Financialization of Housing Markets: Can REITs be the Culprit of Rising House Prices?

Chiara Banti and Kate Phylaktis [*†]

Jan 2022

Abstract

In this paper we study the implications for house price dynamics of the ongoing financialization of housing, focusing on real estate investment trusts (REITs). Building on the dramatic rise in REITs valuation in the last decade, we ask whether housing markets exposure to financial market dynamics is exacerbated by REITs. We find that REITs push up house prices significantly around the world. The effect is stronger in advanced economies, where REITs have grown the most, and in market-based pension systems. REITs channel foreign investors in domestic markets and represent a transmission channel for both domestic and global financial shocks into housing markets.

Keywords: Financialization; house prices; real estate investment trusts (REITs); institutional investors.

JEL classification: E44, F32, G15, G23.

[*]Chiara Banti (corresponding author), cbanti@essex.ac.uk, Essex Business School, University of Essex, Wivenhoe Park, Colchester CO4 3SQ, UK; Kate Phylaktis, K.Phylaktis@city.ac.uk, Bayes Business School (formerly Cass), City, University of London, 106 Bunhill Row, London EC1Y 8TZ, UK.

[†]We thank Stephen Lee, Alessandro Rebucci, and Livio Stracca for useful comments and suggestions.

1 Introduction

In the last decade share prices of real estate investment trusts (so-called, REITs) have increased dramatically. This is good news for investors, both institutional and retail, that hold these financial instruments to invest in housing markets around the world (Subrahmanyam, 2007; Hoesli and Oikarinen, 2012; Cotter and Roll, 2015). However, is this good news for housing markets? Financialization has shaped housing markets. For instance, financial innovations in housing finance have significantly affected housing demand, supply and affordability (Duca, Muellbauer and Murphy, 2010; Aalbers, 2016; Fernandez and Aalbers, 2016). While the focus of the literature has been on housing finance, other types of financial innovations, such as REITs have taken place contributing to the financialization of housing.[1] In this paper, we focus on REITs as investment funds dedicated to the real estate sectors that have originated in financial markets of both advanced and emerging economies. As a means of expanding investors' diversification opportunities, the development of REITs is often encouraged by domestic monetary authorities for its contribution to financial development, both in terms of deepening and widening access to financial markets (International Monetary Fund, 2008; Cannon and Cole, 2011). However, the particular nature of their targeted asset class has important implications for domestic economies, beyond the benefits for financial markets development. Housing provides an intrinsic utility and it is a key tenet of social policies around the world (UN, 2017). Housing can be used to smooth consumption intertemporally given its pledgeability, in addition to offering capital gains and periodic payments in the form of rents as a traditional financial asset. These characteristics make the understanding of the implications of the financialization process on housing markets particularly pressing. Introducing housing in domestic and international investors portfolios, REITs have the potential to expose housing markets

[1] The presence of institutional investors in rented real estate has recently attracted public outrage and regulators have started to take action in various countries. See, for example, "Barbarians at the garden gate", *The Economist*, 20 November 2021.

to financial shocks that originate both domestically and internationally, and thus disrupt housing markets. House price hikes driven by financial investors may affect home affordability resulting in social and public finance costs. In this paper, we study how financialization, and the entry of institutional investors in the real estate market via REITs, contributes to house price dynamics and to the exposure of housing to financial shocks, originating both domestically and internationally over the period 2000 to 2019 for a representative group of advanced economies (AEs) and emerging markets (EMs).

Since the collapse registered during the global financial crisis (GFC), house prices around the world have recovered their upward trajectory and have been increasing across advanced and emerging markets alike (see Figure 1). Mirroring the dynamics of house prices, REITs have been increasing rapidly in the period leading to the global financial crisis (GFC) of 2007/08, collapsing during the crisis, and then recovering in the post-crisis period, outpacing their pre-crisis peak (Figure 1). Although this pattern is more pronounced in AEs, where REITs prices have doubled in the last decade, EMs have also experienced rising REITs prices that have increased by over 65% since 2010.[2] REITs prices seem to respond to financial shocks as stock indexes do. Figure 1 shows that REITs prices in both AEs and EMs exhibit frequent ups and downs corresponding to episodes of market turbulence. For instance, the temporary retrenchments in the 2013/15 period corresponding to the 2013 taper tantrum episode and subsequent disappointing news on economic growth in EMs, especially in China, and in the second half of 2018 due to strong US dollar and escalation of trade tensions between the US and China (Bank for International Settlements, 2013, 2018). This high volatility of REITs valuation motivates us to investigate its implications on the stability of housing markets around the world.

[2] The rise of REITs prices have also outpaced the general rise in stock markets, thus indicating specific renewed interest by investors in this product.

Our work makes two main contributions to the literature. First, we contribute to the literature on financialization and its implications for housing markets by studying how the entry of institutional investors in the real estate market via REITs contributes to house price dynamics and to the exposure of housing to financial shocks, originating both domestically and internationally. While there is no unique definition, the term financialization is generally used to indicate the increasing role of finance in the economy (Turner, 2010; Mazzucato, 2018). The UN defines financialization of housing as the "structural changes in housing and financial markets and global investment whereby housing is treated as a commodity" (UN, 2017, p. 3). Studying commodity markets, Basak and Pavlova (2016) define financialization as the entry of institutional investors in the commodity market. Traditionally, the literature has studied the financialization of housing focusing on housing finance, including mortgage market development and the related securitization activity, and its impact on housing markets within and across countries.[3]

More recently, the emergence of institutional investors has been studied in the US housing market (Lambie-Hanson, Li and Slonkosky, 2019; Ghent, 2021).[4] Mills, Molloy and Zarutskie (2019) suggest that this trend is primarily driven by tight mortgage markets, large housing supply and technological advances. Garriga, Gete and Tsouderou (2021) find that smaller institutional investors are more active locally than larger ones and their investment activity matters for house prices locally. It is difficult to generalize these findings based on the US to other countries, especially since REITs are investment vehicles for an heterogeneous investor base, ranging from institutional investors to individuals. There is evidence that REITs investor base is significantly different among

[3] This literature is vast. A large body of work identifies mortgage market development and securitization as key forces behind the rise of house prices and transaction volume in housing markets, which led to the GFC (Brunnermeier, 2009; Duca, Muellbauer and Murphy, 2010; Aalbers, 2016; Justiniano, Primiceri and Tambalotti, 2019; Mian and Sufi, 2021). Moreover, these developments in housing finance have increased house price comovement within and across countries (Diamond and Rajan, 2009; Claessens, Kose and Terrones, 2011; Cotter, Gabriel and Roll, 2015; Milcheva and Zhu, 2016; Landier, Sraer and Thesmar, 2017; Choi and Hansz, 2021).

[4] There is also a strand of the literature, which studies the impact of speculative activity by retail investors in real estate, again mostly covering the US market (Chinco and Mayer, 2016; Bayer, Mangum and Roberts, 2021).

AEs, including the US (Brounen, Kok and Ling, 2012; Carlo, Eichholtz and Kok, 2021). We extend this work by focusing on REITs in a cross-country setting, looking especially at the impact of financial development, pension systems, mortgage market development, and foreign entry, across countries.

Our second contribution relates to the growing literature on countries' exposure to global financing conditions, including global liquidity and the global financial cycle. There is ample evidence in the literature of the significant exposure of house prices to capital flows (Aizenman and Jinjarak, 2009, 2014; Tillmann, 2013; Favilukis, Kohn, Ludvigson and Van Nieuwerburgh, 2013; Davids, 2020; Gorback and Keys, 2020; Barcelona, Converse and Wong, 2021; Cvijanovic and Spaenjers, 2021; Favilukis and Van Nieuwerburgh, 2021). Documenting the role of London housing market as a prime destination for global capital, Badarinza and Ramadorai (2018) show that the London housing market is significantly exposed to foreign country risk. Empirical work on the relationship between monetary liquidity and house prices provide mixed evidence. While Darius and Radde (2010) and Belke, Orth and Setzer (2010) document for G7 and OECD countries a positive impact of liquidity on house prices, only a limited effect is found in Brana, Djigbenou and Prat (2012) for a group of EMs. Housing finance plays a key role in the transmission, as the development of mortgage markets increases the exposure of house prices to capital flows shocks (Sá, Towbin and Wieladek, 2014). Moreover, the literature stresses the link between global financing conditions and housing markets via bank flows that channel liquidity across the border into the local banking sector. Using a broad sample of countries, Cesa-Bianchi, Cespedes and Rebucci (2015) document a stronger impact of bank flows on house prices in EMs compared to AEs. Banti and Phylaktis (2019) document the exposure of house prices to financing conditions in global wholesale funding markets. We contribute to this literature by investigating whether REITs are a channel of transmission of financial shocks.

Focusing on a panel of 32 countries from 2000 to 2019, we study the role of REITs in the financialization of housing by estimating the impact of REITs performance on house prices and exploring the role of financial development, pension systems, housing finance, and foreign investors. We show that house prices respond positively to REITs, especially in AEs and in countries with more market-based pension systems. Moreover, we find a stronger exposure in countries where foreign investors' access to investments in housing markets is not restricted. Thus, REITs are an effective channel for foreign investors' entry in domestic housing markets. Building on this, we determine the impact of REITs on the financialization of housing by documenting their role as transmission channel for shocks originating in domestic and global financial markets. Estimating a panel VAR (PVAR) of house prices, REITs and a set of controls, we show that house prices increase significantly following a shock to REITs and that these major investors in real estate act as a channel for financial shocks. We find this effect especially in AEs, where REITs have experienced the largest growth in the past decades. We subject our analysis to numerous tests and our results remain robust.

In the next section we study the evolution of the financialization of housing around the world. In section 3 we set up the research strategy of the paper. In section 4 we describe the data. The empirical analysis of the impact of REITs on house prices and the financialization of housing is reported in section 5. Section 6 reports some robustness tests. Finally, section 7 concludes.

2 Financialization of housing

In this section we examine the financialization of housing by considering the intertwined developments of REITs and house prices.

As shown in Table 1 (column 1), in most countries real house prices comove with REITs, with correlation coefficients ranging as high as over 95% in Hong Kong, Malaysia, Sweden, and

Switzerland to below 10% in Austria and The Netherlands. There are four countries in which as house prices increase REITs decline, namely China, Indonesia, Japan, and Turkey. The presence of restrictions on foreign investors in the domestic real estate market is not likely to explain these differences across countries (column 2). In fact, although China, Indonesia and Turkey all have restrictions in place, Japan is open to foreign entry (Fernández, Klein, Rebucci, Schindler and Uribe, 2015).

