Housing price bubbles - a tale based on housing price booms and busts[1]

Thomas F Helbling[2]

I. Introduction

The recent stock market boom-bust cycles in industrial countries have rekindled the debate on the role of asset price fluctuations as a source of economic and financial instability and on their role in the formulation of monetary policy objectives and strategies (eg, Bordo and Jeanne (2002), Bernanke (2002), Cecchetti et al (2000), or Bernanke and Gertler (2000)).

At the current juncture, the focus has shifted from equity price to housing price bubbles, given striking recent price increases in this asset class in a number of industrial countries (IMF (2003)). However, large price increases – which will be referred to as booms – are only a sufficient but not necessary conditions for bubbles. Historically, many episodes of large asset price increases did not end in crashes – or busts, as they are frequently referred to. Similarly, some of the largest asset price busts were not preceded by booms. The purpose of this paper is to establish the main empirical regularities of housing price booms and busts in industrial countries over the last 30 years – the focus on booms and busts obviates the need to measure or explain "bubbles", which, as noted below, remains highly controversial. In particular, the paper will address the following questions:

- How frequent were housing price booms and busts? How often did housing price booms end in busts?
- What were the real consequences of housing price booms and busts? Were busts always associated with severe implications for economic activity? Were the implications of housing price boom-bust cycles different from that of other housing price cycles?
- What was the relationship between housing price boom-busts and interest rates? Were credit market conditions and housing price booms related?

With this focus, the paper aims to contribute cross-country evidence on an issue that has been addressed mostly from a national perspective only.[3] The value added of cross-country evidence is that it allows for the analysis of a much larger set of extreme events, as the number of asset price booms and busts in any particular country tend to be limited over a period of some 30-40 years. While policy issues are not addressed directly in the paper, the results will bear on the appropriate conduct of policies since the benefits of policy actions aimed at avoiding excessive asset price movements depend on the probability of asset price busts after a boom on the one hand and on the real and financial effects of busts on the other.

Some limitations to the analysis should be kept in mind before conclusions are drawn. The empirical regularities are derived by association using event analysis rather than by causal analysis. Also, the number of housing price booms and busts found in a sample of housing prices for 14 industrial countries for the period 1970-2001 is relatively small (20 or less). Finally, the paper focuses on housing prices only, mostly because of space limitations. Nevertheless, while housing prices and other

---

[1] This paper draws on Chapter II of the April 2003 *World Economic Outlook* (IMF (2003)) and on Helbling and Terrones (forthcoming). Both of these references analyse both equity and housing price booms and busts. The views presented in this paper are those of the author and should not be attributed to the International Monetary Fund.

[2] The author's e-mail address is: thelbing@imf.org.

[3] While several studies have documented the effects of asset price busts, they typically cover the experience of only particular countries. For instance, Ito and Iwaisako (1995) and Okina and Shiratsuka (2003) study the Japanese case, Carmichel and Esho (2003) document the Australian experience, and Mishkin and White (2003) study the American experience. Only Bordo and Jeanne (2002) have studied equity and housing price booms and busts for a panel of industrial countries. Borio and Lowe (2002) examine the relationship between financial crises and asset price booms in a cross-country context.

asset prices developments are connected given some substitutability between the two asset classes, the linkages between housing and equity price booms or busts are not stable. Events in the two asset classes do not always overlap and there is no evidence of stable lead-lag relationships in the timing of events (Helbling and Terrones (2004)). This, together with the importance of housing assets in household wealth, also provides some substantial justification for the paper's narrow focus.

II. Housing price booms and busts

Asset price bubbles refer to situations when asset prices exceed their fundamental value by seemingly large margins. While used frequently, the bubble concept is highly contentious, given strong disagreement about measurement and the analytical foundations. Differences in opinion regarding the measurement of bubbles concern the assumptions and models needed to quantify the unobserved expected future values of the fundamentals on which the fundamental asset price depends.[4] Disagreement on what explains bubbles revolve around the question whether they are just "rational" gambles or systemic problems that may require policy intervention.[5]

Despite the many unresolved issues and debates about asset price bubbles, there is widespread agreement that many periods of financial instability and crises in the past were associated with equity or real estate price boom-bust cycles, that is, large increases in asset prices and subsequent sharp drops (eg, Kindleberger (2000)). Given the experience of past episodes, large asset price increases are frequently taken as signals for a bubble in the making while large price decreases are considered evidence for a bubble burst.

In this spirit, this paper identifies large and persistent increases (booms) and decreases (busts) in the broad markets for residential housing. Our data set includes quarterly aggregate housing price indices for 14 industrial countries for the period 1970-2002. Given large variation in inflation rates, both over time and across time, inflation-adjusted, real housing price indices (using the CPI as a deflator) are used.

