovereign credit rating for South Africa at time t as well as the one year lagged sovereign credit rating, a proxy for local macroeconomic conditions.[35] We report the results in Table 11.

[Insert Table 11 about here]

We observe a strong negative relationship between changes in the REER and changes in foreign non-resident demand. The effect is robust when controlling for the prevailing and one year lagged sovereign credit rating for South Africa, a proxy for local macroeconomic conditions. The conditional correlation is also significant from an economic point of view – in the specification controlling for the sovereign credit rating, we observe that a lagged one percentage point year-on-year depreciation is associated with a 67% increase in the year-on-year number of transactions by foreign non-residents. Interestingly, the effect does not hold whatsoever for foreign residents. Notably, the regression also has a significantly lower R-squared, suggesting that while changes in the exchange rate has strong explanatory power for changes in the number of transactions by foreign non-residents, it is less apt at explaining foreign resident transactions. We also see that changes in the REER are positively correlated with transactions by South African residents, consistent with the idea that exchange rate appreciations reflect positive local economic conditions. Nonetheless, while the effect is statistically significant for South African residents, the magnitude of the effect is significantly smaller than in the specification with foreign non-residents.

[35] We present results using the S&P sovereign credit rating. The results are similar when using the Moodys or Fitch.

We then repeat the exercise, but regress on quartiles of the REER. We present the results in Table 12. We see that transactions by foreign non-residents increase with the magnitude of a 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 a depreciation.

[Insert Table 12 about here]

This suggests that changes in the exchange rate play a key role in explaining changes in non-resident demand for property. In particular, depreciations, and especially large-scale depreciations, are associated with economically significant increases in non-resident transactions. This highlights 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 have a discounting effect on local property prices, denominated in foreign currency. The lack of evidence of a relationship between changes in the exchange 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.

3.3 Foreign property demand and house prices

In Section 3.1 and Section 3.2 we establish a number of features of foreign demand for property in Cape Town. Firstly, foreigners sort into suburbs with higher than average property prices and buy more expensive property within these suburbs. A repeat sales specification suggests that most of this effect is attributable to foreigners buying properties of an observably higher quality as opposed to foreigners paying more for otherwise identical property, when compared to South African residents. Secondly, foreigners, especially foreign non-residents, realize significantly lower capital gains upon resale. This evidence suggests strong information asymmetries. Third, the suburbs that foreigners tend to be prefer are predominantly coastal - a feature that is typically associated with luxury secondary residences and higher average incomes. These suburb-level preferences also appear to be largely time-invariant – historical suburb foreign inflow is positively correlated with subsequent foreign inflow. Lastly, we show that foreign non-resident demand is negatively correlated with the exchange rate; depreciations are associated with increases in the number of transactions by foreign non-residents. The effects also increase

with the size of the depreciation, with significantly higher inflows of transactions following large, lower quartile exchange rate movements (large depreciations). The same relationship for foreign residents is insignificant, providing little explanatory power. This suggests that the exchange rate affects the demand of foreign buyers not because of their nationality, but rather their residence status, and thus the likelihood of purchasing a property in foreign currency. As a result, the relationship between exchange rate depreciations and foreign non-resident demand for real estate appears linked to discount the exchange rate provides for foreign non-resident buyers in their local currency, consistent with a range of recent anecdotal evidence.

In this section we establish the relationship between foreign demand and house prices - do properties in suburbs that receive large inflows of foreign transactions sell for higher prices than otherwise identical properties in other suburbs? To answer this question, we revisit our hedonic specification from earlier, but add an additional variable to our setup which captures the sum of the net inflow of foreign transactions in the year preceding the transaction. We consider the same sample as earlier, but filter out transactions occurring in or after January 2012, to give us a year of foreign transactions between January and December 2011. Formally,

$$\begin{aligned} \ln P_{i,t} &= \alpha + \boldsymbol{X}_i^{2015} + \beta_1 B_{i,t} + \beta_2 \sum_{j=1}^{12} FNR_{s,t-j} + \beta_3 \sum_{j=1}^{12} FR_{s,t-j} \\ &\quad + \beta_4 DistCoast_s + \rho_t + \nu_m + \varepsilon_{i,t}, \end{aligned} \tag{6}$$

where $\sum_{j=0}^{12} FNR_{s,t-j}$ represents the net inflow of transactions by foreign non-residents into the sub-place (properties bought minus properties sold) in the year preceding the transaction while $\sum_{j=0}^{12} FR_{s,t-j}$ represents the same measure for foreign residents. To address concerns that our coefficients of interest are simply picking up different price trends across sub-places we include a main-place fixed effect, ν_m, to exploit within-main-place variation in foreign inflow as well as including the sub-place distance to the coastline, $DistCoast_s$, as a sub-place-level control.

We report the results in Table 13. The inflow of both resident and non-resident transactions has a statistically significant and positive correlation with transaction prices. Using the specification under which we include the sub-place distance to the coast and main-place fixed effects in column (2), we see that a one transaction increase in the net foreign resident inflow in the year a property transaction is associated with a 0.5% increase in the price of that property, while a one-transaction increase in the net inflow of foreign non-resident transactions in the year preceding a property transaction is associated with a 0.9% increase in the price of that property. To put these numbers into context, the mean foreign non-resident net inflow of transactions per sub-place in the year preceding a transaction is 1.45 and the mean foreign resident net in-

flow is 1.13. Given concerns that our results may reflect any tendency for foreigners to overpay, we present results for the same specification using the sub-sample of transactions bought by South African residents in columns (3) and (4). The result are marginally higher, but very much similar.

[Insert Table 13 about here]

This suggests that increases in the number of foreign buyers in a given sub-place is associated with higher sub-place prices for all other buyers. Nonetheless, these price effects represent conditional correlations as opposed to pure causal effects of foreign demand on prices. Potential endogeneity arises from two sources. Firstly, foreigners 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 some omitted variable correlated with property prices and foreign demand. For example, a particular sub-place may see new developments or amenities arise which simultaneously push up prices and increase foreign demand.

Ideally, we require 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. For example, Cvijanovic and Spaenjers (2018), who study the period between 1992 and 2016, use census data from 1982, while Badarinza and Ramadorai (2018), who study the period between 1995 and 2013, use census data from 2001. Both papers use the share of foreign persons residing in a given suburb as an instrument for analyzing foreign demand.