Interestingly, countries with the strongest comovement are the ones that exhibit the largest increase in REITs in the past decade (column 4). For instance, in Sweden REITs experienced a striking threefold increase in the last decade, and at the same time house prices increased by almost 50% (column 3). This is common to other countries as well, for instance REITs in New Zealand, Thailand, and the Philippines more than doubled and their comovement with house prices is at over 90%. Few countries do not exhibit large changes in REITs. The Netherlands have actually experienced a contraction in REITs and Germany have registered a modest increase in the last decade, both of them registering low comovement with house prices. This pattern does not apply to all countries, and some countries exhibit increasing REITs and low comovement with house prices (as in the case of Austria), or declining REITs and high comovement (as in the case of Spain). This indicates that other factors are also influencing house prices. Interestingly, in general countries with stronger comovement in house prices and REITs are the ones not only where REITs have increased the most in the past decade, but also the ones where REITs valuations are higher than stock market index. This indicates that the increase in REITs largely exceeds the growth of the stock market, as measured by its index, pointing towards great performance of and interest in REITs among investors.

To better evaluate the dynamics of the financialization of housing, we focus on four countries in Figure 2. We select Sweden and Malaysia as representatives of the advanced and emerging market

groups with high comovement between house prices and REITs (panel a), and Germany and China as representatives of advanced and emerging economies with low and negative comovement (panel b), respectively.

We can point to two regularities across the countries. First, in Sweden and Malaysia, there is an evident sharp increase in REITs across the last two decades, albeit with temporary retrenchments at times of market turbulence (such as during the GFC and the episodes of market turbulence in EMs in 2013-2015). The increase in REITs in Germany is more modest, and takes place in the last part of the sample, while in China there is an overall decline with few episodes of high volatility. Second, in Sweden and Malaysia the increase in REITs have outpaced the stock market index since the post-GFC, whereas REITs are generally lower than the stock market index in Germany and China. These points suggest that in countries with greater financialization of housing as measured by the REITs valuation and their development in the last two decades, house prices and REITs tend to comove. While in countries with less financialized housing markets, house price dynamics are relatively less associated with developments in REITs.

We now turn to the formal investigation of the implications of the financialization of housing for house price dynamics and their exposure to financial shocks in the next section.

3 Methodology and research design

Mortgage market development and securitization are identified as key forces behind the rise of house prices and transaction volume in housing markets in the period leading to the GFC (Brunnermeier, 2009; Aalbers, 2016; Justiniano, Primiceri and Tambalotti, 2019; Mian and Sufi, 2021). Studying commodity markets, Basak and Pavlova (2016) argue that, as a result of the growing importance of institutional investors, the financialization of commodity markets has pushed up commodity prices. Similarly, REITs by encouraging institutional investors' participation in the real estate market,

channel domestic and foreign savings into housing markets. Thus, they represent a potential driver of housing market financialization with implications for housing markets, including the dynamics of house prices. However, their role in this respect has been largely neglected in the literature, which concentrates more on housing finance.

To investigate the role of REITs in the financialization of housing, we build a panel model of house prices and REIT prices for a group of representative advanced and emerging markets. We control for a set of explanatory variables that are known in the literature to affect the demand for housing both nationally and internationally. We then explore further the role of REITs in the financialization of housing by focusing on key country characteristics. We consider financial development as a key factor, as more developed financial systems are more likely to enjoy higher levels of private savings and have more sophisticated investors that can take advantage of investing in real estate via REITs. Linked to the presence of private savings and sophisticated investors, we also consider the role of countries' pension systems in the financialization of housing. Moreover, we test whether the impact of REITs on house prices is related to housing finance, focusing specifically on the development of mortgage markets. Finally, we consider the role of foreign investors in the financialization of housing by looking at housing restrictions to the entry of foreign investors in the domestic real estate market. This is important because if the exposure of house prices to REITs is related to the presence of foreign investors, they may then turn REITs into transmission channels for external shocks in the domestic housing markets. Building on this, we conclude our empirical study by investigating the impact of REITs on the financialization of housing by studying their role as channels of transmission for domestic and global financial shocks on house prices.

3.1 REITs and house prices

Our baseline model is a panel model with country fixed effects of house prices on REITs, as follows:

$$house_{i,t} = \alpha_i + \beta_1 reits_{i,t-1} + \beta_2 Domestic_{i,t-1} + \beta_3 Global_{i,t-1} + \theta_i + \epsilon_{i,t} \quad (1)$$

where *house* are percentage changes in house prices in country i, *reits* are REITs returns, *Domestic* includes the determinants of the domestic demand for housing such as bank flows, real gross domestic product (GDP) growth, short-term interest rates, and domestic private credit.[5] We also include the returns on the domestic stock market index as a measure of local financial market conditions. *Global* includes the VIX and world aggregated real GDP growth, as measures of financial conditions and demand in global markets. *reits* are lagged one period to control for reverse causality from house prices to REITs.[6] Moreover, as common in this setting, we lag all explanatory variables one period to account for general endogeneity concerns. We estimate the model for the full sample period, 2000-2019, by applying least squares.[7] Our main coefficient of interest is β_1 that captures the impact of REITs on house prices. To account for possible multicollinearity, we first include the control variables one-by-one before estimating the full model.[8]

Having documented the impact of REITs on the housing market, we turn to an investigation of mechanisms and dynamics of this exposure. To do so, we augment the baseline model (1) with

[5] In unreported results, we include the growth of urban population as an additional control variable (Aizenman and Jinjarak, 2009), but we find it to be insignificant and so we do not include it in our baseline model for parsimony.

[6] In section 6, we test the robustness of our results to an alternative measure for REITs based on the investment flows into REITs that is only available for a relatively small set of eight AEs.

[7] In section 6, we test the robustness of our results to further endogeneity concerns by employing instrumental variables (IV) and a two-stage least squares (2SLS) estimation.

[8] Moreover, we conduct unit root testing of all variables and for stationarity we include the first-difference of I(1) variables.

an interaction term of the REITs with a specific country characteristic, as follows:

$$house_{i,t} = \alpha_i + \beta_1 reits_{i,t-1} + \beta_2 reits_{i,t-1} \times chara_i + \beta_3 Domestic_{i,t-1} + \beta_4 Global_{i,t-1} + \theta_i + \epsilon_{i,t} \quad (2)$$

where *chara* is an indicator for the country characteristics of interest. Our main coefficient of interest is β_2 that captures the impact of the specific country characteristics on the exposure of house prices to REITs. We introduce key country characteristics related to the financialization of housing next.

3.2 REITs and financial development

Different countries are at different stage of financial development and the financialization of housing is related to the presence of sophisticated institutional investors that channel savings into the property markets. In fact, there is a link between financial liberalization and the financialization of the economy. Financial liberalization leads to more sophisticated instruments and intermediaries, especially the expansion of the activities of non-banks, and thus encourages the development of REITs. Moreover, economic growth promotes stability and increases private saving ratios, leading to a higher demand for capital market instruments (Rojas-Suarez, 2012). Furthermore, entry of foreign investors encourages the development of new instruments and promote technological improvements (Prasad, Rogoff, Wei and Kose, 2003). The relationship is likely to be bidirectional, as financialization also promotes financial deepening. Although REITs are present in both AEs and EMs, not all countries are at the same level of financial development, and so the financialization of housing, and expansion of REITs activity, will also be at different levels. Given its relation to highly sophisticated financial systems, we expect housing markets in more financially developed economies to have a relatively greater exposure to REITs.

To address this question, we run the augmented model (2) with an interaction term of the

REITs and an indicator for financial development. Specifically, we classify countries in groups based on their level of economic development with a dummy variable that takes the value of 1 if the country is classified as an EM, and 0 otherwise. Our classification relies on the IMF 2021 World Economic Outlook. Given the role of private savings and sophisticated investors in REITs markets, we expect house prices in EMs to be less exposed to REITs than house prices in AEs with higher level of financial development.

3.3 REITs and the pension system

In addition to the general level of financial development, the presence of sophisticated institutional investors that channel savings into the property markets is related to countries' pension systems. As documented in the literature, pension funds are key investors in REITs (Ciochetti, Craft and Shilling, 2002; Hartzell, Sun and Titman, 2014; Andonov, Eichholtz and Kok, 2015; Carlo, Eichholtz and Kok, 2021; Ghent, 2021). And, the share of investments by pension funds in REITs is not homogeneous across countries: Brounen, Kok and Ling (2012) report that it is relatively larger in countries such as Australia and the US, and relatively smaller in France. In this section, we ask whether the characteristics of the pension system affect the financialization of housing by categorizing countries based on their pension policy.

To address this question, we run the augmented model (2) with an interaction term of the REITs and an indicator for countries' pension system. There are various ways to conduct a cross-country comparison of pension systems (Anderson, 2015). In this study we rely on the widely used Esping-Andersen (1990) three-regime classification and categorize countries as liberal, conservative, or social-democratic based on the relative importance of the state and the market. Liberal systems rely on market-based pensions, with the state as ultimate provider to prevent poverty. In this systems, private pension funds are essential to pension provision. The state plays a larger role in the conservative and social-democratic systems, with the latter based on generous tax-financed

public pensions while the former relies on a contribution-based system. The classification is available for a subset of countries.[9]

3.4 REITs and housing finance

The literature has documented a clear role of mortgage market development on the financialization of housing. The development of mortgage markets, including the securitization of mortgage loans, has resulted in higher house prices and transaction activity (Mian and Sufi, 2021; Justiniano, Primiceri and Tambalotti, 2019; Brunnermeier, 2009). As housing finance is related to credit market dynamics (Claessens, Kose and Terrones, 2011) and encourages foreign investors into local mortgage markets (Diamond and Rajan, 2009), housing finance increases the exposure of house prices to monetary policy shocks (Iacoviello, 2016) and to capital flows shocks (Sá, Towbin and Wieladek, 2014). Hence, housing finance contributes to the exposure of housing markers to global shocks. As REITs also channel foreign savings in domestic housing markets, their impact on house prices may be confounded with those of housing finance. Indeed, the similar financial deepening and sophistication that encourage the development of mortgage markets are also key for the growth of REITs. On the one hand, housing finance encourages domestic and foreign institutional investors in mortgage markets, thus indirectly affecting the housing market via credit markets. On the other hand, REITs offer a channel to invest in housing market directly.

To establish whether our findings on the exposure of house prices to REITs are related to the mortgage market development, we estimate the augmented model (2) with an interaction term of REITs and an indicator for mortgage market development. Following previous studies on housing finance (Calza, Monacelli and Stracca, 2013; Sá, Towbin and Wieladek, 2014), we employ the mortgage market development index by the International Monetary Fund (2008). We consider countries

[9] Australia, Canada, New Zealand, UK, and US are classified as liberal. Finland, France, Germany, Italy, Japan, and Switzerland are classified as conservatives. Austria, Belgium, Norway, and Sweden are classified as social-democratic.

with an index above the cross-country median to have a high mortgage market development, and countries with an index below the median to have a low mortgage market development. Importantly, this index is available for a subset of AEs in our sample, hence this analysis is conducted exclusively within the advanced country subsample.

