Global House Prices: Trends and Cycles

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SUMMARY

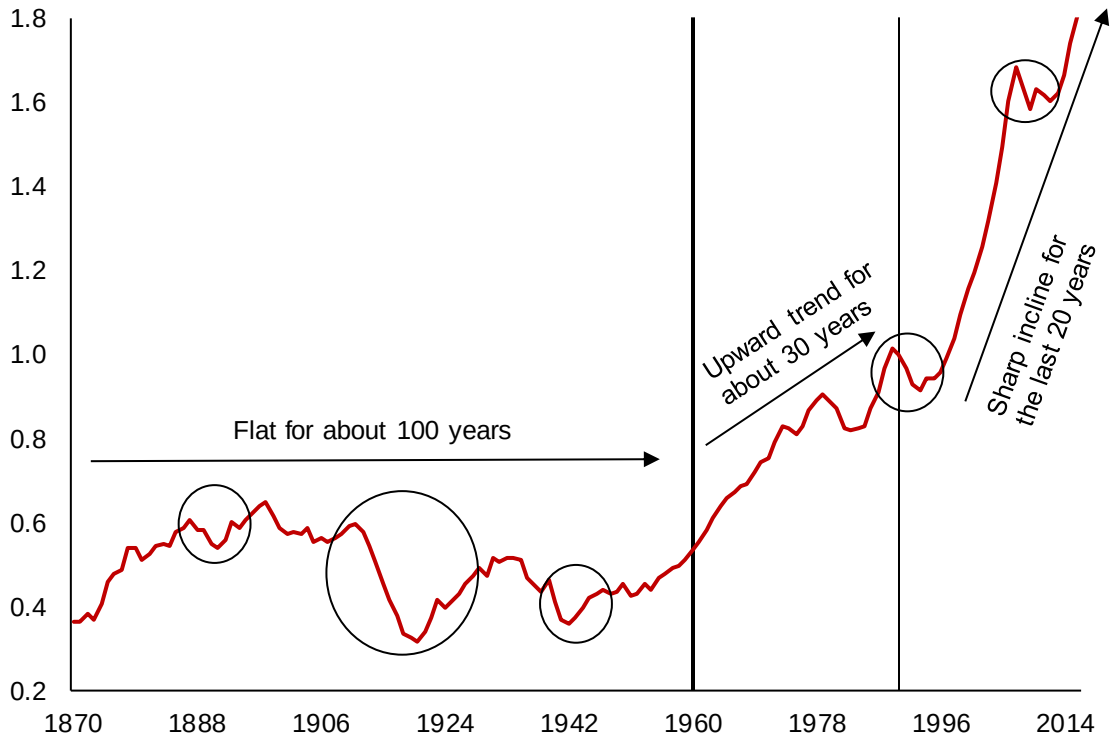
On average across countries, house prices have been on an upward trend over the past 50 years, following a 100-year period over which there was no long-term increase. The rising trend in prices reflects a demand boost due to greater availability of housing finance running up against supply constraints, as land has increasingly become a fixed factor for many reasons. The entire 150-year period has been marked by boom and bust cycles around the trend. These also reflect episodes of demand momentum—due to cheap finance or reasonable or unreasonable expectations of higher incomes—meeting a sluggish supply response. Policy options to manage boom-bust cycles, given the significant costs to the economy from house price busts, are discussed.

Keywords: global housing market, house prices, housing

I. INTRODUCTION

Where house prices are headed and why is debated in both doctoral dissertations and at cocktail parties. A popular expectation, despite the experience of the Global Financial Crisis, is that house prices always go up. It is not an unreasonable expectation given the experience of the last several decades. An average of real house[1] prices for 14 advanced economies since 1870 shows what Knoll, Schularick, and Steger (2017) call a "hockey stick" pattern—a long flat stretch for nearly the first 100 years followed by an increase ever since (Figure 1). The incline over the last two decades has been particularly steep. Another feature of house prices, evident in Figure 1, is the boom and bust cycle. There are periods of expansion, often quite long, followed by a sharp crash.