In this paper, we follow a similar strategy and use the share of household heads who state to have been born outside of South Africa in each sub-place from the 2011 census[36], $Share_s^F$. 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 sub-places within the lower quartile (bottom 25%) of the main-place distribution. We drop any main-place where our instrument approaches zero. Our treatment group then represents sub-places with greater shares of foreign born citizens as of 2010, relative to other sub-places with the smallest share of foreign born citizens *within a given main-place*. Figure 8 plots the sub-place share of foreign non-resident and resident transactions against deciles of $Share_s^F$. Both foreign resident and

[36]The respective question in the census asks - "In which country were you born?". We use the share of individuals who reported a country other than South Africa.

non-resident transactions are increasing in $Share_s^F$, but the rate of increase is much higher for foreign non-residents than foreign residents especially in the upper deciles.

[Insert Figure 8 about here]

Using these groupings, we study the price spreads between our sub-place treatment group and sub-place control group. Specifically, motivated by the earlier empirical evidence on the relationship between the exchange rate and foreign demand, we study the spread following large exchange rate depreciations. Using a range of controls, to rule out alternative explanations, we then seek to attribute price effects following these large exchange rate depreciations to foreign demand.

In empirical terms, we follow a three-step procedure. In the first step, we construct a quality-adjusted house price index for each of our treatment and control groups. To do this we use a variant of our original hedonic specification,

$$\ln P_{i,t} = \alpha + \boldsymbol{X}_i^{2015} + \beta_1 B_i + \rho_m^k + \rho_{m,t}^k + \varepsilon_{i,t}, \tag{7}$$

where as before $\ln P_{i,t}$ represents the transaction price of property i, $\boldsymbol{X}_i^{2015}$ a vector of property characteristics as of 2015 and B_i our variable capturing buyer type. We then include two additional variables, namely, ρ_m^k, a main-place treament fixed effect, where m denotes the main-place in which the property is located in and where k denotes whether or not the sub-place in which the property is located in is in our treatment or control group. This controls for persistent differences in our treatment and control groupings. We then include $\rho_{m,t}^k$, a main-place treatment by time fixed effect, which captures time varying differences in prices of our within main-place treatment and control groups. $\rho_{m,t}^k$ therefore represents the main-place treatment/control group variation in property prices, controlling for hedonics and buyer characteristics, which we interpret as our quality adjusted house price index for each of our main-place treatment and control groups.

For each main-place, we then calculate the spread between every treatment and main-place control group at every point in time, formally

$$\gamma_{m,t} = \rho_{m,t}^{treat} - \rho_{m,t}^{control}. \tag{8}$$

We then use monthly changes in this spread in our final specification,

$$\Delta\gamma_{m,t} = \Delta\gamma_{m,t-1} + \beta_1 \Delta ER^{Q1}_{t-1} + \psi_m + \varepsilon_{m,t}, \tag{9}$$

where $\Delta\gamma_{m,t-1}$ is a lagged dependent variable, where ΔER^{Q1}_{t-1} is a dummy variable which takes the value of one if a lower quartile exchange rate movement (equivalent to a year on year depreciation greater than 14.5%) occured in the previous month and where ψ_m is a main-place fixed effect. If the cross group price spread has increased following a large depreciation, we could expect our coefficient of interest, β_1, to be positive.

A few features of this approach are worth nothing. Firstly, by using the monthly change in price spreads and a lagged dependent variable we control for any persistence in cross group price spreads. Secondly, 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. Fourth, our main-place fixed effect controls for any cross-main-place persistence in the price spread. Fifth, given within main-place price outcomes are likely to be correlated and our prices are likely correlated across time, we double cluster our standard errors at the main-place and year level. Finally, by exploring the difference in the spread following large exchange rate depreciations, our strategy seeks to link cross-sub-place spreads in house prices to changes in foreign demand induced by large exchange rate depreciations. It is important to note that any general effects of these depreciations that are common to all suburbs are removed in the first difference in (8). Our coefficient of interest β_1 is therefore estimated off suburb by time variation.

Our major concern in interpreting β_1 as causal, relates to variation in our treatment and control sub-places that may be correlated with both large depreciations and foreign demand. 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. Our identifying assumption is therefore that the within-main-place distribution of non-foreign 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 choose to focus on the price response following large depreciations for two reasons. Earlier we showed evidence that increases in foreign non-resident transactions are strongly correlated

with exchange rate depreciations. This did not apply to foreign residents or South African residents. Secondly, in the appendix we estimate (9) against deciles of the exchange rate distribution and find the effects to be significant in the upper deciles.

We present the results in Table 14. In column (1), we see that in the month following a large depreciation, the within main-place price spread increases by 2.26 percentage points. The effect is also robust to the inclusion of a year fixed effect. This notable price spread which opens up following large exchange rate depreciations between areas which are ex ante more desirable to foreigners and less desirable areas, provides evidence of foreign demand leading to higher prices following depreciations which act as demand shocks, by discounting the price of property, in the foreign currency of the buyer.

Given that our results are based on price spreads including the full sample of transactions, we may be concerned that our results could be driven by foreign buyers paying higher prices. Even though we include a foreign buyer dummy in (7), a foreign premium could potentially be time-varying and increase after a large depreciation. This would be consistent with the exchange rate affecting foreign purchasing power and changing their willingness to pay. To control for these concerns we re-run our specification on the subsample of transactions removing all transactions bought by foreign residents and non-residents. Another advantage of this specification is that it allows us to test for any spillover effects into local prices.[37] We report these results in columns (3) and (4) of Table 14.

[Insert Table 14 about here]

The effects are both around 1 percentage point smaller and no longer statistically significant at conventional levels. Together, this suggests that following large exchange rate depreciations, there is no spread in average prices paid by South Africans between areas with large shares of foreign households and areas with small shares of foreign households. This suggests a few features potentially driving our results.

First, this suggests that while large exchange rate depreciations lead to increased property demand and prices, this effect appears to be driven by foreign non-resident transactions. As a result, while foreigners may increase demand, given local demand is uncorrelated and the increase in foreign demand is small relative to the market, this increase is not large enough to shift aggregate prices. Second, there are no spillovers from foreign demand to the local market; alternatively, spillovers are slow to materialize. Any second round effects, such as South African residents selling property to foreigners and then purchase a new property, may also take time

[37] We filter out 71 suburb - time pairs in the South African sub-sample. These 71 suburb - time pairs represents specific months where all transactions in a given suburb were bought by either resident or foreign non-residents.

to materialize. Additionally, foreign demand may induce out-migration by locals, who re-enter the property market in other suburbs, an effect we do not capture. Third, large exchange rate depreciations may change foreign non-residents' willingness to pay. By providing foreign non-residents with a discount on local transactions prices, large exchange rate depreciations could make these investors less sensitive to local prices.