3.5 REITs and foreign investors

REITs are an instrument for foreign investors to participate in the domestic housing markets. We study how relevant foreign investors are for the exposure of house prices to REITs. Although domestic institutional investors play a key role, here we focus specifically on foreign investors since they represent a potential transmission channel for external financial shocks into the domestic housing market.

To address this question, we estimate the augmented model (2) with an interaction term of REITs and an indicator for foreign investor entry in the domestic real estate market. In order to classify the countries, we rely on the indicator for capital account controls on inflows into the domestic real estate market developed by Fernández et al. (2015). We consider countries with an index above the cross-country median to have an housing market restricted to foreign investors, and countries with an index below the median to have an open housing market.

3.6 REITs and the exposure of house prices to financial shocks

REITs by encouraging domestic and foreign institutional investors to participate in the real estate sector, are a potential channel of transmission of financial shocks in the local housing market. Evidence from mutual funds shows that investors' requests to purchase new shares and redeem existing shares is met with increased trading activity. Studying flow-induced trading, Lou (2012) finds that mutual funds meet redemption requests exclusively by liquidating existing positions and that they increase their positions by approximately 62% after an inflow. REITs flow-induced

trading may thus transmit shocks originating elsewhere in the financial system to the real estate sector. For instance, shocks originating in the domestic financial markets may affect institutional investors portfolio allocation and be channelled into the housing market via their holdings of REITs. Turning to the international investors, if these investors participate in local real estate sectors by investing in stocks of firms operating in the property sectors, then funding shocks abroad may be transmitted to local house prices via the financial market.

We conduct this analysis on the role of financialization, and REITs specifically, as transmission channels for domestic and global financial shocks by estimating a panel VAR (PVAR) model of house prices and REITs, including control variables for local demand factors for housing, as well as measures for financial conditions in domestic and global markets, as follows:

$$X_{i,t} = \sum_{n=1}^{N} \beta_i X_{i,t-n} + \epsilon_{i,t} \tag{3}$$

where $X_{i,t} = [VIX_t, worldGDP_t, bank_{i,t}, reits_{i,t}, GDP_{i,t}, rates_{i,t}, equity_{i,t}, credit_{i,t}, house_{i,t}]$, and *house* are house prices, *credit* is the private credit by banks, *equity* is the return of the domestic stock market index, *rates* are short term interest rates, GDP is real GDP growth, *reits* are REITs returns, and *bank* are bank flows, all in country i. *worldGDP* is the world real GDP growth and VIX is the VIX index. In other words, we represent model (3) as a panel VAR model in order to investigate the response of house prices to unexpected changes in REITs prices and financial conditions, both locally and globally. All variables except for *worldGDP*, GDP, *equity*, and *rates* are in logs. We determine the number of lags n with the Schwarz criterion and it ranges between 1 to 2 lags.

But financial shocks may not only hit house prices directly, but also indirectly via REITs. Thus, in order to identify the transmission channel of financial shocks to house prices, we also document

the exposure of REITs themselves to the financial shocks in domestic and global markets.

Following our findings related to the role of financial development, we focus separately on the impact of one standard deviation shock on our variables of interest, that is house prices and REITs across the main regional groups of our sample of countries. To avoid imposing restrictions on the slope coefficients of house prices across various countries, we employ the mean group estimator of Pesaran and Smith (1995). In essence, this is a dynamic panel estimation approach that allows for full country heterogeneity. Thus, we estimate a VAR for each country individually via OLS and estimate the impulse response functions (IRFs) by employing the Cholesky decomposition of the covariance matrix of the VAR residuals. Since we consider financial conditions in the main financial systems to be exogenous to domestic conditions and local house prices, we order the VIX first in all the VARs, followed by the real world GDP growth. Moreover, we put house prices last in the order to allow for all global and domestic factors to impact house prices (Banti and Phylaktis, 2019). We measure the average effect of the shock across countries by averaging cross-country responses at each forecasting horizon, excluding the top and bottom 1%. The standard errors of such measures are calculated as the cross-country variance of the responses at each forecasting horizon, divided by the number of countries minus one (Pesaran and Smith, 1995). In section 6, we employ two alternative measures of financing conditions in global markets instead of the VIX, based on the US monetary policy (Avdjiev, Gambacorta, Goldberg and Schiaffi, 2020) and the strength of the US dollar (Bruno and Shin, 2015).

4 Data

We measure the impact of financial investors in the real estate sector of the countries in our sample by employing the General Index from Global Property Research (GPR) that is the stock price index of all listed real estate companies with a market capitalization in excess of $50 millions and

over 75% of operations in the property sector. The data coverage includes 42 countries, but due to the limited number of time-series observations, we restrict our sample to 32 countries.[10] Real residential house prices are taken from the BIS residential house price database.[11]

Our sample includes 21 AEs and 11 EMs, from January 2000 to December 2019.[12] AEs include Australia, Austria, Belgium, Canada, Finland, France, Germany, Greece, Hong Kong, Israel, Italy, Japan, Netherlands, New Zealand, Norway, Singapore, Spain, Sweden, Switzerland, United Kingdom, and the United States. EMs include Brazil, China, India, Indonesia, Malaysia, Philippines, Poland, Russia, South Africa, Thailand, and Turkey.[13] We conduct our analysis at quarterly frequency and we build our quarterly series by taking the average of the monthly prices in the quarter.

In order to capture the impact of financial domestic and global shocks on housing, we include two variables that measure financial conditions in domestic and global financial markets. Following the literature on financial spillovers on housing markets, we include the performance of the domestic equity market, calculated as the returns of the stock market index (Ling and Naranjo, 1999; Subrahmanyam, 2007; Hoesli and Oikarinen, 2012; Cotter and Roll, 2015). Following the vast literature on global liquidity, we employ the VIX as a measure of global risk and risk aversion in

[10] In our analysis we focus on listed companies with over 75% of operations in real estate, thus including not only REITs but also other types of public companies. The more specific GPR REITs index is available for a limited selection of AEs, 11 out of 42. Given the significantly lower number of observations (approx. 900 vs over 2,000) as well as limited coverage, we rely on the General Index for the main analysis. As a robustness test, we rerun our analysis with the GPR REITs index and we confirm our main findings of the significant role of REITs as drivers of house prices and transmission channel for financial shocks to housing markets. Moreover, our sample includes companies that invest in real estate sectors other than residential real estate. Unfortunately our data does not differentiate amongst investment policies and thus all investments in real estate are included in our dataset. This likely results in an underestimation of the impact of REITs activity on residential housing markets in our analysis.

[11] Description of the variables included in the analysis is provided in Table 1A in the Appendix.

[12] Country classification is according to the IMF 2021 World Economic Outlook.

[13] REITs and house price data is available from 1984 but we take 2000 as starting year to obtain a significant cross-section of EMs. We also conduct the analysis on the full sample period for the available countries and we report these results in the robustness section 6. Due to data availability, data series start later for some countries: 3Q2008 for Brazil, 1Q2006 for China, 2Q2006 for Greece, 2Q2008 for Indonesia, 2Q2010 for Israel, 1Q2008 until 4Q2017 for the Philippines, 1Q2010 for Poland and Turkey, and 4Q2005 for Russia and Thailand. There are three missing observations in the REIT series for Spain during the GFC, from 3Q2008 to 1Q2009.

global markets (Cerutti, Claessens and Ratnovski, 2017; Miranda-Agrippino and Rey, 2020). Since we are interested in the impact of global shocks on the housing markets via international investors through REITs, we control for bank flows that are a well documented source of cross-border credit to the local banking sector (Cesa-Bianchi, Cespedes and Rebucci, 2015; Banti and Phylaktis, 2019).

We control for traditional determinants of house prices and the demand for housing, such as annual growth of the real GDP, domestic short-term interest rates, and domestic private credit by banks (Aizenman and Jinjarak, 2009). Moreover, we include world real GDP growth to capture global demand.

Finally, we explore the role of key country characteristics on the financialization of housing markets by exploiting the heterogeneity of the countries in our sample. We consider the role of financial development by focusing on the distinction between AEs and EMs, according to the IMF 2021 World Economic Outlook. We classify countries also according to their pension system following the three-regime classification by Esping-Andersen (1990). Moreover, we consider the role of housing finance by using the mortgage market development index developed by the International Monetary Fund (2008). This index is a snapshot of the development of mortgage markets at 2008 for a set of AEs and it is used in studies of housing finance (Calza, Monacelli and Stracca, 2013; Sá, Towbin and Wieladek, 2014). Finally, we focus on the role of foreign investors and we consider the indicator for capital account controls on inflows into the domestic real estate market developed by Fernández et al. (2015). This indicator is available for our countries for a shorter time period, from 2000 to 2013, hence we use the countries' average value to classify countries as restricted or open.[14]

Table 2 reports the descriptive statistics of REITs and house prices. REITs prices are higher on average in AEs than in EMs, although the coefficient of variation is similar across the two groups.

[14] The index shows low variation across time for each country, so it offers a consistent classification.

Similarly, the average quarterly change in house prices for the period is around 0.55% for AEs and 0.64% for EMs, while the coefficient of variation is similar across the two groups of countries.

We report the correlation matrix of the variables in Table 3. We show that house prices are positively correlated with REITs prices. Moreover, as expected, house prices increase with bank flows, domestic GDP growth, private bank credit, and equity returns. Turning to the global factors, house prices decrease with the VIX and increase with the world GDP growth. Similarly, REITs are positively correlated with bank flows, domestic GDP growth, stock returns and the world GDP growth, and negatively correlated to domestic short-term interest rates, private bank credit and the VIX.

5 Empirical results

5.1 The exposure of house prices to REITs

In this section, we explore the empirical results and the role of REITs in the financialization of housing by focusing on their impact on house prices around the world.

We report the results in Table 4. We present various models starting with model (1) without the control variables and then introducing them one by one in subsequent models, and including all of them together in model (8). We find that house prices are exposed to changes in REITs. The positive and significant coefficient indicates that house prices increase with REITs prices. This effect is robust across the different specifications (columns 1-8). We find the effect to be economically significant, as a one unit increase in REITs returns increases house prices by 4.4%.

As expected, house prices increase with the domestic economy, as positive economic growth stimulates the demand for housing. Moreover, we find that house prices decline when domestic short-term interest rates rise, as evidence of the role that monetary policy has on the financing conditions in domestic credit markets. Indeed, credit markets play an important role, with house

prices increasing with private credit provided by banks. Also, we find that house prices increase with the stock market, but the effect becomes insignificant in model (8).[15] Looking at the global variables, higher growth in the world GDP is related to higher house prices when included alone, as evidence of a significant effect of global demand on domestic housing markets, but it then turns insignificant in model (8).