Drawing on methods developed in business cycle analysis, the procedure used to identify equity and housing price booms and busts involves the following two steps:

- *Determination of asset price cycles*. Turning points in the level of broad real equity and housing price indices define cycles in those prices. Bull and bear markets are the asset market equivalents of expansions and recessions. For example, during a bear market, which begins in the quarter after a peak quarter and ends in the trough quarter, prices generally fall. Following Pagan and Sossounov (2003), the turning points were determined using a slightly modified Bry-Boschan cycle dating procedure.[6]
- *Identification of booms and busts*. Based on the full set of bull and bear market episodes, booms (busts) were identified as those episodes with large price increases (decreases). To qualify as large, a price change had to be in the top (bottom) quartile of all recorded peak-peak (peak-trough) price increases (decreases) in the sample. Hence, one fourth of all bull and bear markets are considered booms and busts. The cutoff value of the top (bottom) quartile for the identification of booms and busts is, of course, arbitrary. Helbling and

[4] For example, McGrattan and Prescott (2001) argue that contrary to conventional wisdom, pre-crash stock prices in 1929 were not over- but undervalued according to their model.

[5] According to one view, the willingness of investor to buy assets at higher prices than justified by fundamentals must reflect "rational" gambles, as investors choose to speculate on future price increases even though they are aware of the bubble and the risk that may burst (eg, Flood and Garber (1994)). Others see bubbles as the outcome of a multitude of factors that change from episode to episode, including psychological factors such as exuberance, financial frictions arising because incomplete information and uncertainty about future events, biased expectations, unwarranted regulatory or tax incentives, and expansionary monetary policy (eg, Allen and Gale (1999), Kindleberger (2000), or Shiller (2000)).

[6] The dating algorithm identifies turning points in the log-level of real equity and housing prices by first searching the input data for maxima and minima in five quarter data windows and then picking pairs of adjacent, locally absolute maxima and minima that meet the rules for the minimal duration of cycles (five quarters) and phases (two quarters). Box 3.1 in the April 2002 *World Economic Outlook* explains business cycle concepts and measurement issues in more detail.

Terrones (forthcoming) examine the sensitivity of the main results with regard to this and other methodological choices and find that they are generally robust.

Peak-to-peak increases were used to identify booms since some of the larger trough-to-peak increases in the sample largely reflect corrections of earlier busts without any increase above trend. Unfortunately, however, using this metric for the identification of booms reduced the number of housing price cycles available, since the first turning point in many housing turned out to be a peak in the mid-1970s. Given relatively few housing price cycles in our sample, this was a matter of considerable concern, and the paper also uses cumulative housing price increases for the eight quarters up to a peak as a metric for the identification of booms.

It is worth noting that the two-step procedure does not require booms to be followed by busts, as the two types of events are determined independently.[7] This is appropriate, since the association between boom-bust cycles and bubbles is empirical only.[8] However, the overall number of booms and busts is the same (except for differences in initial observations), given that they are determined by the number of asset price cycles found in the sample.

In the sample, some 75 housing price cycles were picked up by the procedure. A typical cycle lasted about four years. During the bull market phase, which lasted not quite three years, real housing prices increased by about 11% (cumulative). In the subsequent bear market phase, which lasted just about one year, prices fall by about 6%. Hence, over a full cycle, inflation-adjusted prices increased, which is consistent with trend increases in housing prices that reflect quality improvement, demand for housing space that is increasing with per capita income, and other factors such a land scarcity.

Against this background, housing price increases in a boom were substantially higher, about 32% on average (Table 1). To qualify as boom, prices had to increase by at least 15% (peak-to-peak increases) or 19% (cumulative eight quarter increase up to a peak). The first metric also suggests that boom phases tended to last somewhat longer than regular bull market phases at about four years. Using price increases in the top quartile to identify booms yielded either 16 or 18 booms in the sample, that is, roughly one and a half booms per country in the sample over 30 years. However, two countries, namely Spain and the United States, did not experience a boom during the sample period.[9]

During housing price busts, inflation-adjusted housing prices fell by about 27%, that is, roughly five times as much as during a regular bear market (Table 2). Strikingly, with about four years, busts lasted much longer than average bear markets. As in the case of booms, our quartile-based approach implies roughly one and a half busts per country over three decades or one bust in 20 years. However, the experience across countries varied considerably. Three countries, the United States, Belgium, and New Zealand, did not record any housing price crashes during 1970-2001.[10] Others, including the United Kingdom, Sweden, and Switzerland experienced three busts. These differences may again reflect country-specific developments and factors, including regulations and financial system characteristics (eg, fixed rate versus flexible rate mortgages).

There is a strikingly low number of housing price boom-bust cycles in our sample if the peak-to-peak metric for booms is used. Only six out of the 16 booms ended in a bust (Figure 1), suggesting an unconditional probability of a boom ending in tears of not quite 40%. Moreover, quite strikingly, a bust after a below-average increase in housing prices during the bull market phase is almost as likely to occur as one after a boom. On the other hand, if the cumulative housing price increase for the eight quarters up to a peak is used as a metric, roughly two thirds of all booms ended in a bust (Figure 2). Moreover, with this metric, most episodes with below-average prices during bull markets were also characterised by small, that is, below-average price decreases.