Figure 1: Trends and Cycles in House Prices

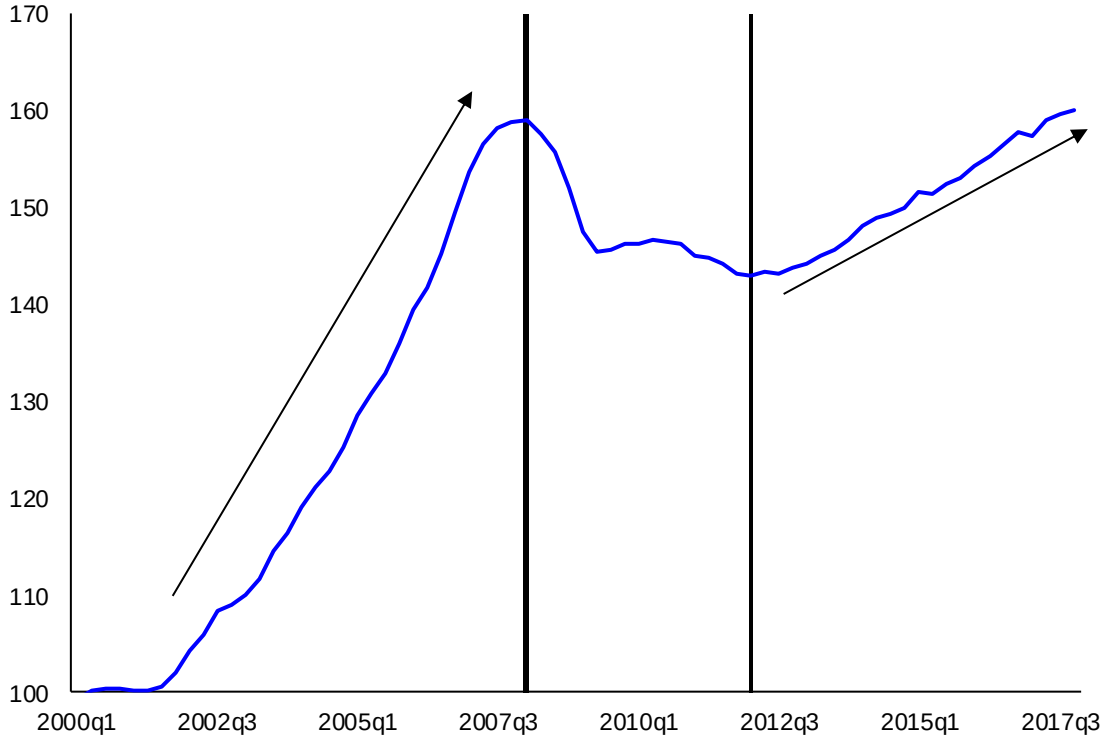


Note: The index is a simple average of real house prices for Australia, Belgium, Canada, Denmark, Finland, France, Germany, Japan, Netherlands, Norway, Sweden, Switzerland, United Kingdom, and United States.
Source: Knoll, Schularick, and Steger (2017).

[1] The focus of the paper is residential real estate. For a discussion of commercial real estate as an asset class, see Ghent, Torous and Valkanov (2018).

Focusing on the more recent period permits the addition of a larger group of advanced economies and many emerging market economies. Figure 2 shows the IMF's global house price index, an average of real house prices for about 60 countries, about half of which are emerging markets.[2] The period before the Great Recession was characterized by a synchronized boom across most countries. With the exception of Germany and Japan, real house prices in all OECD countries increased substantially from 2000 to 2006. A similar increase, again with a few exceptions, was recorded in emerging economies. Since 2012, global house prices have again increased but at a more subdued pace than in the 2000-06 period.

Figure 2. IMF's Global House Price Index



Source: IMF Global Housing Watch, drawing on data from Bank for International Settlements, European Central Bank, Federal Reserve Bank of Dallas, Savills, and national sources. Countries included: Australia, Austria, Belgium, Brazil, Bulgaria, Canada, Chile, China, Colombia, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hong Kong, Hungary, Iceland, India, Indonesia, Ireland, Israel, Italy, Japan, Kazakhstan, Korea, Latvia, Lithuania, Luxembourg, Macedonia, Malaysia, Malta, Mexico, Morocco, Netherlands, New Zealand, Norway, Peru, Philippines, Poland, Portugal, Qatar, Romania, Russia, Serbia, Singapore, Slovak Republic, Slovenia, South Africa, Spain, Sweden, Switzerland, Taiwan, Thailand, Turkey, Ukraine, United Arab Emirates, United Kingdom, United States, and Vietnam.

[2] An effort led by the Centre for Affordable Housing Finance provides an annual house price index for the past decade for about 50 low-income countries in Africa.

Understanding what drives the longer-term upward trend in house prices, and how to manage boom-bust cycles, is important given the role that housing plays in the economy. Housing makes up a significant part of total wealth in most countries, as homeownership rates are typically 60 to 70 percent. Housing loans are a sizable portion of the economy, with the ratio of total outstanding residential loans to GDP ranging around 30-40 percent in many countries (Hypostat, 2018).

House price busts can pose significant costs to the economy. Claessens, Kose, and Terrones (2009) show that output losses in recessions accompanied by housing busts are two to three times greater than in other recessions.[3] Housing busts also tend to slow down the recovery, as falling house prices act as a drag on household consumption and residential investment while putting financial intermediary balance sheets under stress. The cost of resolving housing crises can be very high; in the case of Ireland, for instance, government bailouts of banks as a result of the 2007 house price collapse amounted to 40 percent of GDP (Laeven and Valencia, 2012).

Section II discusses some of the factors behind the long-term trends and Section III discusses drivers of boom-bust cycles and Section IV discusses the policy options to manage these cycles. Conclusions and issues for further research are presented in Section V.

II. Understanding Long-term Trends in House Prices

The hockey-stick pattern shown in Figure 1 is consistent with the findings of many previous studies for individual countries.[4] The change in the trend in house prices is attributable both to supply constraints becoming more binding at the same time that constraints on demand were being loosened. While this explains the average behavior of prices, there is also some heterogeneity across and within countries, which is partly due to differences in the relative strengths of these demand and supply forces.