5.2 Country heterogeneity

5.2.1 The role of financial development

The development of REITs is intertwined with financial development, as deeper financial systems are characterized by higher savings, and more sophisticated investors and financial instruments. We study the role of financial development in the financialization of housing by estimating model (2) with interaction terms of REITs and a dummy that classifies countries as AEs and EMs.

We report the results in Table 5 (column 1). We confirm that house prices are positively related to REITs prices. Looking at financial development across countries, we find a negative coefficient for the interaction term between REITs prices and EMs, indicating that house prices in EMs are less exposed to REITs than house prices in AEs.

Hence, we conclude that housing market exposure to REITs is related to the sophistication of investors and it is thus stronger in AEs than in EMs.

5.2.2 Do certain pension systems encourage financialization of housing?

Higher savings and more sophisticated investors are also associated with greater role of pension funds in countries' pension systems. We study the role of pension systems in the financialization of housing by estimating model (2) with interaction terms of REITs and a dummy that classifies

[15] To explore the possibility of multicollinearity we estimate variance inflation factors (VIFs). Test statistics for all coefficients are well below 2, except for stock market returns at 2.2. Instead of excluding stock returns from our model, we run model (1) including one control at a time to test whether the inclusion of stock returns affects our results and we do not find any evidence for this. We conclude that our results are not driven by multicollinearity.

countries as liberal, conservative, or social-democratic depending on the state-market mix of their pension system according to the widely employed three-regime classification by Esping-Andersen (1990).

We report the results in Table 5 (columns 2-4). We find that house prices are positively related to REITs prices, especially so in countries with liberal pension systems that have a prevalent market-based component in their pension policy. Moreover, we show that the financialization of housing, as indicated by the impact of REITs on house prices, is lower than average for countries that rely on a conservative and social-democratic system. Indeed, for the latter, the coefficient associated with the interaction term of REITs and pension system is as large as the ones for REITs alone.[16]

In conclusion, pension systems are an important factor in the financialization of housing, indicating the important role that pension funds play in the exposure of house prices to REITs.

5.2.3 Disentangling the impact of REITs from housing finance

Next, we turn to disentangle the exposure of house prices to REITs from the effect of housing finance, and the mortgage market development estimating model (2) for a subset of AEs classified according to the level of development of their mortgage market by the International Monetary Fund (2008).

In Table 5 (column 5), we find that house prices increase with REITs, and that the effect is not related to mortgage market development. Indeed, the interaction term with the mortgage market development indicator is statistically insignificant. Given the relatively weak effect, we conclude that the exposure of housing markets to REITs activity is specific to this instrument and it is

[16] In unreported tests, we run the augmented model interacting REITs with the pension system classification and with the dummy for country group, to make sure that our results are not driven by the fact that the pension system classification is only available for AEs. Results are quantitatively similar, hence the impact of the pension system that we document is different from the impact of the general financial development of the country. We do not report these results for brevity, but they are available from the authors upon request.

different than that of housing finance.

5.2.4 Is the impact of REITs on house prices related to the presence of foreign investors?

Finally, we focus on foreign investors and their role in the financialization of housing. We estimate model (2) focusing on countries with different levels of restrictions to the entry of foreign investors in the domestic real estate market.

Table 5 (column 6) reports the results and we confirm that house prices increase with REITs prices. The negative coefficient on the interaction term between REITs and controls on foreign entry indicates that countries with relatively more restricted housing markets experience a weaker exposure to REITs. Given the evidence of REITs stronger impact on house prices when foreign entry is easier, we find support for REITs as an important channel for foreign investments into the real estate market.

5.3 The role of REITs in the transmission of domestic and global financial shocks to house prices

In this section, we study the role of REITs as transmission channel for financial shocks originating in the domestic and global financial markets. We estimate the PVAR model (3) and focus separately on the impact of one standard deviation shock on our variables of interest in AEs and EMs.

Figure 3 reports the IRFs of house prices to shocks to the variables of interest in the model, REITs, financial market conditions domestically (domestic equity prices) and globally (VIX and claims by foreign banks to the domestic banking sector depicted by bank), by employing the Cholesky decomposition of the covariance matrix of the VAR residuals. We report the responses for AEs in panel (a) and for EMs in panel (b). Focusing first on shocks to REITs, house prices increase persistently following a shock to REITs in both AEs and EMs. In particular, in AEs and

EMs a one standard deviation shock to REITs increases house prices by around 0.34% and 0.40% after 4 quarters, respectively, after which the impact starts to decline. However, the effect is still significant after 12 quarters. After 12 quarters the cumulated increase in house prices due to a REITs shock in AEs and EMs is 3.26% and 3.40% on average, respectively.

Turning to financial shocks, we focus on the financial conditions in domestic and global financial markets. House prices in AEs (panel a) respond to shocks in global and domestic financial conditions. Following a shock to the VIX, house prices decline persistently. The effect lasts for 8 quarters before turning insignificant. Shocks to bank flows have a significant effect only on impact, and turn insignificant afterwards. Turning to domestic financial shocks, unexpected increases in stock prices have a lagged but persistent impact on house prices. In EMs (panel b), house prices exhibit only a rather brief decline following an unexpected increase in the VIX and stock prices, whereas they do not seem to respond to bank flows.[17]

Turning next to the role of REITs in channelling domestic and global shocks in Figure 4, we find that REITs decline following a positive shock to domestic stock prices and to the VIX. Moreover, REITs increase following an unexpected increase in bank flows. Thus, we document that both domestic and global financial conditions affect REITs. This applies to both AEs in panel (a) and EMs in panel (b).

In conclusion, we find a significant and persistent exposure of housing markets in both advanced and emerging markets to REITs. Moreover, we document a strong impact of financial shocks on housing markets in AEs, while we find a weaker effect in EMs. Financial shocks significantly affect REITs across both groups of countries. Hence, we conclude that the effect of financial shocks is

[17] We report all the responses of house prices to shocks in the variables in the model in Figure 1A in the Appendix. House prices in AEs decline following unexpected increase in short-term interest rates, as confirmation of the significant effect of monetary policy on house prices we documented in the panel model. Moreover, positive surprises to the economic performance as measured by real GDP growth result in higher house prices, as expected. The effect of shocks to domestic bank credit is negative and lagged. House prices in EMs are not related to other variables.

stronger in AEs, indicating that REITs are more likely to channel external shocks in sophisticated and deep financial systems.

6 Robustness tests

To test the robustness of our results we employ an alternative measure for REITs activity based on investment flows into REITs that is only available for a subset of AEs; secondly, we re-estimate our models (1) and (2) with instrumental variable (IV) estimators in two-stage least squares (2SLS) regressions to account for additional endogeneity concerns; thirdly, we repeat our analysis for a longer sample period 1990-2019 for the countries that we have data for to confirm that our results are not sample dependent; and finally, we employ alternative measures for global financial conditions based on the US monetary policy and the strength of the US dollar.

6.1 Alternative measure for REITs - investment flows into REITs

In our main analysis, we measure REITs activity by their stock market performance. In this section, we employ an alternative measure based on the fund flows into REITs (Ling and Naranjo, 2003). This variable is the net of share purchases and redemptions by investors and it is only available for a subset of AEs. Quarterly investment flows into real estate funds expressed in millions of Euros are available from the ECB Statistical database starting in 2009 for Austria, Finland, France, Germany, Greece, Netherlands, and Poland.[18] For the US, we take quarterly transactions in the equity capital of REITs from the Flow of Funds Accounts available from the FRED database in million USD starting in 2000 (Ling and Naranjo, 2003).[19]

We report the results of the exposure of house prices to REITs flows in Table 6. For the

[18] We exclude Belgium, Italy and Spain from the set of countries included in the analysis due to missing observations.

[19] As it is reasonable to expect flows to take a while to impact house prices, we allow for multiple lags in our model. We find that the second lag is significant, so we report the results for the flows variable lagged twice. Results are quantitatively similar if more lags are included in the specification. We do not report these additional test for brevity, but they are available from the authors upon request. Moreover, as we find that REITs flows interact with short-term interest rates, we exclude this variable from our model in this specification.

baseline model (1), we find that REITs flows are positively and significantly related to house price appreciation. Moreover, we report the IRFs from the PVAR model (3) in Figure 5 and we show that shocks to REITs flows trigger significantly higher house prices in our set of countries. The impact is immediate and lasts 4 quarters before turning insignificant. We do not find significant evidence for a role of REITs flows in channeling financial shocks into housing markets, as REITs flows responses to domestic and global shocks are largely insignificant.

In conclusion, we confirm that REITs activity, as measured by investment flows into REITs, affects domestic house prices, although we are restricting this analysis to a subset of AEs for which data is available.

6.2 Alternative estimation method - two-stage least squares (2SLS)

In our main analysis, we include all explanatory variables lagged one period to account for potential endogeneity. In this section, we conduct a further robustness test by employing twice-lagged independent variables as IV in our models and estimate them via 2SLS.

We report the results of the exposure of house prices to REITs for the alternative estimation method in Table 7. For the baseline model (1) (column 1), we confirm the main findings that house prices increase with REITs. The magnitude of the effect is qualitatively similar to that observed in the main analysis. Looking at the estimations of the augmented model (2) (columns 2-7), the impact of REITs on house prices is stronger for AEs than EMs, and it is weaker for countries that adopt less market-based pension systems. Also, we confirm that the exposure of house prices to REITs is unrelated to housing finance, as the interaction with mortgage market development is not statistically significant. The effect of the restrictions on foreign entry in the local real estate market is significant and negative, indicating that countries with more foreign investors (less restrictions on foreign entry) are characterized by stronger impact of REITs on house prices.

In conclusion, the results are similar to the OLS estimation, indicating that our results in the

main analysis are not driven by endogeneity.

6.3 Longer sample period 1990-2019

We have restricted the main analysis to the 2000-2019 sample period so that we have data for a representative set of EMs. Nonetheless, house prices and REITs data for some countries in our sample goes back to 1984. While house prices and REITs data start in 1984, data for the VIX start in 1990 and so we set the extended sample period from 1990 to 2019, taking advantage of the longest period available for our dataset. Hence, here we estimate models (1) and (2) for an unbalanced panel for the longer period 1990-2019.

Table 8 confirms our main findings. House prices are positively associated with REITs in all specifications. We confirm the stronger impact for AEs and the weaker exposure for countries with less market-based pension systems. Moreover, we document that the level of mortgage market development does not relate to the exposure of house prices to REITs. Finally, we confirm the strong effect associated with entry of foreign investors in the housing market. Thus, our results in the main analysis are not sample dependent.