---

[7] Bordo and Jeanne (2002) also use a procedure whereby booms and busts are determined independently.

[8] Allowing for disconnect is appropriate from a theoretical perspective as well, as bubbles need not burst.

[9] The analysis is based on completed housing price cycles only. At end-2001, some of the housing price bull markets or booms that began in the mid to late 1990s were still ongoing.

[10] In Belgium and New Zealand, the absence of a bust may reflect shorter series for the housing price indices. For the United States, there is evidence of regional housing price busts despite the absence of country-wide busts (eg, Chaplin et al (1997)).

Table 1

Housing price bull markets and booms

Median over all events in category

Metric	Number	Price change (percent)	Duration (quarters)
Peak-to-peak increases			
All bull markets	62	2.1	…
Booms only	16	32.7	16
1970s	4	51.0	
1980s	7	28.4	
1990s	5	30.4	
Cumulative eight-quarter increases up to peak			
All Bull Markets	71	8.2	8
Booms only	18	31.7	8
1970s	6	37.3	8
1980s	10	31.2	8
1990s	2	19.2	8
Memorandum:			
Trough - peak increases	*62*	*11.3*	*11*

Source: Author's calculations.

Table 2

Housing price bear markets and busts

Median over all events in category

	Number	Price change (percent)	Duration (quarters)
All Bear Markets	76	–5.7	5
Busts only	20	–27.3	16
1970s	9	–27.2	19
1980s	10	–30.1	16
1990s	1	–21.2	21

Source: Author's calculations.

How does the price behaviour during boom-bust cycles compare to other bull and bear markets (Table 3)? Median price declines in the bust phase are very close to those for all busts, implying that the bust phase of combined boom-bust cycles is not very different from that of other busts. Regarding price increases during the boom phase, the difference with regard to the general median in the category depends on the metric. According to the first metric, the price increases during booms in boom-bust cycles tend to be large compared to other booms while according to the second metric, the difference in price increases is relatively small. Overall, these results suggest that the notion of large price increases being reflective of exuberance needs to be considered with some caution. Rapid price increases over a short period appear to be better but obviously still imperfect predictors of bubbles than those occurring over a longer time period.

Table 3

Housing price boom-bust cycles

Median over all events in category

Boom metric	Number	Price change (percent)	Duration (quarters)
Peak-to-peak increases			
Boom	6	64.2	17
Bust		–31.6	16
Cumulative eight-quarter price increases up to peak			
Boom	12	29.4	8
Bust		–30.1	16
Memorandum:			
Peak-to-peak increases			
Other booms	*10*	*23.2*	*16*
Other busts	*14*	*–26.5*	*16*
Cumulative eight-quarterprice increases up to peak			
Other booms	*6*	*23.7*	*8*
Other busts	*8*	*–21.2*	*14*

Source: Author's calculations.

III. Housing price booms and busts and economic activity

Asset price booms and busts are generally assumed to have strong impact on the real economy. In particular, there is a presumption that the asset price movements are mirrored in the profile of economic activity, given the impact of asset prices on financial positions of firms and households, which in turns affects their savings and investment decisions through a variety of channels.[11] In addition, there is a presumption that the duration and magnitude of the increase in asset prices matter because they raise the vulnerability of the financial positions of households and firms to shocks (eg, Kindleberger (2000)). Accordingly, the magnitude of the declines in aggregate demand and output during the bust should vary inversely with the magnitudes of the price increase during the boom.

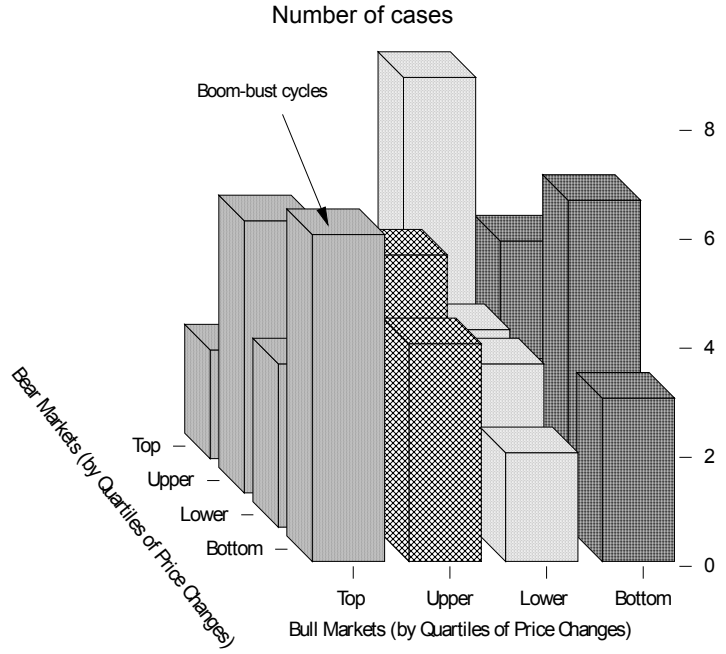
Are these presumptions relevant for housing price booms and busts? Does it matter whether busts were preceded by a boom? Following standard event study methodology, the behaviour of real GDP before and after a housing price bust (the event) is used as a yardstick to assess the effects of housing price busts and housing price boom-bust cycles on economic activity.[12] More specifically, the paper studies the median of the GDP growth rates associated with the selected booms and busts for 12 quarters before, during, and 12 quarters after a housing price peak (Figure 3).