Tighter supply constraints

[3] Housing is also essential to health and well-being. Poor housing conditions are associated with adverse health outcomes (Krieger and Higgins, 2002) and homeownership can influence school outcomes for children; Green and White (1997), for instance, found that children of owners are more likely to finish high school than children of renters.

[4] See Stapledon (2010) for a historical house price index for Australia from 1880 onwards, Friggit (2002) for France from 1840, Eichholtz (1994) for the Netherlands from 1628, Eitrheim and Erlandsen (2004) for Norway from 1819, Monnery (2011) for the United Kingdom from 1900 and Shiller (2018) for the United States from 1890.

On the supply side, the rising price of land has been a key driver. The value of a house comprises the value of the structure and the value of the underlying land. A decomposition of house price growth into these two components shows that over 80 percent of the rise in house prices between 1950 and 2012 is due to rising land prices, while less than 20 percent comes from an increase in construction costs, which is a proxy for replacement value (Knoll, Schularick, and Steger, 2017).[5]

The increase in land prices in turn comes from land increasingly becoming a fixed factor. From the 19th to the early 20th century, construction of the railway network and introduction of steam shipping led to a drop in transportation costs, substantially augmenting the supply of economically-usable land (Jacks and Pendakur, 2010). However, this land-augmenting decline in transportation costs has subsided since the 1950s, making land increasingly a fixed factor. A second reason for land becoming a fixed factor is that housing supply is affected not only by land availability and geography but also by land use regulations.

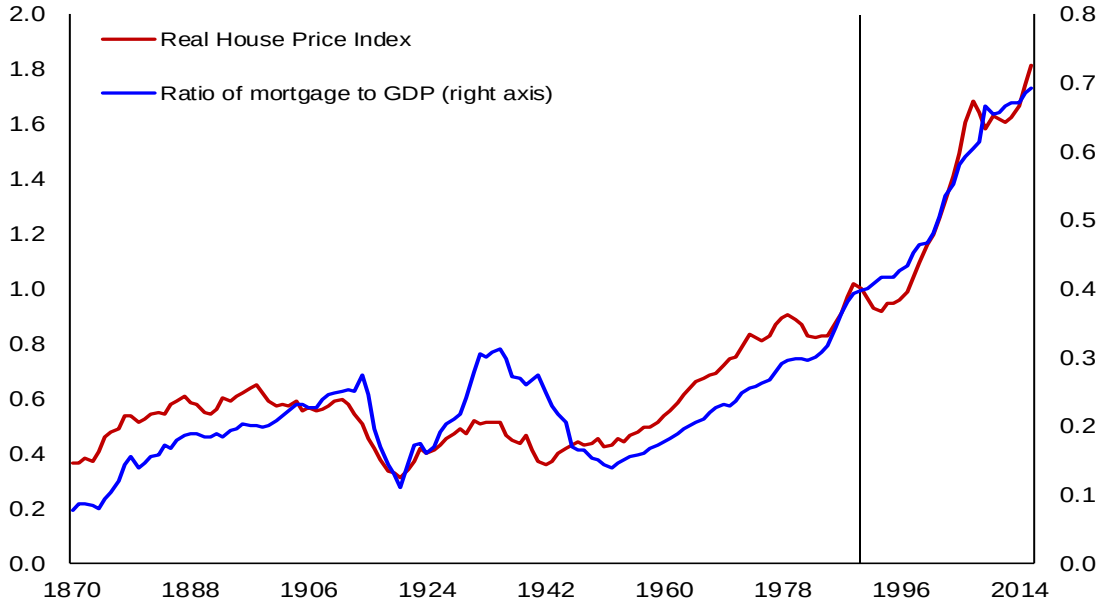
Looser demand constraints

At the same time as supply constraints have become tighter, demand constraints have become looser as changes in housing finance have made it easier for households to gain access to mortgage credit. Since the mid-1940s, regulations have been put place to make the banking systems safer on average than in the pre-1940 period; these have led to a fall in the cost of finance and a process of domestic credit deepening.

Jordà, Schularick and Taylor (2014) document that the ratio of mortgage credit to GDP has gone up from about 20 percent at the start of the 20th century to nearly 70 percent of GDP at present. Figure 3 shows the close association between the increase in the ratio of mortgage credit to GDP and the increase in house prices. The changes in housing finance have been particularly profound over the past 30 years. Until the 1980s, mortgage lending was dominated by specialized lenders, who faced limited competition in regulated and segmented markets. However, the deregulation of mortgage markets since then has led to a more competitive housing finance system in which households have easier access to housing-related credit, with increased diversity in funding sources, lender types, and loan products (IMF, 2008).

[5] The upward trend in land prices since the 1950s has also been documented by others. Davis and Heathcote (2007) find that the price of land in the United States has been growing much quickly than the price of existing homes. See also Case (2007), Gyourko, Mayer, and Sinai (2006) and Glaeser and Ward (2009).