6.4 Alternative measures of global financial conditions

Following the literature (Miranda-Agrippino and Rey, 2020), we base our main analysis on the VIX to capture global financial conditions. Nonetheless, other measures have been proposed in the literature as drivers of global liquidity, such as the US monetary policy (Avdjiev et al., 2020) and the US dollar (Bruno and Shin, 2015). The literature on the international transmission of US monetary policy is vast and the exact mechanisms at work are still debated (Avdjiev and Hale, 2019). On the one hand, as US monetary policy tightens, more stringent funding constraints lead banks to deleverage and reduce cross-border bank flows. Moreover, higher interest rates also affect banks' assets valuation leading to reduced lending activity. On the other hand, tighter US monetary policy

results in a reduction in domestic bank borrowers' worth, pushing banks to lend more to borrowers abroad. Finally, as higher interest rates in the US strengthen the US dollar, they also weaken balance sheets of borrowers abroad, leading to a reduced willingness by the international banks to lend abroad. The literature has documented both effects empirically (Avdjiev and Hale, 2019; Buch, Bussière, Goldberg and Hills, 2019). Following this literature, in this section we estimate the impact of unexpected tightening of the US monetary policy and strengthening of the US dollar on house prices. We investigate whether REITs are likely channels for these shocks to the housing market. We employ the federal funds rate (FF) to measure the stance of the US monetary policy, and the US dollar broad index (USD) provided by the FRED database for the strength of the US dollar. We reestimate the PVAR model (3) including FF and USD one at a time in place of the VIX.

The IRFs with the alternative measures for global financial conditions are reported in Figure 6. The IRFs show that house prices are exposed to US monetary policy in EMs, but not in AEs. However, turning to the role of REITs as transmission of monetary policy shocks, we do not find evidence of a significant impact of monetary policy in the US on REITs in EMs.

A positive impact of the US dollar is present across both groups, but the responses are very different. While the impact of an unexpected appreciation of the US dollar on house prices is lagged and persistent in AEs, the response is immediate and relatively shorter in EMs. REITs respond to shocks to the US dollar across both groups and the responses are similar, that is following an unexpected appreciation of the US dollar, REITs decline.

In conclusion, we find support for the main findings, but we document that while global shocks to the US dollar affect house prices in both AEs and EMs, the effect of unexpected tightenings to the US monetary policy affect house prices in EMs only. Furthermore, REITs appear to be significant transmission channels for US dollar shocks, but not of the US monetary policy shocks.

7 Conclusion

The role of finance in housing markets have attracted considerable attention in the wake of the GFC, when the emergence of complex financial instruments in mortgage markets precipitated a global credit crunch (Brunnermeier, 2009; Diamond and Rajan, 2009). Although developments in mortgage markets have received considerable attention, other sources of financial innovation have also developed rapidly in the last decade, posing a potential seed of instability in housing markets. This paper documents the role of REITs in the financialization process of housing around the world. Although REITs have been relatively less studied in the literature, they have registered dramatic increases in their valuation in the last decade, exceeding the generalized rises of stock markets.

Although we show that the impact of REITs is stronger on advanced economies, with larger saving pools and more sophisticated investors, emerging markets are also characterized by the rise of these instruments. We show that countries' diverse pension systems are reflected in the financialization of housing, with more market-based systems encouraging the development of those instruments that channel investments in real estate. Documenting that foreign investors play a key role in the financialization of housing, we confirm the important role of global finance on domestic economies. Indeed, we show that REITs channel financial shocks originating not only in domestic financial markets, but also globally. We find our results to be robust to numerous tests.

In conclusion, as instruments of the financialization of housing markets, REITs contribute potentially to the build-up of vulnerability to the stability of housing markets around the world, and especially in advanced economies.

References

Aalbers, Manuel B. 2016. *The Financialization of Housing: A Political Economy Approach*. London: Routledge.

Aizenman, Joshua and Yothin Jinjarak. 2009. "Current account patterns and national real estate markets." *Journal of Urban Economics* 66(2):75–89.

Aizenman, Joshua and Yothin Jinjarak. 2014. "Real estate valuation, current account and credit growth patterns, before and after the 2008-9 crisis." *Journal of International Money and Finance* 48(PB):249–270.

Anderson, Karen M. 2015. *Pension Policy*. Vol. 17.

Andonov, Aleksandar, Piet Eichholtz and Nils Kok. 2015. "Intermediated investment management in private markets: Evidence from pension fund investments in real estate." *Journal of Financial Markets* 22:73–103.

Avdjiev, Stefan and Galina Hale. 2019. "U.S. monetary policy and fluctuations of international bank lending." *Journal of International Money and Finance* 95:251–268.

Avdjiev, Stefan, Leonardo Gambacorta, Linda S Goldberg and Stefano Schiaffi. 2020. "The Shifting Drivers of Global Liquidity." *Journal of International Economics* 125:1–17.

Badarinza, Cristian and Tarun Ramadorai. 2018. "Home away from home? Foreign demand and London house prices." *Journal of Financial Economics* 130(3):532–555.

Bank for International Settlements. 2013. "Markets precipitate tightening." *BIS Quarterly Review* (September):1–11.

Bank for International Settlements. 2018. "Divergences widen in markets." *BIS Quarterly Review* (September):1–6.

Banti, Chiara and Kate Phylaktis. 2019. "Global Liquidity, House Prices and Policy Responses." *Journal of Financial Stability* 43:79–96.

Barcelona, William, Nathan Converse and Anna Wong. 2021. "U.S. Housing as a Global Safe Asset: Evidence from China Shocks." *International Finance Discussion Paper* 1332.

Basak, Suleyman and Anna Pavlova. 2016. "A Model of Financialization of Commodities." *Journal of Finance* 71(4):1511–1556.

Bayer, Patrick, Kyle Mangum and James W. Roberts. 2021. "Speculative Fever: Investor Contagion in the Housing Bubble." *American Economic Review* 111(2):609–651.

Belke, Ansgar, Walter Orth and Ralph Setzer. 2010. "Liquidity and the dynamic pattern of asset price adjustment: A global view." *Journal of Banking & Finance* 34(8):1933–1945.

Brana, Sophie, Marie-Louise Djigbenou and Stéphanie Prat. 2012. "Global excess liquidity and asset prices in emerging countries: A PVAR approach." *Emerging Markets Review* 135(3):256–267.

Brounen, Dirk, Nils Kok and David C. Ling. 2012. "Shareholder composition, share turnover, and returns in volatile markets: The case of international REITs." *Journal of International Money and Finance* 31(7):1867–1889.

Brunnermeier, Markus K. 2009. "Deciphering the liquidity and credit crunch 2007-2008." *Journal of Economic Perspectives* 23(1):77–100.

Bruno, Valentina and Hyun Song Shin. 2015. "Cross-Border Banking and Global Liquidity." *Review of Economic Studies* 82(2):535–564.

Buch, Claudia M., Matthieu Bussière, Linda S. Goldberg and Robert Hills. 2019. "The International Transmission of Monetary Policy." *Journal of International Money and Finance* 91:29–48.

Calza, Alessandro, Tommaso Monacelli and Livio Stracca. 2013. "Housing finance and monetary policy." *Journal of the European Economic Association* 11(SUPPL. 1):101–122.

Cannon, Susanne E. and Rebel A. Cole. 2011. "Changes in REIT Liquidity 1988-2007: Evidence from Daily Data." *Journal of Real Estate Finance and Economics* 43:258–280.

Carlo, Alexander, Piet Eichholtz and Nils Kok. 2021. "Three Decades of Global Institutional Investment in Commercial Real Estate." *Journal of Portfolio Management* 47(10):25–40.

Cerutti, Eugenio, Stijn Claessens and Lev Ratnovski. 2017. "Global Liquidity and Drivers of Cross-Border Bank Flows." *Economic Policy* 32(89):81–125.

Cesa-Bianchi, Ambrogio, Luis Felipe Cespedes and Alessandro Rebucci. 2015. "Capital Flows, House Prices, and the Macroeconomy: Evidence from Advanced and Emerging Market Economies." *Journal of Money, Credit and Banking* 47(S1):301–335.

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

Choi, Chi Young and J. Andrew Hansz. 2021. "From banking integration to housing market integration - Evidence from the comovement of U.S. Metropolitan House Prices." *Journal of Financial Stability* 54.

Ciochetti, Brian A, Timothy M Craft and James D Shilling. 2002. "Institutional Investors' Preferences for REIT Stocks." *Real Estate Economics* 30(4):567–593.

Claessens, Stijn, M. Ayhan Kose and Marco E. Terrones. 2011. "Financial Cycles: What? How? When?" *NBER International Seminar on Macroeconomics* 7(1).

Cotter, John and Richard Roll. 2015. "A Comparative Anatomy of Residential REITs and Private Real Estate Markets: Returns, Risks and Distributional Characteristics." *Real Estate Economics* 43(1):209–240.

Cotter, John, Stuart Gabriel and Richard Roll. 2015. "Can housing risk be diversified? A cautionary tale from the housing boom and bust." *Review of Financial Studies* 28(3):913–936.

Cvijanovic, Dragana and Christophe Spaenjers. 2021. ""We'll always have paris": Out-of-country buyers in the housing market." *Management Science* 67(7):4120–4138.

Darius, Reginald and Sören Radde. 2010. "Can Global Liquidity Forecast Asset Prices?" *IMF working paper* 196.

Davids, Allan. 2020. "The Cape of Good Homes: Exchange Rate Depreciations, Foreign Demand and House Prices." *SSRN Electronic Journal* .

Diamond, Douglas W. and Raghuram G. Rajan. 2009. "The Credit Crisis: Conjectures about Causes and Remedies." *American Economic Review* 99(2):606–610.

Duca, John V., John Muellbauer and Anthony Murphy. 2010. "Housing markets and the financial crisis of 2007–2009: Lessons for the future." *Journal of Financial Stability* 6(4):203–217.

Esping-Andersen, Gosta. 1990. *The Three Worlds of Welfare Capitalism.* Princeton: Princeton University Press.

Favilukis, Jack, David Kohn, Sydney C. Ludvigson and Stijin Van Nieuwerburgh. 2013. International capital flows and house prices: theory and evidence. In *Housing and the Financial Crisis*, ed. Edward L. Glaeser and Todd Sinai. Chicago: University of Chicago Press pp. 235–299.

Favilukis, Jack and Stijn Van Nieuwerburgh. 2021. "Out-of-Town Home Buyers and City Welfare." *Journal of Finance* 76(5):2577–2638.

Fernández, Andrés, Michael W Klein, Alessandro Rebucci, Martin Schindler and Martín Uribe. 2015. "Capital Control Measures: A New Dataset." *IMF Working Papers* 80.

Fernandez, Rodrigo and Manuel B. Aalbers. 2016. "Financialization and housing: Between Globalization and Varieties of Capitalism." *Competition and Change* 20(2):71–88.

Garriga, Carlos, Pedro Gete and Athena Tsouderou. 2021. "Investors and Housing Affordability." *SSRN Electronic Journal* .

Ghent, Andra C. 2021. "What's wrong with Pittsburgh? Delegated investors and liquidity concentration." *Journal of Financial Economics* 139(2):337–358.