[11] There are four main channels through which asset prices affect aggregate demand: (i) household wealth, which influences consumption; (ii) the market value of the capital stock relative to its replacement value, which influences fixed investment; (iii) balance sheets of financial intermediaries, other firms, and households; (iv) capital flows which affect demand through the real exchange rate. Prominent among these balance sheet mechanisms are the financial accelerator (asset prices determine values of collaterals) and the bank (insurance) capital channel. The latter operates through the effects of asset prices on intermediaries' equity positions, which in turn determine the amount of their intermediation services (eg, the amount of bank lending). Finally, large asset price change can also affect confidence and expectations.

[12] This methodology has been widely used in the literature to study a variety of events, including currency crises, debt crises, banking crises, current account reversals, and stabilisation programs, among others (eg, Freund (2000), Bordo and Jeanne (2002), Mishkin and White (2003) and Gourinchas et al (2001)).

Figure 1

Housing price bull and bear markets with peak-to-peak boom metric

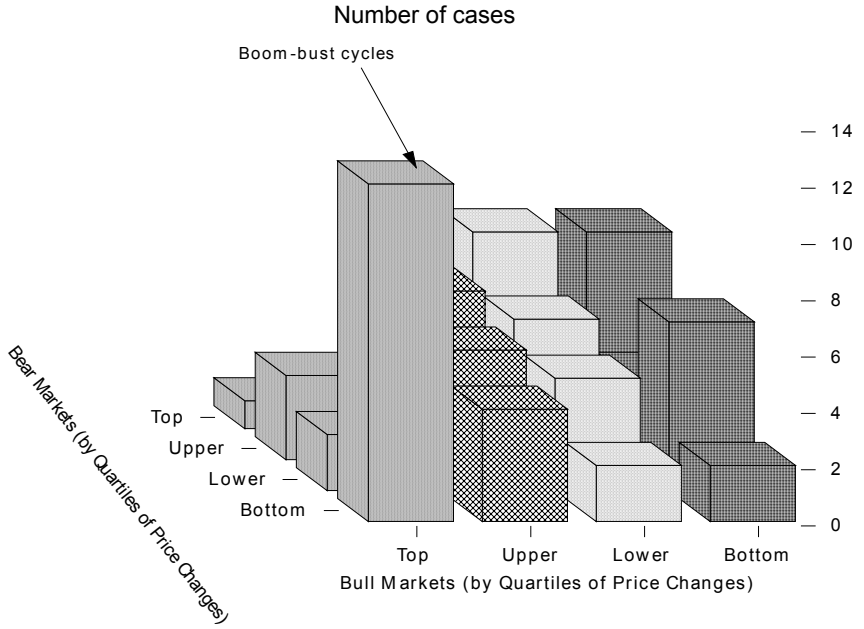


Note: The figure shows the combinations of market constellations for broad housing prices according to quartiles. Booms are defined by price changes in top quartile for bull markets while busts are defined by price changes in the bottom quartile.

Source: Author's calculations.

Figure 2

Housing price bull and bear markets with cumulative eight quarter increase boom metric



Note: The figure shows the combinations of market constellations for broad housing prices according to quartiles. Booms are defined by price changes in top quartile for bull markets while busts are defined by price changes in the bottom quartile.

Source: Author's calculations.

The evidence from the busts in the sample clearly suggests that housing price busts in industrial countries were associated with substantial negative output gaps, as real GDP growth decreases noticeably. On average, the output level three years after the beginning of a housing price bust was about 8% below the level that would have prevailed with the average growth rate during the three years up to the bust (about 6% if the average growth rate for all housing price bull markets were used).

The lower panel of Figure 3 shows the effects on economic activity of housing price bear markets more generally. Comparing output behaviour by quartiles of the price declines corroborates the notion that housing price busts are different when it comes to their association with economic activity. The output level three years after the beginning of a bear market in the lower middle quartile (that is, price declines in the quartile immediately above that for busts) is roughly where it would have been with the average growth rate during the three years prior to a bust, suggesting that regular housing price bear markets should not be of great concern to policymakers or investors.

In terms of timing, the beginning of the output slowdown after a housing price bust coincided roughly with the beginning of the bust itself. This is consistent with the finding that all but one housing price bust were associated with recessions (that is, declines in the level of economic activity), as the decline in prices began about three quarters before the fall in economic activity, that is, the level of real GDP (GDP growth rates begin declining about three to four quarters before the actual recession sets in).[13] As noted in Helbling and Terrones (forthcoming), the fall in output growth rates during busts typically reflects declining growth rates in all key components of private domestic absorption.