Figure 3. Average house prices and mortgages



Notes: See notes to Figure 1 for list of countries. Sources: Jordà, Schularick and Taylor (2014) and Knoll, Schularick, and Steger (2017).

Differences across locations

While the pattern of a substantial increase in house prices since 1950 holds on average, there is some heterogeneity across countries. Germany and Switzerland have seen much slower trend increases in house prices, perhaps reflecting a stronger culture of renting rather than buying, which mutes the demand pressures compared with other countries. Japan has seen declines in house prices over the course of its 'lost decades' of economic growth.

There is also considerable heterogeneity in house price developments within countries, reflecting differences in the confluence of demand and supply forces. As noted by Glaeser, Gyourko and Molloy (2005), it is "the interaction of strong latent demand for markets … combined with restrictive or inelastic supply that largely accounts for relatively high house prices" in Manhattan compared to places like Dallas. "In Manhattan, local authorities are able to impose sufficiently high costs on new development (or simply limit it outright), so that higher demand results in higher prices without much increase in the number of housing units."

In addition to variations in land use regulations, geography also imposes constraints on countries and on cities. Saiz (2010) uses satellite-generated data on terrain elevation and presence of water bodies to estimate the amount of developable land in U.S. metropolitan areas. He finds that "most areas in which housing supply is regarded as inelastic are severely

land-constrained by their geography". His empirical work shows that "elasticity of housing supply depends critically on both regulations and physical constraints."

III. DRIVERS OF BOOM-BUST CYCLES

As with long-run trends, a basic demand and supply framework has some success in explaining house price booms as arising from demand momentum that is not fully absorbed by a commensurate increase in supply. Credit growth, and household and investor expectations, can amplify the effects of these fundamental driving forces on house prices. The bust comes when demand momentum slows, or credit conditions are tightened for prudential considerations, or expectations adjust.

Modeling housing cycles

While booms and bust have long been a feature of house prices, as noted earlier in Figure 1, the frequency of boom-bust cycles has gone up since 1950 (Bordo and Landon-Lane, 2013), and particularly since 1970. Bracke (2013) provides a comprehensive analysis of housing cycles for 19 OECD economies from 1970 onwards.[6] On average across countries, the boom in house prices has lasted 6-7 years during which house prices increase about 60 percent. The bust lasts 4-4 ½ years with prices falling about 30 percent over this phase of the cycle (Table 1). The boom in the late 1990s and early 2000's was exceptionally long in duration and in amplitude. Ireland for instance experienced a boom lasting over a decade during which house prices increased nearly 300 percent.

Table 1: Duration and Amplitude of Housing Cycles

	Duration (quarters)		Amplitude (%)	
	Mean	StDev	Mean	StDev
Upturns	24	15	61	56
Downturns	18	13	29	28

Note: The amplitude of upturns is the difference between the peak in real housing prices and its preceding trough, divided by its preceding trough. The amplitude of downturns is computed as the difference between the preceding peak and the trough divided by the trough.
Source: Bracke (2013).

[6] See also Andre (2010) and Claessens, Kose and Terrones (2009).

An important feature of housing cycles is that prices and quantities tend to move in the same direction. This positive relation suggests that house price cycles might reflect shifts in demand along a relatively inelastic short-run supply curve, which is the starting point of the widespread approach to modeling housing cycles (Abraham and Hendershott, 1996; Malpezzi, 1999). Typically, income growth, population growth and interest rate changes are treated as drivers of short-run demand, and changes in construction costs as a supply shifter. Credit growth is included as a covariate that can amplify cycles, as discussed further below.

In this framework, long-run house prices are pinned by their relationship with incomes and rents. Economic theory asserts that, because buying and renting are alternate ways of meeting the need for shelter, they should move in tandem over the long run. If that were not the case people would switch between buying and renting, bringing about adjustments both in prices and rents to bring them back in line (Poterba, 1992). Likewise, theory asserts that in the long run, the price of houses cannot stray too far from people's ability to afford them—that is, from their income. Availability of mortgage credit allows people to borrow against expectations of future income, but since loans eventually have to be paid back, house prices cannot drift too far away in the long run from income. To reflect these long-term anchors, the models typically include error-correction terms for the ratio of house prices to income and house prices to rents.

Igan and Loungani (2014) estimate a model of this kind for a number of advanced countries. The coefficients on income growth, population growth and interest rate changes generally have the expected positive sign and are significantly different from zero. The error-correction terms show some tendency of house prices to drift back towards long-run equilibrium. However, there is considerable heterogeneity across countries in how well the model fits, and even in the best cases over half on the variation in house prices is left unexplained. Pooling the data for countries helps with the precision of the estimated effects, but still leaves a large portion of house price growth unexplained (Ahir and Loungani, 2019).

Ireland provides a concrete example. Irish income growth was more than 10 percent a year during 1992-2006, more than twice the average of the preceding two decades. Population growth also picked up after 1992. However, the increase in house prices—which increased at 10 times the rate of the previous two decades—was far greater than can be explained by the relationship with these drivers. Hence, while accounting for the fundamental demand forces is an important part of explaining house price booms, other factors appear to be at play as well as discussed next.