3.4 Heterogeneous effects of foreign demand on prices

In an earlier section of the paper we demonstrated that foreign non-residents buy property in wealthier areas where households tend to have higher average income and education levels. In this section, we explore whether the price spreads in main-places with higher income and education levels – i.e areas where foreign non-residents are more likely to buy – are different to the price spreads in other areas, following large exchange rate depreciations. We consider the same specification as before, using transactions made by South African residents, and split our sample in two according to main-place income and education, where high (low) income main-places represent main-places in the top (bottom) 50% of the income distribution and where high (low) education main-places refers to main-places in the top (bottom) 50% of the main-place distribution of the share of household heads with a tertiary education. We present these results in Table 15.

[Insert Table 15 about here]

The results show that following large depreciations, price spreads are statistically and economically insignificant in main-places with higher levels of income and education, but are statistically and economically significant in areas with lower levels of income and education.

A possible explanation for this relates to the degree of mobility across households; out-migration could be more likely in main-places with higher income and education, than in main-places with lower income and education. If lower income households have fewer residential options owing to income constraints, they could be more likely to make a subsequent purchase in similar areas. Finding foreign non-resident price effects in areas with lower incomes and education levels, which should be *ex ante* less desirable to foreign non-residents, is also consistent with findings in Cvijanovic and Spaenjers (2018).

3.5 Robustness

Lastly, we test how common these increased price spreads are across our treatment and control groups. In other words, if we were to observe these prices spreads at a range of different periods, how likely/unlikely is the effect we measure?

To test, this we repeat our main specification using a range of placebo time periods. In our main specification, we study the price spread in the month following large exchange rate depreciations, which we classify as upper quantile movements in the exchange rate. This corresponds to 17 of the 69 months in our sample. In our implementation, we randomly sample 17 months, with replacement 2000 times and run re-run our main specification 2000 times using the placebo events.

We plot the distribution of these placebo coefficients in Figure 9. The red dashed line indicates the coefficient we estimate in our main specification, in column (1) of Table 14. This coefficient lies in the upper right tail of the distribution, with an associated p-value of 0.049 - evidence that we can reject the possibility that the coefficient we measure is as good as random with a reasonable degree of confidence. This provides strong reinforcement that the price spreads we measure related to exchange rate effects.

[Insert Figure 9 about here]

4 Conclusion

In this paper, we document the extent and features of foreign resident and non-resident demand for property in a major emerging market city, Cape Town. We show that foreign buyers purchase property in wealthier suburbs with higher property-level amenities, but do not appear to pay higher prices conditional on these features. However, foreign buyers do realize lower capital gains upon resale, with the effect being particularly economically pronounced for foreign non-residents. We then show that the tendency to purchase property in areas with large shares of secondary residences is more striking for foreign non-residents, suggesting motives aligned with the purchase of vacation homes.

Next, we show a strong relationship between aggregate changes in foreign non-resident demand and changes in the exchange rate. Specifically, we find that statistically and economically significant increases in foreign non-resident demand only emerge following large exchange rate depreciations. We find no comparable evidence for foreign residents. This suggests that the exchange rate effect is linked to the likelihood of a property being purchased using foreign cur-

rency, as opposed to the buyer being foreign. This reinforces the view that large exchange rate depreciations matter for non-resident buyers, given the discount on rand-denominated property prices such depreciations provide in the home currency of the buyer.

Lastly, we explore the relationship between foreign demand and house prices. We find that both foreign non-resident and resident demand have positive conditional correlations with prices. To permit causal inferences of this effect, we use a difference in difference strategy, comparing local and geographically close, within main-place price spreads between sub-places which would likely be ex-ante more desirable to foreign non-residents and other sub-places within the same main-place, in the month following a large exchange rate depreciation. In that sense, we use large exchange rate depreciations as a positive demand shock to foreign non-resident buyers, motivated by the earlier evidence on non-resident transaction inflows and large exchange rate depreciations. While we find evidence that price spreads increase, there is, however, little evidence to suggest that these increases in demand lead to aggregate price increases. We then provide evidence that these exchange rate depreciations can have significant heterogeneous effects, with price spreads more significant in areas where households have lower average income and education levels.

Our results highlight a clear channel, namely foreign demand, through which the exchange rate can affect domestic house prices, over and above the general way in which exchange rate movements affect property prices across all suburbs. The effect is particularly strong in the housing market, where prices are typically slow to change. In particular, large exchange rate depreciations which effectively discount the price of local property for foreign investors can induce increases in foreign demand, which can lead to increases in local house prices, where the magnitude of the effect is determined by both the increase in foreign demand and the increase in the premium paid by foreign investors.

References

Agarwal, Sumit, Tien Foo Sing and Long Wang. 2018. "Information Asymmetries and Learning in Commercial Real Estate Markets.". Working Paper.

Badarinza, Cristian and Tarun Ramadorai. 2018. "Home Away From Home? Foreign Demand and London House Prices." *Journal of Financial Economics* .

Badarinza, Cristian, Tarun Ramadorai and Chihiro Shimizu. 2018. "Gravity, Counterparties, and Foreign Investment.". Working Paper.

Chinco, Alex and Chris Mayer. 2016. "Misinformed speculators and mispricing in the housing market." *Review of Financial Studies* 29(2):486–522.

Cvijanovic, Dragana and Christophe Spaenjers. 2018. ""We'll Always Have Paris": Out-of-Country Buyers in the Housing Market.". Working Paper.

Favilukis, Jack and Stijn Van Nieuwerburgh. 2017. "Out-of-town Home Buyers and City Welfare." Working Paper.

International Monetary Fund. 2018. Global Financial Stability Report. Technical report International Monetary Fund.

Maveé, Nasha, Mr Roberto Perrelli and Mr Axel Schimmelpfennig. 2016. *Surprise, Surprise: What Drives the Rand/US Dollar Exchange Rate Volatility?* International Monetary Fund.

Morris, Jan. 1958. *South African Winter*. Faber and Faber.

Ramachandran, Vijaya, George Clarke, David E Kaplan, James Habyarimana and Mike Ingram. 2007. *An assessment of the investment climate in South Africa*. The World Bank.

Ruf, Thomas and Maurice Levi. 2011. "The Law of One Price in Unfamiliar Places: The Case of International Real Estate.". Working Paper.

Sá, Filipa. 2016. "The Effect of Foreign Investors on Local Housing Markets: Evidence from the UK." Working Paper.

Twain, Mark. 1821. *Following the equator: A journey around the world*. American Publishing Company.