Gorback, Caitlin S and Benjamin J Keys. 2020. "Global capital and local assets: House prices, quantities, and elasticities." *NBER Working Papers* 27370.

Hartzell, Jay C., Libo Sun and Sheridan Titman. 2014. "Institutional investors as monitors of corporate diversification decisions: Evidence from real estate investment trusts." *Journal of Corporate Finance* 25:61–72.

Hoesli, Martin and Elias Oikarinen. 2012. "Are REITs real estate? Evidence from international sector level data." *Journal of International Money and Finance* 31(7):1823–1850.

Iacoviello, Matteo. 2016. "House Prices, Borrowing Constraints, and Monetary Policy in the Business Cycle." *American Economic Review* 95(3):739–764.

International Monetary Fund. 2008. "The changing housing cycle and the implications for monetary policy." *IMF World Economic Outlook* (April):103–132.

Justiniano, Alejandro, Giorgio E. Primiceri and Andrea Tambalotti. 2019. "Credit supply and the housing boom." *Journal of Political Economy* 127(3):1317–1350.

Lambie-Hanson, Lauren, Wenli Li and Michael Slonkosky. 2019. "Leaving Households Behind: Housing Recovery." *Federal Reserve Bank of Philadelphia Working Papers* 01.

Landier, Augustin, David Sraer and David Thesmar. 2017. "Banking integration and house price co-movement." *Journal of Financial Economics* 125(1):1–25.

Ling, David and Andy Naranjo. 1999. "The integration of commercial real estate markets and stock markets." *Real Estate Economics* 27(3):483–515.

Ling, David and Andy Naranjo. 2003. "The Dynamics of REIT Capital Flows." *Real Estate Economics* 31(3):405–434.

Lou, D. 2012. "A flow-based explanation for return predictability." *Review of Financial Studies* 25(12):3457–3489.

Mazzucato, Mariana. 2018. *The value of everything: making and taking in the global economy.* New York: PublicAffairs.

Mian, Atif and Amir Sufi. 2021. "Credit Supply and Housing Speculation." *Review of Financial Studies* (Forthcoming).

Milcheva, Stanimira and Bing Zhu. 2016. "Bank integration and co-movements across housing markets." *Journal of Banking and Finance* 72:S148–S171.

Mills, James, Raven Molloy and Rebecca Zarutskie. 2019. "Large-Scale Buy-to-Rent Investors in the Single-Family Housing Market: The Emergence of a New Asset Class." *Real Estate Economics* 47(2):399–430.

Miranda-Agrippino, Silvia and Hélène Rey. 2020. "US Monetary Policy and the Global Financial Cycle." *Review of Economic Studies* 87(6):2754–2776.

Pesaran, M.Hashem and Ron Smith. 1995. "Estimating long-run relationships from dynamic heterogeneous panels." *Journal of Econometrics* 68(1):79–113.

Prasad, Eswar S., Kenneth Rogoff, Shang-jin Wei and M. Ayhan Kose. 2003. "Effects of Financial Globalization on Developing Countries: Some Empirical Evidence." *IMF Occasional Paper* 220.

Rojas-Suarez, Liliana. 2012. "Towards strong and stable capital markets in emerging market economies." *BIS Papers* (75):13–20.

Sá, Filipa, Pascal Towbin and Tomasz Wieladek. 2014. "Capital inflows, financial structure and housing booms." *Journal of the European Economic Association* 12(2):522–546.

Subrahmanyam, Avanidhar. 2007. "Liquidity, Return and Order-Flow Linkages Between REITs and the Stock Market." *Real Estate Economics* 35(3):383–408.

Tillmann, Peter. 2013. "Capital inflows and asset prices: Evidence from emerging Asia." *Journal of Banking and Finance* 37(3):717–729.

Turner, Adair. 2010. "What do banks do? Why do credit booms and busts occur and what can public policy do about it?" *The Future of Finance: the LSE report* pp. 5–86.

UN. 2017. "Report of the special rapporteur on adequate housing as a component of the right to an adequate standard of living, and on the right to non-descrimination in this context." *UN Human Rights Council Report* 34/51.

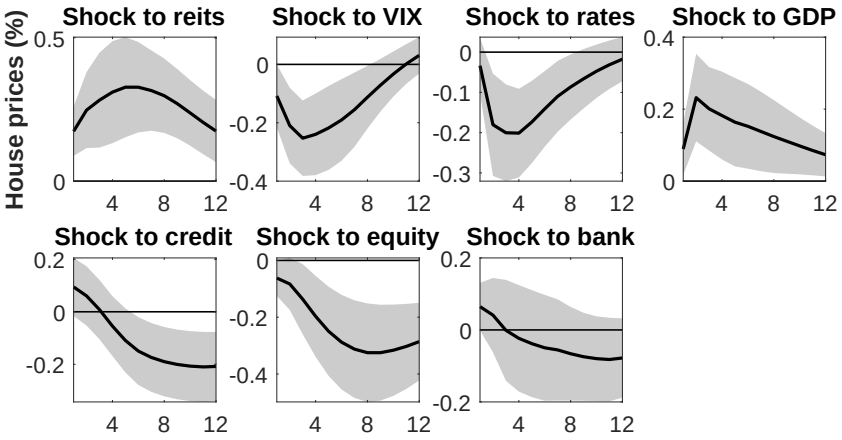
Appendix

Table 1A: Description of the variables included in the analysis

Variables	Abbreviation	Data source
House price index	house	BIS residential house price database
Real Estate Investment Trusts (REITs) price index	reits	Global Property Research (GPR)
External claims (deposits and loans) of reporting banks vis-à-vis banks of each country	bank	BIS Locational Statistics
Real GDP growth rate	GDP	IMF
Domestic short-term interest rates	rates	IMF
Domestic private credit by banks	credit	IMF
Domestic stock market index	equity	IMF
VIX index	VIX	CBOE
World real GDP growth rate	world GDP	IMF
Pension system classification	pension	Esping-Andersen (1990)
Mortgage market development index	mortgage	International Monetary Fund (2008)
Restrictions on real estate purchases and sales by nonresidents	restricted	Fernández et al. (2015)
Federal funds rate	FF	FRED
US dollar broad index	USD	FRED

Figure 1A. House price responses (%) to all variables in the PVAR model. The solid black lines are IRFs of house prices to a one-time shock of one standard deviation in each variable as indicated in the title to each plot. The shaded areas are two standard error confidence bands. Lags are determined according to the Schwarz criterion and are between 1 and 2.

a. Advanced Economies



b. Emerging Markets

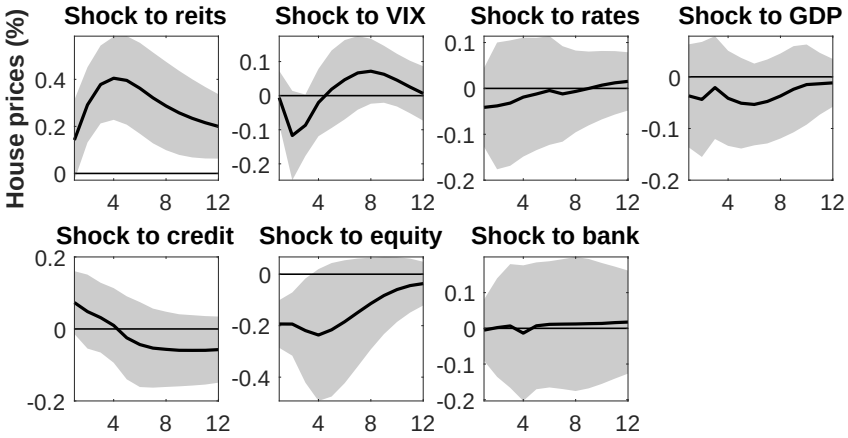


Table 1: **Financialization of housing**

	(1) Correlation House Prices/REITs 2000-19	(2) Controls on foreign entry in house market	(3) Change in House Prices 2010-19	(4) Change in REITs 2010-19	(5) Level of REITs in 2019	(6) Difference REITs and Stock Index in 2019
Australia	0.84	1.00	0.15	1.50	240.72	95.82
Austria	0.07	0.84	0.38	1.35	225.61	94.76
Belgium	0.83	0.00	0.08	1.49	252.49	104.99
Brazil	0.69	0.37	-0.02	0.36	110.94	-50.29
Canada	0.94	0.00	0.39	1.25	202.94	63.86
China	-0.50	1.00	0.10	0.01	91.19	-12.82
Finland	0.87	1.00	-0.01	1.11	205.54	66.85
France	0.76	0.00	0.05	1.00	199.91	34.54
Germany	0.13	0.00	0.38	0.26	131.18	-39.46
Greece	0.33	0.00	-0.36	1.12	263.43	212.10
Hong Kong	0.97	0.00	0.99	0.91	173.88	48.65
India	0.78	1.00	0.79	1.92	273.39	52.91
Indonesia	-0.41	1.00	0.01	1.18	183.19	-18.77
Israel	0.54	0.16	0.53	1.12	168.50	50.50
Italy	0.24	0.00	-0.24	0.31	139.70	11.56
Japan	-0.65	0.00	0.07	1.27	214.08	24.70
Malaysia	0.95	0.89	0.66	1.55	234.08	118.78
Netherlands	0.07	0.00	0.03	-0.18	82.75	-79.48
New Zealand	0.94	1.00	0.55	2.55	342.12	91.86
Norway	0.81	0.53	0.27	0.45	158.91	-78.45
Philippines	0.90	1.00	0.57	3.31	371.68	163.57
Poland	0.52	1.00	0.04	-0.72	28.95	-105.53
Russia	0.29	0.53	-0.47	-0.07	92.98	-109.48
Singapore	0.78	1.00	0.05	1.06	190.79	81.73
South Africa	0.64	0.00	-0.02	0.38	120.26	-76.23
Spain	0.91	0.16	-0.18	-0.59	47.46	-39.12
Sweden	0.95	0.58	0.46	3.87	428.98	228.73
Switzerland	0.98	1.00	0.37	1.19	206.22	42.06
Thailand	0.90	1.00	0.27	4.91	471.95	283.31
Turkey	-0.34	1.00	0.04	-0.53	44.59	-131.65
United Kingdom	0.79	0.00	0.13	1.03	202.85	68.78
United States	0.25	1.00	0.28	2.06	272.83	87.80

Notes: The table reports some descriptive analysis of the REITs and house price series for each country. EMs are indicated in bold (according to the IMF 2021 WEO classification). Column (1) reports the correlation between house prices and REITs during our sample period 2000-2019. Column (2) reports the indicator for the presence of controls on foreign entry in the real estate sector, as the averaged REI index by Fernández et al. (2015). Columns (3) and (4) report the changes in the post-crisis period, from 2010 to 2019, experienced by house prices and REITs, respectively. Column (5) reports the level of REITs in 2019. Column (6) reports the difference between REITs and stock price index. All series are indexed at 2010. The sample period is 2000-2019.