Amplification effects

Credit growth generally has a significant association with house price growth even after the inclusion of income and population growth and interest rate changes. This suggests that credit might amplify the effects of house price booms. Because houses serve as collateral, an increase in house prices can have a feedback effect: once collateral values increase, banks are willing to lend even more to households, which feeds the house price boom. Such interactions have become more likely due to the institutional changes discussed earlier that have increased the availability of mortgage credit.[7] Relaxation in lending standards in good times can further drive up both credit and house price growth, as well documented for the case of the United States.[8]

In addition, house price booms can be fed by psychological and sociological factors, which can amplify the response of house prices to fundamentals. Case, Quigley and Shiller (2003) found in a 2002 survey that U.S. homebuyers were expecting "double-digit annual [house] price growth over the next 10 years" even though a long boom had already taken house prices to very high levels. Such expectations can sometimes take house prices far beyond what is warranted by fundamental driving forces.

Of course, distinguishing bubbles from fundamental forces can be difficult in real time or even with hindsight. Kahn (2008) asserts that the surge in U.S. house prices from the mid-1990s to 2007 can be explained by economic fundamentals, particularly expectations that strong productivity growth would lead to continued growth in incomes. The dynamic reversed in 2007 when productivity growth was perceived to have slowed—though productivity growth had begun to decelerate in 2004, the perception caught up with reality only in 2007, according to Kahn—thereby stifling the boom and the viability of mortgages predicated on sustained increases in house prices.

Differences between advanced and emerging economies

In emerging economies, housing is often the only marketable asset to escape financial repression and high inflation; hence, the hedging motive can be an important factor in driving house prices in these economies. After the wave of capital account liberalization in the mid-1990s, there has been a stronger role for capital flows and the global financial cycle in

[7] Favara and Imbs, 2009; Dell'Ariccia, Igan, and Laeven, 2008; Geanakoplos, 2010; and Mian and Sufi, 2009. See IMF (2011), Lecat and Mesonnier (2005), Crowe and others (2011a) for more on the interrelationship between credit growth and house price growth. Cesa-Bianchi, Ferrero and Rebucci (2018) stress that amplification effects from credit growth depend on the extent to which borrowers are credit constrained.

[8] There is also evidence (IMF, 2011) that government participation in the mortgage market exacerbates house price swings. For instance, government subsidies to first time home buyers, and tax deductibility of capital gains on housing, and government provision of mortgage guarantees tend to amplify house price swings by exacerbating the boom.

driving house price cycles in emerging economies, as documented by Cesa-Bianchi, Cespedes, and Rebucci (2015) and Cesa-Bianchi, Ferrero, and Rebucci (2018). Unlike in advanced economies, however, the amplification mechanism is necessarily household credit but the fact that housing in emerging economies is used as collateral for investment and by small businesses.

IV. Policy Options to Manage Housing Cycles

As discussed in the previous section, housing booms can reflect demand forces, supply constraints and amplification effects through various channels. Sorting out the relative importance of these factors is difficult in real time. In the 1990s and 2000s, the prevailing view was that, rather than try to prick an asset bubble—in stocks, bonds or housing—it was better to clean up after the fact. After the experience of the global financial crisis, however, policymakers are taking a more activist approach to managing housing cycles, particularly through the use of macroprudential policies (Zhu, 2014). The specific set of policy options to deal with real estate booms and busts can be grouped in three: monetary policy, fiscal tools, and macroprudential regulation (Table 2).

Table 2. Policy measures to address housing boom and bust

	Monetary measures	**Fiscal measures**
Impact	Potential to prevent booms, less so to stop one already in progress	Automatic stabilizer; reduce incentive for leverage
Side effects	Inflict damage to activity and welfare	Impair already-slow price discovery process
Practical issues	Identifying and reacting in time a challenge	Little room for cyclicality; incentive to avoid by misreporting
	Macroprudential: Supply side	**Macroprudential: Demand (LTV/DTI limits)**
Impact	Increase cost of borrowing while building buffer for downturn	Potentially limit leverage and price appreciation; decrease default probability
Side effects	Potential credit rationing; earnings management	Potential credit rationing (first-time buyers); can worsen bust
Practical issues	Data requirements and calibration	Calibration difficult, circumvention easy