Figure 1: Mean transaction prices, Cape Town: 2011-2016

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

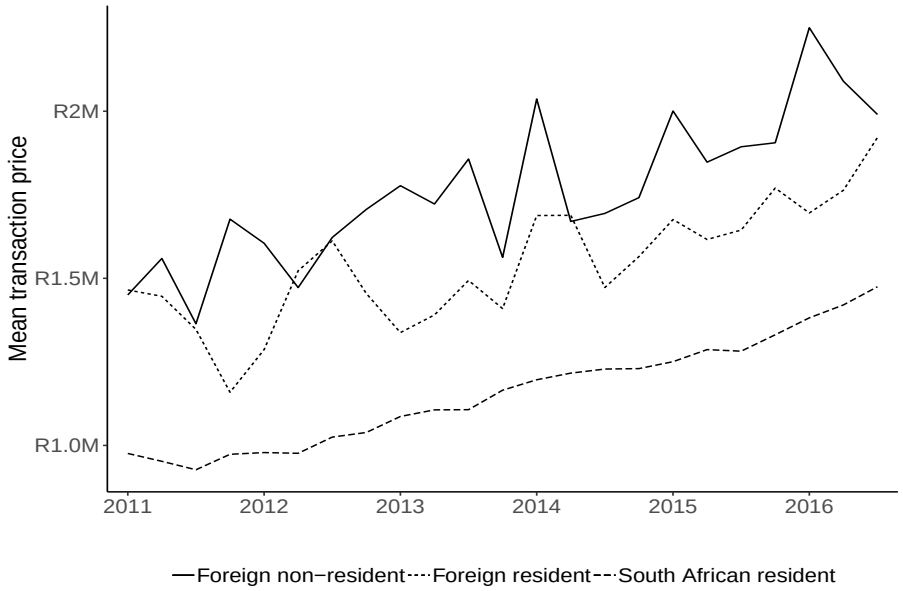
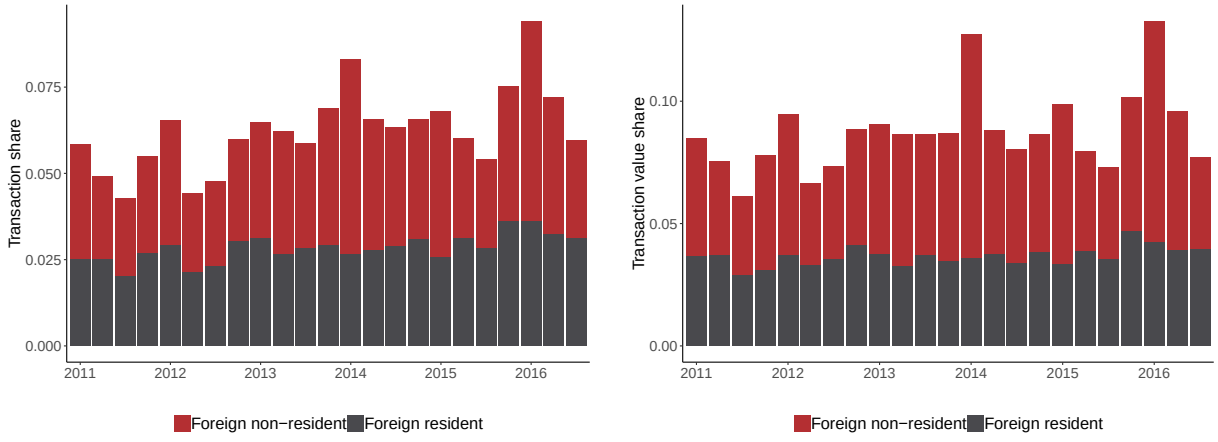


Figure 2: Foreign buyer transaction share

This figure plots plots the foreign resident and foreign non-resident share of total quarterly (a) transaction volume and (b) transaction value.



(a) Transaction volume share

(b) Transaction value share

Figure 3: Main-place and Sub-place map of Cape Town

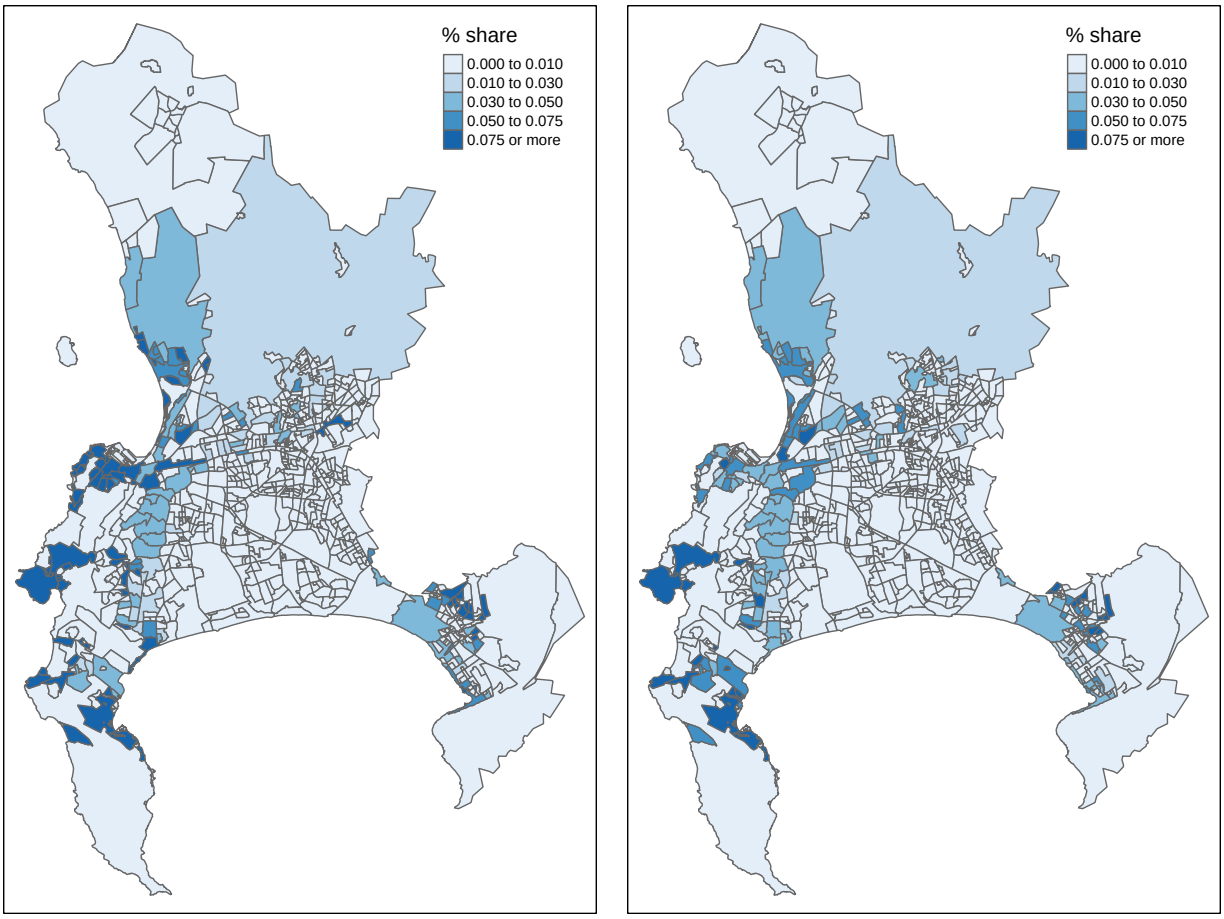
This figure depicts both the main-place and sub-place suburb boundaries for Cape Town.