Combined housing price boom-bust cycles are of particular interest for reasons noted above. In the top panel of Figure 4, the median output behaviour during housing price boom-bust cycles is compared to that for other busts using both boom metrics applied in the paper. The median decline in output growth rates appears larger in the case of boom-bust cycles compared to other busts. After three years, the output loss is more than 7% for both boom metrics (loss relative to the output level if average growth rates during bull markets had prevailed). Nevertheless, the median output loss of about 5% for other busts is large enough for them to remain a matter of great concern.[14] Another striking difference is the pre-peak behaviour. In boom-bust cycles, GDP growth accelerates noticeably during booms while in for other cases, such a pattern is absent. This observation is consistent with the notion of overheating during booms.

Another issue concerns the indicator properties of housing prices as leading indicators for economic activity more generally. In the lower panel of Figure 4, output behaviour during boom-bust cycles is compared to that during booms followed by a regular bear market. Clearly, output behaviour is strikingly different, reinforcing the notion of regular housing price bear markets being associated with more benign output responses. This also highlights the problems of using large, persistent housing price increases as leading indicators.

IV. Housing price boom-busts, monetary policy and the financial system

Recent attention has focused on two aspects of the relationship between housing price booms and busts and the financial system. The first one concerns the relationship with interest rates. It has been argued that the striking housing price increases in some countries in recent years were a response to the sharp decreases in interest rates, as central banks eased their monetary policy stance during the downturn. The upper panel in Figure 5 shows the profile of nominal short-term interest rates before, at, and after peaks for housing price busts, comparing all busts with those preceded by a boom and those preceded by regular bull markets. Monetary policy tightening appears to have played a role in triggering housing price busts after booms, *as* short-term rates typically increased toward the end of a boom and remained high into the first year of a bust. This evidence reflects the fact that most housing

[13] It is worth noting, though, that not all recession during the sample period were associated with housing price busts. (See IMF (2002)).

[14] Naturally, formal testing is problematic given the few observations for each subgroup. Nevertheless, it should be noted that the difference in median output behaviour for the two types of busts is not statistically significant if the standard deviation for the entire sample of busts is used (see Helbling and Terrones (forthcoming), for details).

price boom-busts in the sample occurred during either the late 1970s and early 1980s or the late 1980s, when reducing inflation was an important policy objective. The disinflation increased the real burden of debt, which exposed inflation-related overinvestment and associated financial frailty.[15] The chart also suggests that interest rates were declining in the early stages of booms - a trend which would be even more recognisable if real rather than nominal interest rates had been used - a fact that highlight that favourable liquidity conditions tend to coincide with housing market booms. In contrast, there is no apparent linkage between short-term interest rate changes and other housing price busts.

Another crucial relationship is that between credit and housing price booms and busts. Borio and Lowe (2002) note that asset price booms tend to go hand-in-hand with credit booms. This partly reflects normal behaviour of credit, which tends to be procyclical. However, credit booms in conjunction with asset price booms also reflect the amplification of the real economy effects through the financial accelerator and other supply side mechanisms.[16] Finally, credit booms have also been associated with financial deregulation, particularly if the latter was not accompanied by adequate strengthening of regulatory and supervisory frameworks and appropriate macroeconomic policies. This was found to have been an important factor behind some of the housing price boom-busts of the 1980s, as substantial steps in that domain were taken in many industrial countries in the late 1970s and early to mid-1980s (eg, Drees and Pazarbasioglu (1998), Allen and Gale (1999), and BIS (2003)).

The evidence shown in the lower panel of Figure 5 confirms that credit booms tended to coincide with housing price boom-bust cycles but not with other housing price bull markets followed by a bust. In the former, private credit, as a percent of GDP, increased rapidly during booms before falling some time into the bust.

This finding is consistent with results discussed in IMF (2003), where the important link between housing price busts and credit markets was highlighted. Housing price busts had strong and fast adverse effects on the banking system and its capacity to lend, which, in turn, likely explains the relatively strong impact on economic activity. Moreover, in some cases, banks were affected by solvency problems after housing price busts. Indeed, according to the chronology of banking crises reported by Eichengreen and Bordo (2002), all major banking crises in industrial countries during the postwar period coincided with housing price busts.

V. Conclusions

The recent equity price bust has been a forceful reminder of how dramatic asset price reversals and their implications can be. This paper examined the main empirical regularities of housing price booms and busts in 14 industrial countries during 1970-2001. The evidence suggests that while housing price busts are infrequent events, they nevertheless occur frequently enough to be of great concern to policymakers and investors alike. Like other asset prices, housing prices do sometimes decline, especially when they are adjusted for general consumer price increases, notwithstanding frequent claims to the contrary. However, booms and busts are not as closely connected, as it is widely believed. Depending on the metric used to identify booms, only between two fifths and two thirds of all housing price booms in the sample ended in a bust. The paper also established that large housing price increases over several years need not be good indicators of forthcoming busts. Relatively rapid increases over a short period of two years or less appear to be better but still imperfect indicators.