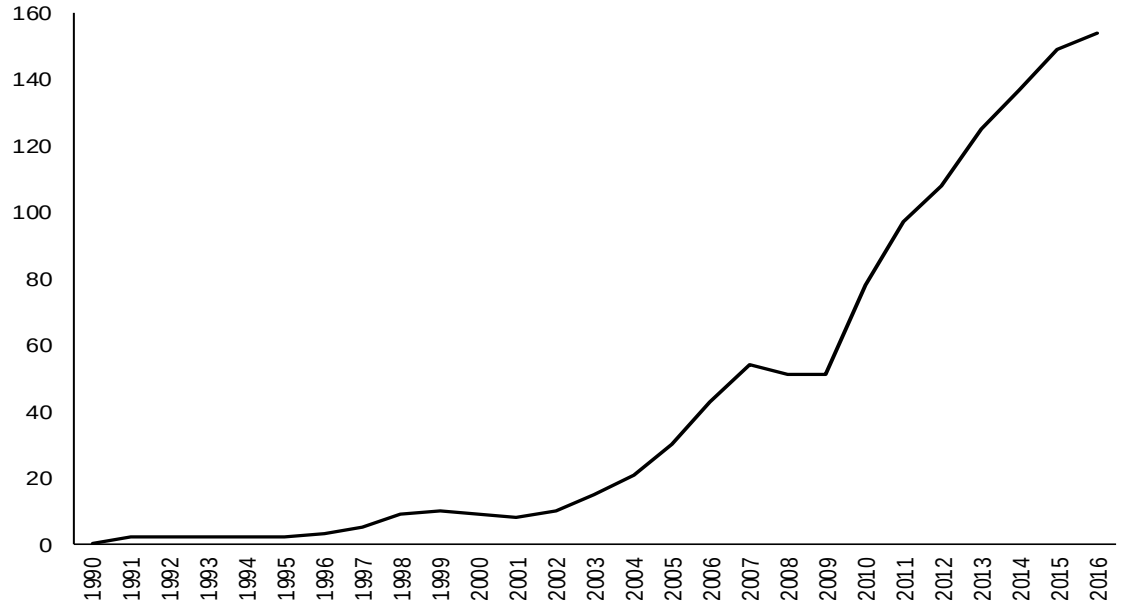
Source: Claessens, 2015.

Monetary policy is seen as a policy tool that can sometimes be effective, but it has some shortcomings. First, tightening monetary policy to tame the house price boom could come at the cost of slowing down the rest of the economy and not just the housing sector; monetary policy is a blunt tool. Second, tightening monetary policy might not succeed in cooling down the house price boom. For instance, Crowe and others (2011b) point out speculation in the housing market is unlikely to be stemmed by tightening of monetary policy. They note that "the experiences of Australia and Sweden suggest that marginal changes in the policy rate are unlikely to tame a real estate boom." Later, when policy interest rates were again raised in Sweden in 2010-13 to slow the housing boom, they again did not have the intended effects (Svensson, 2014). Svensson (2017) concludes that the costs of using monetary policy to lean against asset price booms "exceed the benefits by a substantial margin."

Fiscal tools include transaction taxes, property taxes, and mortgage interest deductibility. According to Crowe and others (2011b) fiscal tools can dampen volatile house price dynamics and the build-up of vulnerabilities associated with debt-financed homeownership. However, scope for using them in a cyclical setting is likely to be limited.

The use of macroprudential tools—particularly loan-to-value (LTV) ratios, debt-to-income (DTI) ratios, and sectoral capital requirements—has steadily increased (Figure 4).

Figure 4. The use of macroprudential tools, 1990-2016



Note: This figure shows the cumulative sum of macroprudential measures over time, with an increase indicating net tightening of the measures. The macroprudential measures included are: loan-to-value, debt service-to-income, and sectoral capital requirements.
Source: International Monetary Fund

Limits on LTV ratios cap the size of a mortgage loan relative to the value of a property, in essence imposing a minimum down payment. Limits on DTI ratios restrict the size of a mortgage loan to a fixed multiple of household income. The hope is to thereby contain unaffordable increases in household debt. Another macroprudential tool is to impose stricter capital requirements on loans to a specific sector such as real estate. This forces banks to hold more capital against these loans, discouraging heavy exposure to the sector.

In tandem with the increased use of macroprudential policies, researchers have devoted increased attention to studying the effectiveness of such policies in managing house price booms. Cerutti, Claessens and Laeven (2017) study the effects of several macroprudential policies for 119 countries over the 2000–13 period. They find that tightening these measures does significantly lower household credit growth; the impact on house price growth is also negative but not statistically significant. The argue that since "house price booms associated with increased leverage are the most destructive," macroprudential policies can play a useful role by "dampening household indebtedness."

Macroprudential tools thus appear promising but they are still in their early days and evidence on their effectiveness is just starting to come in (Ahir, 2016a, Ahir and Loungani, 2019). Moreover, as with other tools, there are also shortcomings to macroprudential measures. They may be easy to circumvent as they target specific type of contracts or group of agents. They can also be hard to implement. During the global financial crisis, Israel found it politically difficult to cap LTVs because of the impact it would have on first time home buyers, particularly young couples. In the Netherlands, it was hard to bring down the LTV ratios because it could have a negative impact on an already weak housing market and economy (Ahir, 2016b).

In sum, it should be recognized that there is no single policy that can fully manage risks to financial stability from house price booms and busts. As Crowe and others (2011b) conclude, "each policy will entail costs and distortions, and its effectiveness will be limited by loopholes and implementation problems. Broad-reaching measures (such as a change in the monetary policy rate) will be more difficult to circumvent, and hence potentially more effective, but will typically involve greater costs. More targeted measures (such as maximum loan-to-value ratios) may limit costs, but will be challenged by loopholes."