Table 2: **Descriptive statistics**

	a. REITs price index	
	Advanced Economies	Emerging Markets
mean	110.45	101.00
median	114.79	113.63
st dev.	46.33	42.99
max	207.18	168.35
min	36.11	33.15
	b. House prices (%)	
	Advanced Economies	Emerging Markets
mean	0.55	0.64
median	0.60	0.48
st dev.	0.87	0.95
max	2.15	2.84
min	-2.58	-2.36

Notes: Descriptive statistics of the quarterly series of the main variables, REITs price index and house prices for AEs and EMs for the period 2000-2019. REITs are indexed at 2010, while house prices are quarterly changes in the house price index reported in percentage. REITs and house prices are averages across the countries in the groups.

Table 3: **Correlation matrix**

	house	reits	bank	GDP	rates	credit	equity	VIX
reits	0.23***							
bank	0.15***	0.30***						
GDP	0.25***	0.26***	0.20***					
rates	-0.03	-0.08 ***	0.04*	0.10***				
credit	0.09***	-0.08***	0.07***	-0.06***	0.03*			
equity	0.16***	0.65***	0.20***	0.33***	0.02	-0.06***		
VIX	-0.12***	-0.32***	-0.13***	-0.22***	0.13***	0.05**	-0.44***	
world GDP	0.09***	0.40***	0.10***	0.15***	-0.05**	-0.01	0.41***	-0.09***

Notes: Correlation matrix of all the variables in the model. *house* are percentage changes in house prices, *reits* are log-differenced REITs price indices, *bank* are log-differenced claims by foreign banks on the domestic bank sector, *GDP* is the domestic growth in real GDP, *rates* are domestic short-term interest rates, *credit* is log-differenced domestic private credit by banks, *equity* are the returns on the domestic stock market index, *VIX* is the log of the implied volatility in US markets, *world GDP* is the first difference of the growth in real aggregated world GDP. For panel variables, the average correlation coefficient among the correlation coefficients for each country is reported in the table. Significance of the coefficients is reported as ***,**, and * for 1%, 5%, and 10% respectively. The sample period is 2000-2019.

Table 4: **House prices and REITs**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
reits	0.044***	0.036***	0.045***	0.046***	0.039***	0.044***	0.042***	0.036***
bank	0.009							0.000
GDP		0.004***						0.005***
rates			-0.001**					-0.001***
credit				0.077***				0.099***
equity					0.014**			0.000
VIX						-0.001		0.002
world GDP							0.002**	0.001
constant	0.005***	0.002***	0.007***	0.004***	0.005***	0.009**	0.005***	-0.002
Adj. R^2	0.12	0.12	0.09	0.09	0.09	0.09	0.09	0.13
cross-sections	32	32	32	32	32	32	32	32
obs	2176	2176	2176	2176	2176	2176	2176	2176

Notes: Results of the panel model. The dependent variable is the percentage changes in house prices. *reits* are log-differenced REITs price indices, *bank* are log-differenced claims by foreign banks on the domestic bank sector, *GDP* is the domestic growth in real GDP, *rates* are domestic short-term interest rates, *credit* is log-differenced domestic private credit by banks, *equity* are the returns on the domestic stock market index, *VIX* is the log of the implied volatility in US markets, *world GDP* is the first difference of the growth in real aggregated world GDP. The model includes country fixed effects and it is estimated by least squares. Significance of the coefficients is reported as ***,**, and * for 1%, 5%, and 10% respectively. The sample period is 2000-2019.

Table 5: **House prices and REITs - country heterogeneity**

	(1) EMs	(2) Pension system Liberal	(3) Pension system Conservative	(4) Pension system Social-democratic	(5) Mortgage market dev. (AEs only)	(6) Restrictions on foreign entry
reits	0.041***	0.032***	0.039***	0.044***	0.042***	0.044***
reits*country	-0.019**					
reits*pension		0.026**	-0.021**	-0.043***		
reits*mortgage					-0.004	
reits*restricted						-0.019**
bank	0.001	0.000	0.000	0.000	0.002	0.000
GDP	0.005***	0.005***	0.005***	0.005***	0.004***	0.005***
rates	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
credit	0.098***	0.100***	0.100***	0.098***	0.138***	0.099***
equity	0.002	0.002	-0.001	0.001	0.015	0.000
VIX	0.002	0.002	0.002	0.002	0.007***	0.002
world GDP	0.001	0.001	0.001	0.001	0.000	0.001
constant	-0.003*	-0.003	-0.001	-0.002	-0.015**	-0.002
Adj. R^2	0.13	0.13	0.13	0.14	0.13	0.13
cross-sections	32	32	32	32	16	32
obs	2176	2176	2176	2176	1140	2176

Notes: Results of the panel model with interaction terms. The dependent variable is the percentage changes in house prices. *reits* are log-differenced REITs price indices, *country* is a dummy that takes the value of 1 if the country is an emerging market, and 0 otherwise (according to the IMF 2021 WEO classification), *pension* is a dummy that takes the value of 1 if the country's pension system is classified as liberal, conservative, or social-democratic, respectively as indicated in the columns, and 0 otherwise, *mortgage* is a dummy that takes the value of 1 if the country has a highly developed mortgage market, and 0 otherwise, *restricted* is a dummy that takes the value of 1 if the country has a restricted housing market to non-resident investors, and 0 otherwise, *bank* are log-differenced claims by foreign banks on the domestic bank sector, *GDP* is the domestic growth in real GDP, *rates* are domestic short-term interest rates, *credit* is the log-differenced domestic private credit by banks, *equity* are the returns on the domestic stock market index, *VIX* is the log of the implied volatility in US markets, *world GDP* is the first difference of the growth in real aggregated world GDP. Column 5 is restricted to a subsample of AEs due to data availability for *mortgage*. The model includes country fixed effects and it is estimated by least squares. Significance of the coefficients is reported as ***, **, and * for 1%, 5%, and 10% respectively. The sample period is 2000-2019.

Table 6: **House prices and REITs - Investment flows into REITs**

	(1)	(2)
flows	0.00017**	0.00015**
bank		0.021
GDP		0.006***
credit		-0.054
equity		0.022*
VIX		-0.007***
world GDP		0.002
constant	0.000	0.020**
Adj. R^2	0.10	0.17
cross-sections	8	8
obs	366	366

Notes: Results of the panel model of REITs flows on house prices. The dependent variable is the percentage changes in house prices. *flows* are fund flows into REITs, *bank* are log-differenced claims by foreign banks on the domestic bank sector, *GDP* is the domestic growth in real GDP, *credit* is log-differenced domestic private credit by banks, *equity* are the returns on the domestic stock market index, *VIX* is the log of the implied volatility in US markets, *world GDP* is the first difference of the growth in real aggregated world GDP. The model includes country fixed effects and it is estimated by least squares. Significance of the coefficients is reported as ***,**, and * for 1%, 5%, and 10% respectively. The sample period is 2000-2019.

Table 7: **House prices and REITs - 2SLS**

	(1) baseline	(2) EMs	(3) Pension system Liberal	(4) Pension system Conservative	(5) Pension system Social-democratic	(6) Mortgage market dev. (AEs only)	(7) Restrictions on foreign entry
reits	0.094***	0.107***	0.096***	0.101***	0.117***	0.072	0.134***
reits*country		-0.058**					
reits*pension			-0.013	-0.060***	-0.087***		
reits*mortgage						-0.029	
reits*restricted							-0.081**
bank	-0.021	-0.019	-0.021	-0.019	-0.023*	-0.005	-0.022
GDP	0.005***	0.005***	0.005***	0.005***	0.004***	0.004***	0.005***
rates	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
credit	0.110***	0.105***	0.110**	0.111***	0.108***	0.119**	0.110***
equity	-0.041*	-0.034*	-0.042*	-0.042*	-0.044*	0.004	-0.042*
VIX	0.003	0.004**	0.003	0.002	0.003*	0.007*	0.003*
world GDP	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
constant	-0.004	-0.008	-0.004**	-0.002	-0.005	-0.014**	-0.005
Adj. R^2	0.08	0.08	0.08	0.08	0.07	0.13	0.06
cross-sections	32	32	32	32	32	16	32
obs	2167	2167	2176	2176	2176	1136	2167

Notes: Results of a 2SLS estimation. The dependent variable is the percentage changes in house prices. *reits* are log-differenced REITs prices, *country* is a dummy of 1 if the country is EM, and 0 otherwise (IMF 2021 WEO), *pension* is a dummy that takes the value of 1 if the country's pension system is classified as liberal, conservative, or social-democratic, respectively as indicated in the columns, and 0 otherwise, *mortgage* is a dummy of 1 if the country has a highly developed mortgage market, and 0 otherwise, *restricted* is a dummy of 1 if the country housing market is restricted to non-resident investors, and 0 otherwise, *bank* are log-differenced claims by foreign banks, *GDP* is domestic real GDP growth, *rates* are domestic short-term interest rates, *credit* is log-differenced domestic private bank credit, *equity* are returns on the domestic stock index, *VIX* is the log of the implied volatility in US markets, *world GDP* is the first difference of real aggregated world GDP growth. Column 6 is restricted to AEs due to data availability for *mortgage*. The models include country fixed effects and are estimated by two-stage least squares with lagged independent variables as instruments. Significance of the coefficients is reported as ***,**, and * for 1%, 5%, and 10% respectively. The sample period is 2000-2019.