(a) Main-place

(b) Sub-place

Figure 4: Cape Town spatial foreign transaction share of total transactions: 2011-2016

This figure captures the share of transactions by foreign residents and foreign non-residents in total transactions between 2011 and 2016 across sub-places in Cape Town.



(a) Foreign non-residents

(b) Foreign residents

Figure 5: Rand Real Effective Exchange Rate

This figure shows the evolution of the South African rand Real Effective Exchange Rate between 2011 and 2016.

Figure 6: Rand Real Effective Exchange Rate month-on-month change

This figure depicts the month-on-month percentage change in the South African rand Real Effective Exchange Rate between 2011 and 2016.

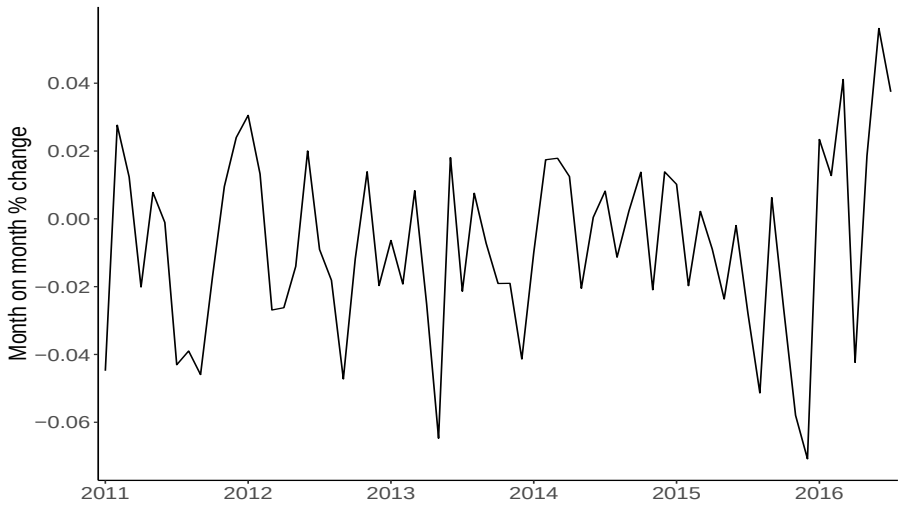


Figure 7: Rand Real Effective Exchange Rate year-on-year change

This figure shows the year-on-year percentage change in the South African rand Real Effective Exchange Rate between 2011 and 2016.

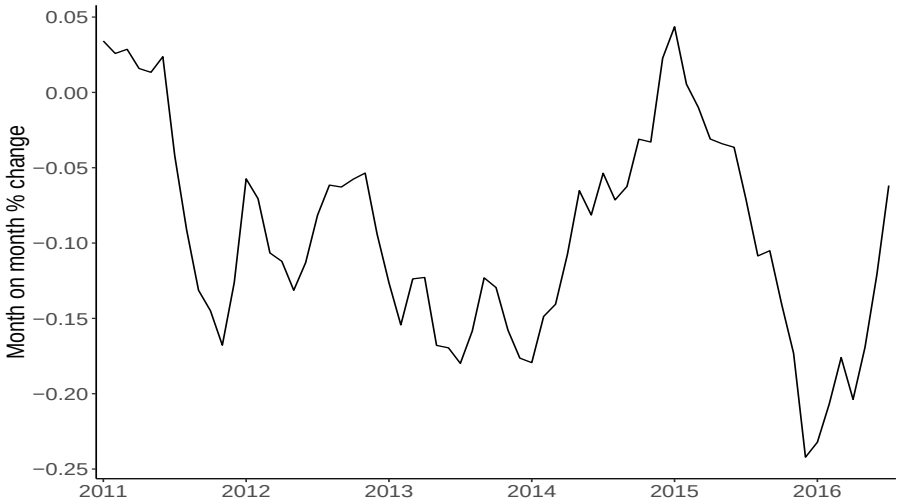


Figure 8: Foreign transaction deciles and the 2011 share of foreign born household heads

This figure illustrates the sub-place share of foreign non-resident and foreign resident transactions against deciles of the 2011 sub-place share of foreign-born household heads.

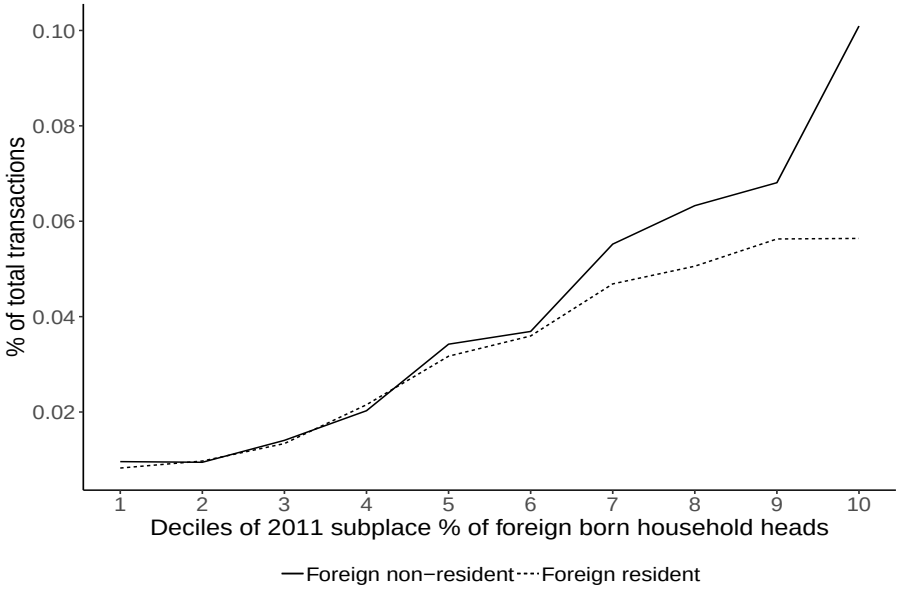


Figure 9: Placebo test: alternative events

This figure plots the distribution of our coefficient of interest from our main specification from 2000 placebo regression where we randomly choose the event window 2000 times, with replacement. The dashed black line represents an effect of 0, while the dashed red line represents the coefficient we estimate in our main specification.