Housing price busts coincided with sharp slowdowns in economic activity and, in all but one case, with outright recessions. They are thus costly from a welfare point of view. The paper also showed that the

---

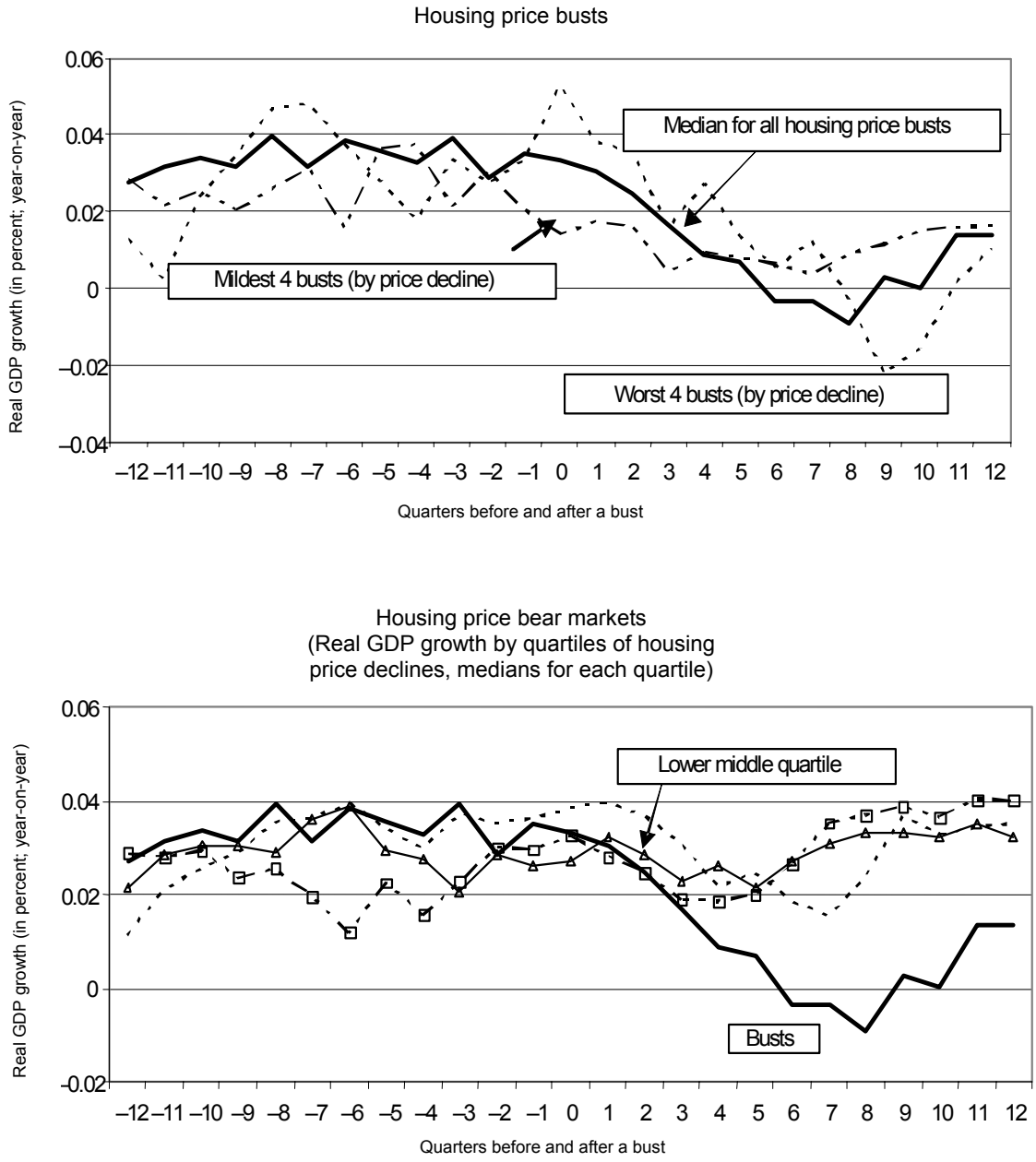
[15] Schwartz (1995) argued that sustained inflation encourages speculative investments, especially in real assets, because investors expect rising prices, which reduces the real value of their borrowing but not of their investments.

[16] The financial accelerator refers to the interaction between a borrower's net worth, which depends in part on asset prices, and the costs and availability of external funds relative to internal funds (cash flow from operations). A decrease in net worth increases the relative costs of external funds while an increase reduces these costs. Another important supply channel is the bank (insurance) capital channel, which operates through the effects of asset prices on intermediaries' equity positions, which in turn determine their supply of intermediation services (eg, the amount of bank lending). See Bernanke (1993) and Bernanke et al (1999) for surveys on how the financial sector transmits and amplifies shocks to the economy or asset prices.

downturns in economic activity tend to be more severe in the case of boom-bust cycles, although output gaps in the case of busts that were not preceded by booms were also substantial. Housing price busts after boom were associated with prior monetary policy tightening, reflecting the fact that most boom-busts occurred during either the late 1970s and early 1980s or the late 1980s, when reducing inflation was an important policy objective. Housing price booms were generally associated with credit booms while credit typically declined during busts. Overall, the main empirical regularities discussed in this paper underscore the need for policymakers and market participants to be cognisant of the risks associated with housing price booms and busts. They suggest that despite obvious limitations, housing prices should be monitored when it comes to assessing macroeconomic conditions and prospects or financial vulnerabilities.