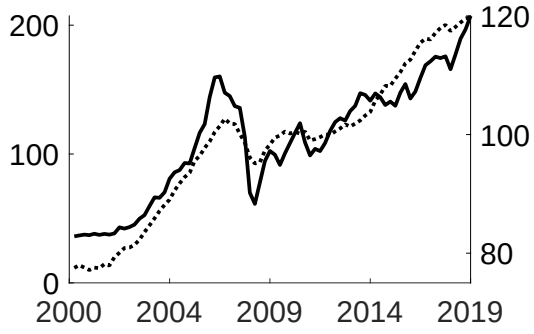
Table 8: **House prices and REITs - extended sample period 1990-2019**

	(1) baseline	(2) EMs	(3) Pension system Liberal	(4) Pension system Conservative	(5) Pension system Social-democratic	(6) Mortgage market dev. (AEs only)	(7) Restrictions on foreign entry
reits	0.038***	0.046***	0.035***	0.043***	0.043***	0.052***	0.047***
reits*country		-0.031***					
reits*pension			0.016*	-0.030***	-0.027***		
reits*mortgage						-0.011	
reits*restricted							-0.020***
bank	0.001	0.002	0.002	0.002	0.002	0.003	0.001
GDP	0.005***	0.005***	0.005***	0.005***	0.005***	0.005***	0.005***
rates	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
credit	0.133***	0.131***	0.133***	0.133***	0.133***	0.170***	0.134***
equity	0.012*	0.014**	0.013**	0.011	0.012*	0.023***	0.012**
VIX	0.004***	0.005**	0.004***	0.004***	0.004***	0.009***	0.004***
world GDP	-0.001	-0.001	-0.001	-0.001	-0.001	-0.002	-0.001
constant	-0.008**	-0.010**	-0.009**	-0.008*	-0.008**	-0.020***	-0.008**
Adj. R^2	0.16	0.16	0.16	0.16	0.16	0.17	0.16
cross-sections	32	32	32	32	32	16	32
obs	2831	2831	2831	2831	2831	1545	2831

Notes: Results of the panel model for the extended sample period 1990-2019. The dependent variable is the percentage changes in house prices. *reits* are log-differenced REITs price indices, *country* is a dummy that takes the value of 1 if the country is an emerging market, and 0 otherwise (according to the IMF WEO 2021 classification), *pension* is a dummy that takes the value of 1 if the country's pension system is classified as liberal, conservative, or social-democratic, respectively as indicated in the columns, and 0 otherwise, *mortgage* is a dummy that takes the value of 1 if the country has a highly developed mortgage market, and 0 otherwise, *restricted* is a dummy that takes the value of 1 if the country has a restricted housing market to non-resident investors, and 0 otherwise, *bank* are log-differenced claims by foreign banks on domestic banks, *GDP* is the domestic growth in real GDP, *rates* are domestic short-term interest rates, *credit* is the log-differenced domestic private credit by banks, *equity* are the returns on the domestic stock market index, *VIX* is the log of the implied volatility in US markets, *world GDP* is the first difference of the growth in real aggregated world GDP. Column 6 is restricted to a subsample of AEs due to data availability for *mortgage*. The model includes country fixed effects and it is estimated by least squares. Significance of the coefficients is reported as ***,**, and * for 1%, 5%, and 10% respectively.

Figure 1: **REITs and house prices.** The figure shows the quarterly series of REITs (solid line, left hand side axis) and house prices (dotted line, right hand side axis), averaged across AEs and EMs. Countries are classified according to the IMF 2021 WEO classification. Base year is 2010.

a. Advanced Economies



b. Emerging Markets

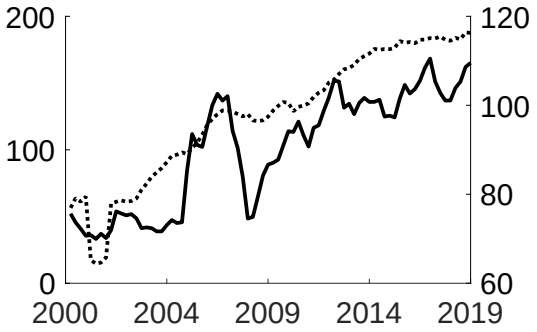
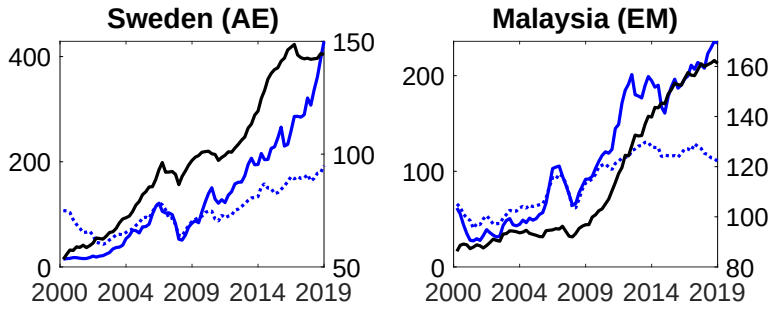


Figure 2: **REITs and house prices for representative countries.** The figure reports the quarterly series of house prices (black line, right hand side axis), REITs (blue solid line), and stock market index (blue dotted line) for four representative countries. Sweden and Malaysia are advanced and emerging economies with high correlation between house prices and REITs, while Germany and China are advanced and emerging economies with low and negative correlation. Base year is 2010.

a. High comovement



b. Low comovement

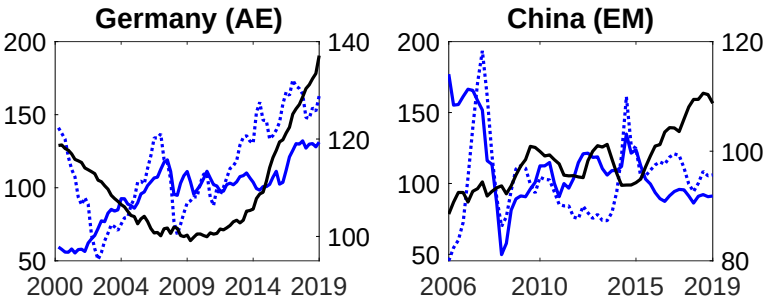
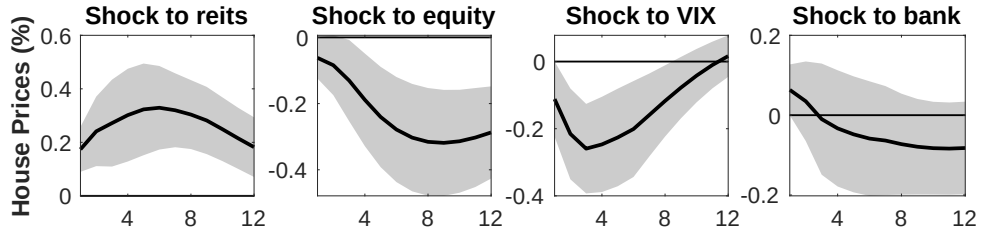


Figure 3: **House price responses (%).** The solid black lines are IRFs of house prices to a one-time shock of one standard deviation in REITs (*reits*) and financial conditions in domestic (*equity*) and global markets (*VIX* and *bank*). *equity* is the return of the domestic market stock market index. *VIX* is the implied volatility in US markets, and *bank* are the claims by foreign banks on the domestic bank sector. The shaded area is the two standard error confidence band.

a. Advanced Economies



b. Emerging Markets

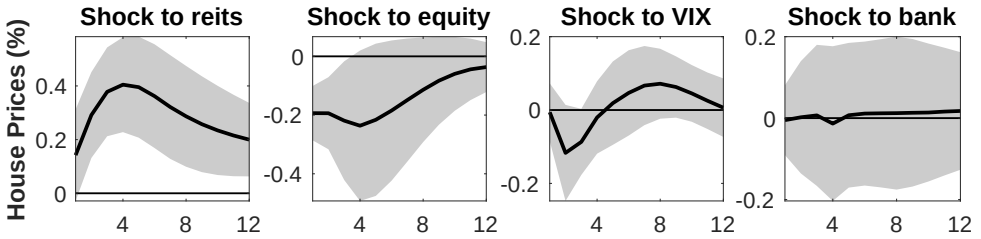
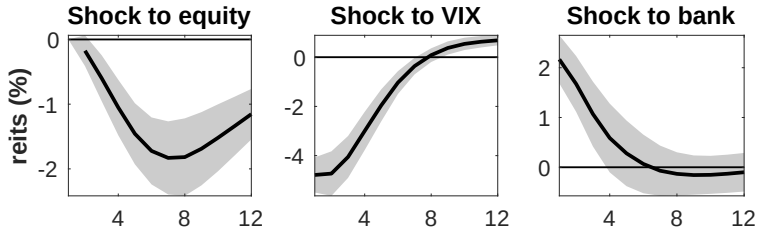


Figure 4: **REITs responses (%) to domestic and global financial shocks.** The solid black lines are IRFs of REITs prices to a one-time shock of one standard deviation in domestic (*equity*) and global financial (*VIX* and *bank*) conditions. *equity* is the return of the domestic market stock market index. *VIX* is the implied volatility in US markets, and *bank* are the claims by foreign banks on the domestic bank sector. The shaded area is the two standard error confidence band.

a. Advanced Economies



b. Emerging Markets

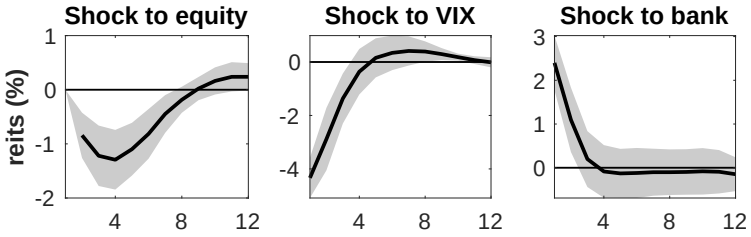


Figure 5: **IRFs with REITs flows.** The solid black lines are IRFs of house prices and REITs flows, as indicated, to a one-time shock of one standard deviation in the variable as reported on top of each plot. The shaded area is the two standard error confidence band.

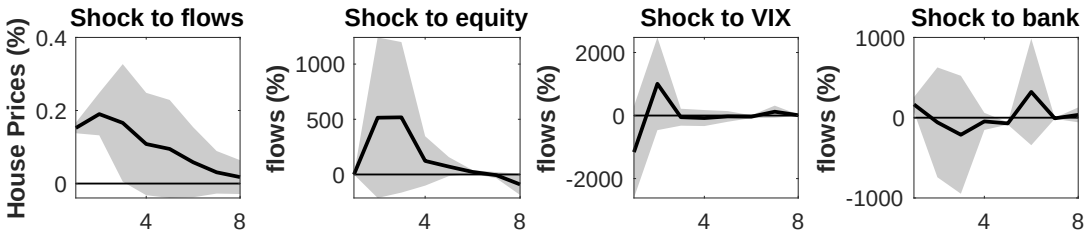
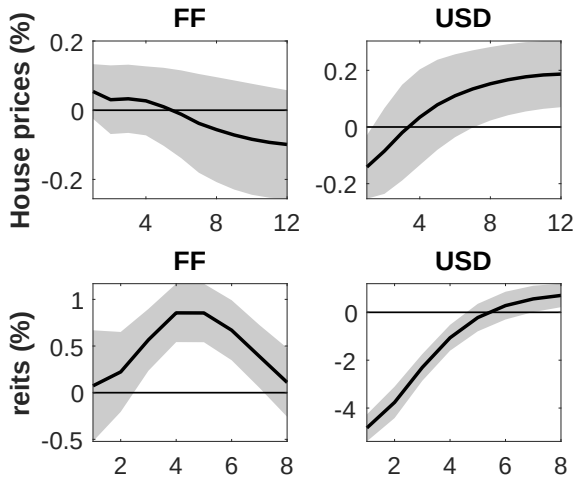


Figure 6: **House prices and REITs responses (%) to US monetary policy and the US dollar.** The solid black lines are IRFs of house prices and REITs to a one-time shock of one standard deviation in global financial conditions, as measured by the federal funds rate (*FF*) and the US dollar broad index (*USD*). The shaded area is the two standard error confidence band.

a. Advanced Economies



b. Emerging Markets