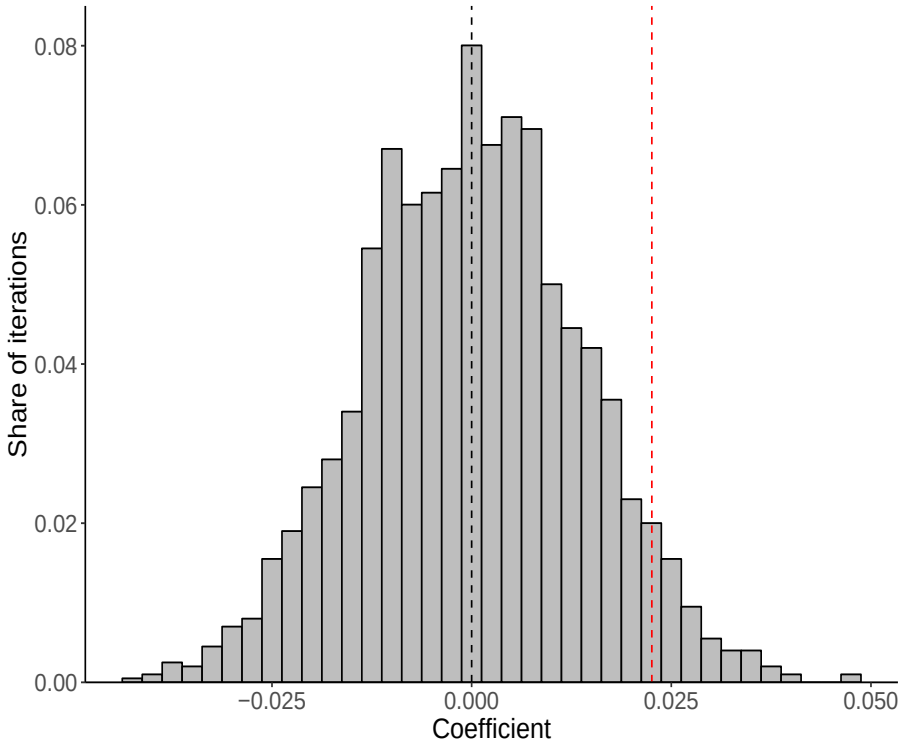


Table 1: Buyer type summary statistics: transactions

This table provides an overview of summary statistics across different types of buyers for the entirety of the sample, 2011-2016. South African residents are defined as individuals holding South African citizenship and 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	N	% N	% Rand value
Foreign Non-Residents	R1.80M	3,700	3.41	5.17
Foreign Residents	R1.54M	3,072	2.83	3.70
South African Residents	R1.15M	101,661	93.80	91.11

Table 2: Seller type summary statistics: transactions

This table provides an overview of summary statistics across different types of sellers for the entirety of the sample, i.e. from 2011 to 2016. South African residents are defined as individuals who hold South African citizenship and 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.

	N	Mean Holding Period	Mean Capital Gain	Price sold
Foreign Non-Residents	2,322	8.04	145%	R1.14M
Foreign Residents	1,954	9.71	272%	R0.81M
South African Residents	58,983	7.98	176%	R0.67M

Table 3: Buyer and seller pairs

This table reports the number of transactions and the share of total transactions carried out across all buyer and seller pairs between 2011 and 2016. Panel (a) shows the buyer's perspective while Panel (b) represents the data from the seller's perspective. We only include transactions between South African residents, foreign residents and foreign non-residents. South African residents are defined as individuals who hold South African citizenship and 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.

Buyer	Seller	N	Share
Non-res for.	Non-res for.	293	12.20%
Non-res for.	Res for.	136	5.65%
Non-res for.	RSA Res	1,976	81.22%
Total		2,405	
Res for.	Non-res for.	150	7.64%
Res for.	Res for.	112	5.71%
Res for.	RSA Res	1,701	65.70%
Total		1,963	
RSA Res	Non-res for.	1,879	3.19%
RSA Res	Res for.	1,706	2.90%
RSA Res	RSA Res	55,306	93.90%
Total		58,891	

(a) Buyers

Seller	Buyer	N	Share
Non-res for.	Non-res for.	293	12.60%
Non-res for.	Res for.	150	6.46%
Non-res for.	RSA Res	1,879	80.90%
Total		2,322	
Res for.	Non-res for.	136	6.96%
Res for.	Res for.	112	5.73%
Res for.	RSA Res	1,706	87.30%
Total		1,954	
RSA Res	Non-res for.	1,976	3.35%
RSA Res	Res for.	1,701	2.88%
RSA Res	RSA Res	55,306	93.80%
Total		58,983	

(b) Sellers

Table 4: Buyer type summary statistics: hedonics

This table reports summary statistics across different types of buyers for the entirety of the sample, i.e. from 2011 to 2016. South African residents are defined as individuals who hold South African citizenship and 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 and hold either (i) a residence visa, (ii) a work visa, (iii) a study visa, or (iv) a travel visa. We calculate the distance to coastline by measuring the linear distance to the nearest coast from each property.

Buyer Type	Plot size (m^2)	Floor size (m^2)	Bed-rooms	Bath-rooms	% Sectional title	Distance from coast (km)
Foreign non-resident	378	141	2.67	2.06	38.80%	8.02
Foreign resident	371	130	2.65	1.99	33.60%	9.79
South African resident	390	119	2.76	1.86	20.20%	15.00

Table 5: Foreign demand and 2011 suburb characteristics

This table shows the 2011 average (i) age, (ii) income, (iii) share of the population that has completed higher education, (iv) share of the population born outside of South Africa, and (v) share of individuals who reported their South African address as being a secondary residence. The underlying data was taken from the 2011 South African national census. We calculate these values as sub-place averages ordered in deciles of the sub-place share of transactions made by foreign non-residents between 2011 and 2016 in panel (a) and foreign residents in panel (b).