Figure 3

Housing price declines and economic activity

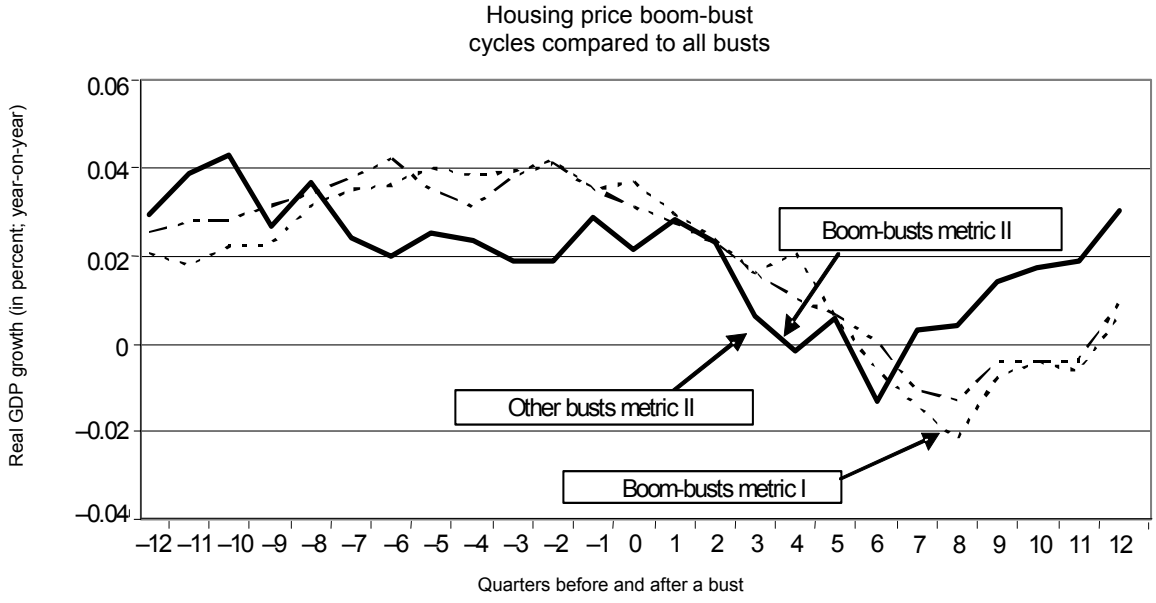


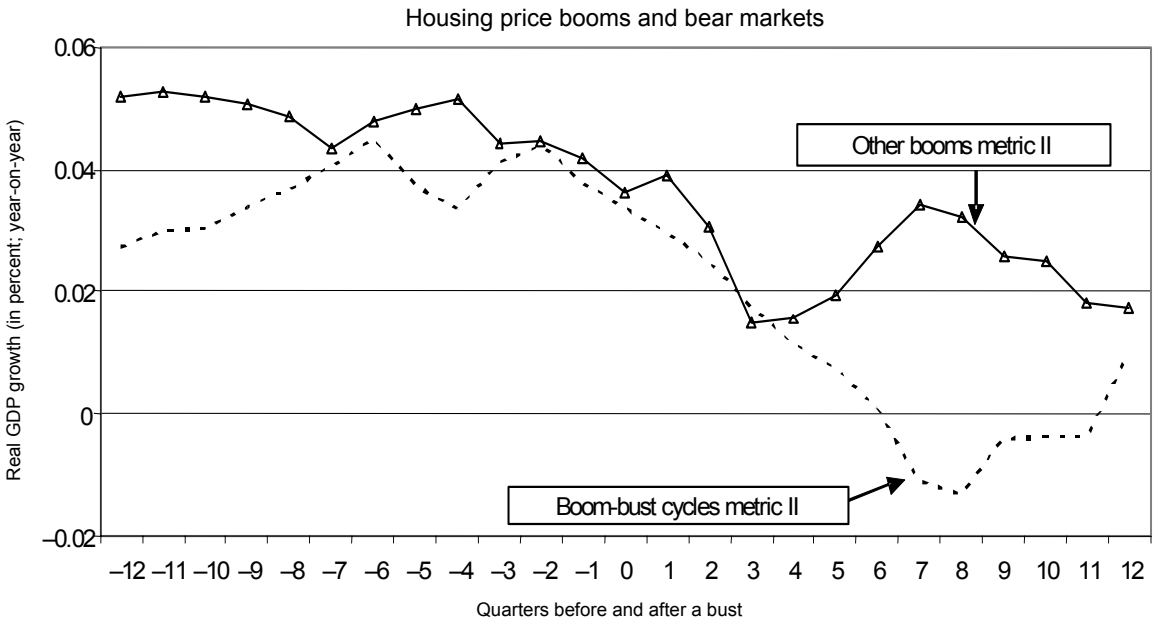
Source: Author's calculations.