V. CONCLUSIONS

On average across countries, house prices have been on an upward trend over the past 50 years, following a 100-year period over which there was no long-term increase. The rising trend in prices reflects a demand boost due to greater availability of housing finance running

up against supply constraints, as land has increasingly become a fixed factor for many reasons. The entire 150-year period has been marked by boom and bust cycles around the trend. These also reflect episodes of demand momentum—due to cheap finance or reasonable or unreasonable expectations of higher incomes—meeting a sluggish supply response. Policy options to manage boom-bust cycles are monetary policy, fiscal policy, and macroprudential policy. No single policy can manage the risks to financial stability from house price booms and busts, but there is a strong view emerging that macroprudential policies should be the first line of defense while monetary policies may be a last resort.

In recent years, there is some evidence that house prices in major cities are diverging from the national average and that booms are often restricted to one or a few cities. Some examples of local booms are Vienna, Vancouver, Amsterdam and London, where house prices are rising far more than the national average. This increasing shift in the action to the city-level raises many issues that will require increasing attention from researchers and policymakers. First, there is limited evidence on the effectiveness of policies in containing local house price booms. This includes measures by several state and local authorities to deter foreign real estate investors, who they argue are fueling house price booms through their speculative behavior. Second, issues of housing affordability are much more salient at the city level. More generally, the focus on city-level developments has also brought to the fore the need to view housing markets through a broader lens of growth and economic development. Cities are essential for growth (Glaeser 2011), making policy actions to manage city level housing booms much more than just a matter of financial stability.

References

Abraham, J. & Hendershott, P. (1996). Bubbles in Metropolitan Housing Markets. *Journal of Housing Research*. Vol. 7, No. 2: 191-207.

Ahir, H. & Loungani, P. (2019). Managing House Price Booms: Evolution of IMF Surveillance and Policy Advice. A forthcoming chapter in Hot Property: The Housing Market in Major Cities. *Springer International Publishing*.

Ahir, H. (2016a). The Quest for Stability in Housing Markets. *IMF Research Bulletin*, March 2016. Washington: International Monetary Fund.

———. (2016b). Cooling Housing Markets: What Works?, *EconoMonitor*.

Andre, C. (2010). A bird's eye view of OECD housing markets. OECD Economics Department Working Papers, N° 746.

Bednarek, P. & te Kaat, D. M. & C. Ma & A. Rebucci. (2019). Capital Flows, Real Estate, and City Cycles: Bank, Firm and City Evidence from Germany". Manuscript.

Bordo, M. & Landon-Lane, J. (2014). What Explains House Price Booms? History and Empirical Evidence. *Macroeconomic Analysis and International Finance*, pp.1 - 36

Bracke, P. (2013) How long do housing cycles last? A duration analysis for 19 OECD countries. *Journal of Housing Economics*, Volume 22, Issue 3: 213-230.

Case, K. & Quigley, J. & Shiller, R. (2005). Comparing Wealth Effects: The Stock Market versus the Housing Market. *Advances in Macroeconomics*, vol. 5(1):1235-1235.

Case, K E. (2007). The Value of Land in the United States, in G K Ingram and Y-H Hong (eds.), *Land Policies and their Outcomes*, Cambridge: Lincoln Institute of Land Policy.

Cerutti, E., S. Claessens, and L. Laeven. 2017. "The Use and Effectiveness of Macroprudential Policies: New Evidence," *Journal of Financial Stability.* Volume 28, 203-24.

Cesa-Bianchi, A. & A. Ferrero & A. Rebucci. (2018). International Credit Supply Shocks. *Journal of International Economics*, Vol 112(C), 219-237.

Cesa-Bianchi, A. & L. Felipe Cespedes & A. Rebucci. (2015). Global Liquidity, House Prices, and the Macroeconomy. *Journal of Money, Credit and Banking*, Vol. 47, 301-335.

Claessens, S. (2015). Opening Remarks. *Journal of Money, Credit and Banking*, 47: 13-17. doi:10.1111/jmcb.12186

Claessens, S., Kose, A., & Terrones, M. (2009). What Happens during Recessions, Crunches and Busts? *Economic Policy*, 24(60), 653-700

Crowe, C., Dell'Ariccia, G., Igan, D., & Rabanal, P. (2011a). Policies for Macrofinancial Stability: Options to Deal with Real Estate Booms. *IMF Staff Discussion Note* 11/02 Washington: International Monetary Fund.

———. (2011b). How to Deal with Real Estate Booms: Lessons from Country Experiences. *IMF Working Paper*. Washington: International Monetary Fund.

Davis, M., & Heathcote, J. (2007). The Price and Quantity of Residential Land in the United States. *Journal of Monetary Economics* 54(8): 2595–2620.

Dell'Ariccia, G.i, Igan, D., & Laeven, L. (2008). Credit Booms and Lending Standards: Evidence from the Subprime Mortgage Market. *IMF Working Paper* 08/106. Washington: International Monetary Fund.