Decile	Age	Income	% Higher education	% Born outside South Africa	% Secondary residence
1	37.91	233,730	18.48	6.00	2.42
2	38.85	272,021	23.97	9.75	6.41
3	40.30	306,313	27.52	9.83	2.93
4	39.50	302,600	31.23	11.60	8.69
5	40.42	336,752	31.73	15.05	9.14
6	40.58	367,804	35.21	19.33	9.37
7	39.68	325,800	34.32	19.04	10.95
8	40.87	442,449	39.54	21.43	7.71
9	42.16	504,042	45.65	27.46	13.47
10	42.09	479,885	44.15	27.86	12.00

(a) Foreign non-residents

Decile	Age	Income	% Higher education	% Born outside South Africa	% Secondary residence
1	38.37	209,355	17.49	5.26	3.10
2	39.33	297,494	23.95	9.02	10.23
3	39.21	334,893	27.49	11.65	1.80
4	39.36	330,831	32.42	9.72	8.56
5	37.85	345,853	34.14	15.54	5.71
6	40.36	339,776	35.71	17.86	8.88
7	42.10	376,915	37.54	20.37	13.07
8	41.58	366,580	41.35	23.70	10.62
9	42.35	440,739	41.86	24.24	9.44
10	45.38	456,882	41.35	24.63	8.02

(b) Foreign residents

Table 6: Prices paid by different types of buyers

This table exhibits the results from the estimation of equation 1. All coefficients are multiplied by 100 for ease of interpretation in the form of percentage changes. Standard errors are White heteroskedasticity-robust and are reported in parentheses. *, **, *** represents significance levels of 0.1, 0.05 and 0.01, respectively.

	(1)	(2)	(3)	(4)
Foreign non-resident buyer	33.54***	18.45***	6.46***	5.91***
	(0.010)	(0.009)	(0.006)	(0.006)
Foreign resident buyer	26.75***	11.79***	3.24***	2.86***
	(0.010)	(0.008)	(0.006)	(0.006)
Time fixed effects	Yes	Yes	Yes	Yes
Main-place fixed effect	No	Yes	No	No
Sub-place fixed effect	No	No	Yes	Yes
Qualitative controls	No	No	No	Yes
Observations	108,397	108,397	108,397	108,397
Adj. R-squared	0.431	0.637	0.813	0.821

Table 7: Capital gains realized by different types of buyers

This table captures the results from the estimation of equation 2. As our dependent variable, we use the log return for a given property, calculated as the difference between the log price at which the property was bought and the log price at which the property was sold. All coefficients are multiplied by 100 for ease of interpretation in the form of percentage changes. Standard errors are White heteroskedasticity-robust and are reported in parentheses. *, **, *** represents significance levels of 0.1, 0.05 and 0.01, respectively.

	(1)	(2)	(3)
Foreign resident buyer	0.60	0.42	0.50
	(0.009)	(0.009)	(0.008)
Foreign non-resident buyer	-0.00	1.29	0.73
	(0.008)	(0.008)	(0.008)
Foreign resident seller	-3.40***	-2.79***	-2.88***
	(0.008)	(0.008)	(0.008)
Foreign non-resident seller	-10.75***	-9.86***	-10.20***
	(0.008)	(0.008)	(0.008)
Renovated	8.33***	6.93***	5.08***
	(0.012)	(0.012)	(0.012)
Year of purchase fixed effect	Yes	Yes	Yes
Year of sale fixed effect	Yes	Yes	Yes
Main-place fixed effect	No	Yes	No
Sub-place fixed effect	No	No	Yes
Observations	61,991	61,991	61,991
Adj. R-squared	0.661	0.674	0.703

Table 8: Holding periods by different types of buyers

This table reports the results from the estimation of equation 3. As our dependent variable, we use the holding period for a given property, calculated as the difference in time between the year in which a property was originally bought and the year in which it was sold. Standard errors are White heteroskedasticity-robust and are reported in parentheses. *, **, *** represents significance levels of 0.1, 0.05 and 0.01, respectively.

	(1)	(2)
Foreign resident seller	-0.18	-0.23
	(0.034)	(0.034)
Foreign non-resident seller	-0.89***	-0.10***
	(0.031)	(0.031)
Year of sale fixed effect	Yes	Yes
Main-place fixed effect	Yes	No
Sub-place fixed effect	No	Yes
Observations	63,233	63,233
Adj. R-squared	0.923	0.923

Table 9: Foreigners' residential preferences display spatial persistence

This table displays the coefficients results from the estimation of equation 4. 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 resident		
	(1)	(2)	(3)	(4)	(5)	(6)
2010 foreign-born population share	0.490***	0.444***	0.440***	0.270***	0.241***	0.241***
	(0.039)	(0.039)	(0.039)	(0.025)	(0.025)	(0.025)
Main-place fixed effect	No	Yes	Yes	No	Yes	Yes
Distance to the coast	No	No	Yes	No	No	Yes
Observations	421	421	421	421	421	421
Adj. R-squared	0.275	0.351	0.356	0.206	0.320	0.317

Table 10: 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

Table 11: Exchange rate depreciations have an impact on foreign demand

This table shows the coefficient results from the estimation of equation 5. Coefficients are multiplied by 100 to facilitate them being interpreted as percentage changes. 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-residents			Foreign residents			South African residents		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
ΔER_{t-1}	-82.25***	-74.30***	-67.42***	-13.59	-10.42	-29.16	2.89	6.10***	5.18*
	(0.174)	(0.181)	(0.236)	(0.155)	(0.161)	(0.192)	(0.025)	(0.022)	(0.027)
Sov. credit rating (t)	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Sov. credit rating ($t-1$)	No	No	Yes	No	No	Yes	No	No	Yes
Observations	57	57	57	57	57	57	57	57	57
Adj. R-squared	0.284	0.309	0.315	0.014	0.053	0.140	0.023	0.366	0.396

Table 12: Large exchange rate depreciations are correlated with increased foreign demand

This table reports the coefficients results from the estimation of equation 5, 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. Coefficients are multiplied by 100 to facilitate them being interpreted as percentage changes. 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-Residents			Foreign Residents			South African Residents		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
ΔER_{t-1}^{Q3}	5.98*	6.00*	5.76*	2.82	2.84	2.28	-0.45	-0.49	-0.47
	(0.032)	(0.032)	(0.033)	(0.028)	(0.028)	(0.028)	(0.005)	(0.003)	(0.004)
ΔER_{t-1}^{Q2}	9.36***	7.44**	5.62	1.32	-0.379	1.59	-0.29	-1.17***	-0.99**
	(0.032)	(0.035)	(0.038)	(0.028)	(0.030)	(0.032)	(0.005)	(0.004)	(0.004)
ΔER_{t-1}^{Q1}	13.14***	12.23***	10.22***	1.68	1.11	2.84	-0.41	-1.03***	-0.88**
	(0.32)	(0.032)	(0.036)	(0.028)	(0.028)	(0.031)	(0.005)	(0.004)	(0.004)
Sov. credit rating (t)	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Sov. credit rating ($t-1$)	No	No	Yes	No	No	Yes	No	No	Yes
Observations	57	57	57	57	57	57	57	57	57
Adj. R-squared	0.262	0.292	0.314	0.020	0.062	0.121	0.038	0.403	0.423

Table 13: Conditional correlations of foreign demand and property prices

This table reports the coefficients results from the estimation of equation 6. Coefficients are multiplied by 100 to facilitate them being interpreted as percentage changes. Standard errors are White heteroskedasticity-robust and are reported in parentheses. *, **, *** represents significance levels of 0.1, 0.05 and 0.01, respectively.

	(1)	(2)	(3)	(4)
Inflow: foreign residents	0.30***	0.50***	0.43***	0.62***
	(0.001)	(0.001)	(0.001)	(0.001)
Inflow: foreign non-residents	1.15***	0.90***	1.19***	0.95***
	(0.000)	(0.000)	(0.000)	(0.000)
Year of sale fixed effect	Yes	Yes	Yes	Yes
Buyer fixed effect	Yes	Yes	No	No
Main-place fixed effect	Yes	Yes	Yes	Yes
Distance to coast	No	Yes	No	Yes
Observations	94,051	94,051	87,742	87,742
Adj. R-squared	0.686	0.694	0.685	0.693

Table 14: Difference in differences specification of foreign demand and property prices

This table captures coefficients results from the estimation of equation 9. Coefficients are multiplied by 100 to to facilitate them being interpreted as percentage point changes. Standard errors are double clustered at the main-place and year level and are reported in parentheses. *, **, *** represents significance levels of 0.1, 0.05 and 0.01, respectively.

	Full sample		South African sub-sample	
	(1)	(2)	(3)	(4)
ΔER_{t-1}^{Q1}	2.26**	3.25**	1.20	1.25
	(0.009)	(0.010)	(0.013)	(0.018)
Main-place fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	No	Yes	No	Yes
Observations	1,367	1,367	1,296	1,296
Adj. R-squared	0.225	0.223	0.210	0.201

Table 15: Difference in differences specification of foreign demand and property prices across sub-samples

This table shows the coefficients results from an alternative estimation of equation 9. We disregard all transactions involving foreign buyers and split the sample into two dimensions, i.e. income and education. High (low) income refers to main-places in the top (bottom) 50% of the main-place income distribution and high (low) education refers to main-places in the top (bottom) 50% of the main-place distribution of the share of household heads with a tertiary education. Coefficients are multiplied by 100 to facilitate them being interpreted as percentage point changes. *, **, *** represents significance levels of 0.1, 0.05 and 0.01, respectively.

	High income	Low income	High education	Low education
	(1)	(2)	(3)	(4)
ΔER_{t-1}^{Q1}	0.31	4.97**	-0.45	5.75***
	(0.157)	(0.017)	(0.017)	(0.012)
Main-place fixed effect	Yes	Yes	Yes	Yes
Observations	707	589	698	598
Adj. R-squared	0.206	0.212	0.243	0.190

Appendix

Table 1: Property characteristics - 2015

This table reports the various property characteristics recorded in our valuation roll dataset. These characteristics are reported for all properties in Cape Town as of 2015. The three qualitative variables, *Quality*, *Condition* and *View* are populated by property valuers at the City of Cape Town. The valuation fields represent property valuations generated by a Computer Assisted Mass Appraisal (CAMA) valuation model.

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 the table below

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
Sub-place distance to coast	Calculated as the shortest linear path from the midpoint of a sub-place to the nearest coastline
Property distance to coast	Calculated as the shortest linear path, from a property to the nearest coastline.

Table 2: Coefficients from hedonic regression

This table report the coefficients results from the following regression

$$\ln P_{i,t} = \alpha + \boldsymbol{X}_i^{2015} + \beta_1 B_i + \rho_t + \nu_s + \varepsilon_{i,t}$$

where $\ln P_{i,t}$ represents the log transaction price of property i; $\boldsymbol{X}_i^{2015}$ represents a vector of property level controls observed in 2015; B_i represents a dummy variable capturing the nationality and residency status of the buyer; ρ_t a time fixed effect, specifically the year in which a property was sold, and lastly; ν_s, a sub-place fixed effect. The reference property is a freehold studio dwelling, smaller than 100 square meters, with 1 bathroom, built before 1985, which has never been formally renovated, has an average view, is in an average condition and was bought by a South African resident. We multiple all coefficients by 100 to facilitate them being interpreted as percentage increases. Standard errors are White heteroskedasticity-robust. *, **, *** represents significance levels of 0.1, 0.05 and 0.01, respectively. Adjusted R^2 is .821.

Bedrooms		**Bathrooms**		**Year built**	
One bedroom	12.34***	Two bathrooms	11.26***	1985 - 1995	0.23
Two bedrooms	33.61***	Three bathrooms	18.39***	1995 - 2005	2.71***
Three bedrooms	43.00***	Four or more bathrooms	23.11***	>2005	0.81*
Four or more bedrooms	48.80***				

View		**Size**		**Condition**	
Poor	-7.02***	Between 100 m^2 and 233 m^2	37.25***	Poor	-19.50**
Below average	-5.62***	Between 233 m^2 and 496 m^2	52.09***	Fair	-16.55***
Above average	13.69***	Bigger than 496 m^2	69.87***	Good	10.02***
Partially obstructed	9.04***			Excellent	-8.75***
Panoramic	27.20***				
Excellent	36.22***				

Buyer		**Property type**		**Renovated**	
Foreign resident	2.86***	Sectional Title	4.40***	Yes	-1.11
Foreign non-resident	5.91***				

Figure 2: Foreign transaction deciles and the 2011 share of foreign-born household heads

This figure reports the coefficient of interest, $\beta 1$ from the following specification

$$\Delta\gamma_{m,t} = \Delta\gamma_{m,t-1} + \beta_1 \Delta ER_{t-1}^{Decile} + \psi_m + \varepsilon_{m,t},$$

The specification is identical to our main specification in the paper, but instead uses deciles of the exchange rate depreciation, where the 1st (10th) decile represents large appreciations (depreciations). The total height of the bar represents the point estimate and the darker area of the bar represent 90% confidence intervals.