Eichholtz, P M. (1994). A Long-Run House Price Index: The Herengracht Index, 1628–1973. *Real Estate Economics* 25(2): 175–192.

Eitrheim, Ø., & Erlandsen, S. (2004). House Price Indices for Norway, 1819–2003, in Ø Eitrheim, J T Klovland, and J F Ovigstad (eds.), *Historical Monetary Statistics for Norway* 1819–2003, Oslo: Norges Bank, Norges Bank Occasional Paper 35.

Favara, G., & Imbs, J. (2009). Credit Supply and the Price of Housing. unpublished; HEC Lausanne Swiss Finance Institute.

Friggit, J. (2002). Long Term Home Prices and Residential Property Investment Performance in Paris in the Time of the French Franc, 1840–2011.

Geanakoplos, J., (2010). Solving the Present Crisis and Managing the Leverage Cycle. Federal Reserve Bank of New York Economic Policy Review (August). New York: Federal Reserve Bank.

Ghent, A., Torous T. and Valkanov, R. (2018), Commercial Real Estate as an Asset Class. Working paper, November 29.

Glaeser, E. (2011). Triumph of the City: How Our Greatest Invention Makes US Richer, Smarter, Greener, Healthier, and Happier. (Penguin Books).

Glaeser, E. & Ward, B. (2009). The Causes and Consequences of Land Use Regulation: Evidence from Greater Boston. *Journal of Urban Economics* 65(3): 265–278.

Glaeser, E.L., Gyourko, J. and Saks (Molloy), R.E., 2005, "Why is Manhattan so expensive? Regulation and the rise in housing prices. *The Journal of Law and Economics*, Vol. 48, 331-69.

Green, R., & White, M. (1997). Measuring the Benefits of Homeowning: Benefits to Children. *Journal of Urban Economics* 41:441–461.

Gyourko, J., Mayer, C., & Sinai, T. (2006). Superstar Cities. *American Economic Journal* 5(4): 167–199.

Hypostat (2018). A Review of Europe's Mortgage and Housing Markets. European Mortgage Federation. September 2018.

Igan, D. & Loungani, P. (2012). Global Housing Cycles. IMF Working Paper No. 12/217. Washington: International Monetary Fund.

International Monetary Fund. (2011). Housing Finance and Financial Stability—Back to Basics? Chapter 3 in *Global Financial Stability Report* (April). Washington: International Monetary Fund.

———. (2008). The Changing Housing Cycle and the Implications for Monetary Policy. Chapter 3 in *World Economic Outlook* (April). Washington: International Monetary Fund.

Jacks, D. & Pendakur K. (2010). Global Trade and the Maritime Transport Revolution. *Review of Economics and Statistics* 92(4): 745–755.

Jordà, Ò, Schularick, M. & Taylor, A. (2014) Betting the House. NBER Working Paper No. 20771.

Kahn, J. (2008). What Drives Housing Prices? Federal Reserve Bank of New York Staff Report No. 345.

Knoll, K., Schularick, M., & Steger, T. (2017). No Price Like Home: Global House Prices, 1870-2012. *American Economic Review*, 107 (2): 331-53.

Krieger, J. & Higgins, D. (2002). Housing and Health: Time Again for Public Health Action. *American Journal of Public Health* 92, no. 5 (May 1, 2002): pp. 758-768.

Laeven, L. & Valencia, F. (2012). Systemic Banking Crises Database : An Update. IMF Working Paper No. 12/163. Washington: International Monetary Fund.

Lecat, R. & Mesonnier, J. (2005). What Role do Financial Factors Play in House Price Dynamics? Banque de France Bulletin Digest No. 134.

Malpezzi, S. (1999). A Simple Error Correction Model of House Prices. *Journal of Housing Economics*, Vol. 8, pp. 27-62.

Mian, A & Sufi, A. (2009). The Consequences of Mortgage Credit Expansion: Evidence From the U.S. Mortgage Default Crisis. *Quarterly Journal of Economics*, Vol. 124, No. 4, pp. 1449–496.

Monnery, N. (2011). Safe as Houses: A Historical Analysis of Property Prices. London: London Publishing Partnership.

Poterba, James M., 1992, "Taxation and Housing: Old Questions, New Answers," American Economic Review, Vol. 82, No. 2, pp. 237-42.

Saiz, A. (2010). The Geographic Determinants of Housing Supply. *Quarterly Journal of Economics*.

Shiller, Robert. (2018). House price index (available at http://www.econ.yale.edu/~shiller/data.htm)

Stapledon, N. D. (2010). A History of housing prices in Australia 1880-2010. The University of New South Wales Australian School of Business, School of Economics Discussion Paper 2010/18.

Svensson, L. (2017). Cost-Benefit Analysis of Leaning Against the Wind. *Journal of Monetary Economics*. 90: 193-213.

———. (2014). Why leaning against the wind is the wrong monetary policy for Sweden. VoxEU.

Zhu, M. (2014). Housing Markets, Financial Stability and the Economy. Speech at *Housing Markets and the Macroeconomy: Challenges for Monetary Policy and Financial Stability*. Germany. 11 June 2014.