Figure 4

Housing price boom-busts and economic activity

Medians over all events in categories



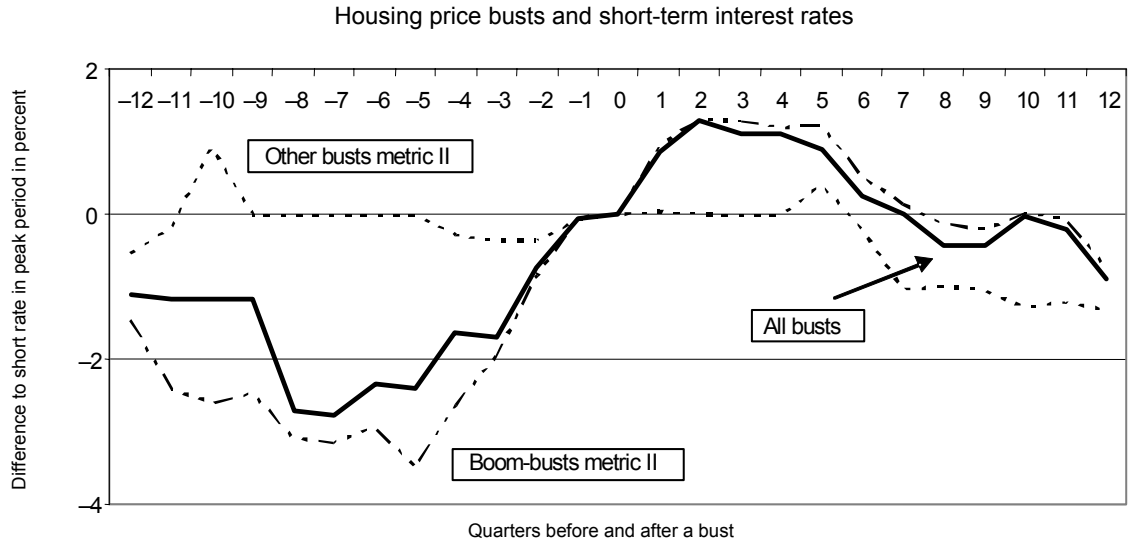


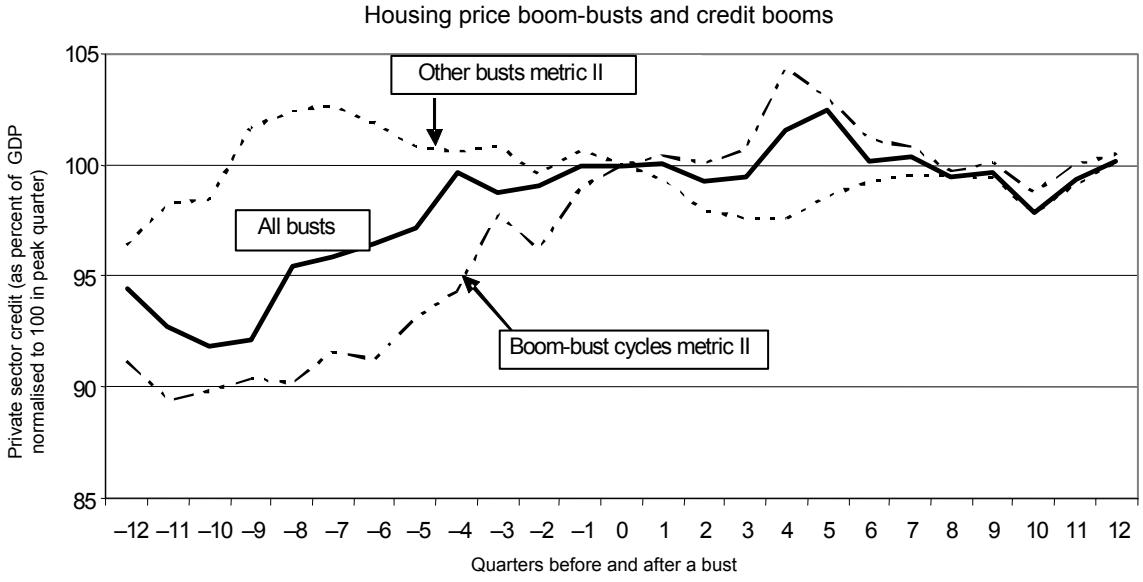
Source: Author's calculations.

Figure 5

Housing price busts, monetary policy and the financial system

Medians over all events in categories





Source: Author's calculations.

References

Allen, Franklin and Douglas Gale (1999): "Bubbles, crises, and policy", *Oxford Review of Economic Policy*, vol 15, Autumn, pp 9-18.

Bank of International Settlements (2000): "Turbulence in asset markets: the role of micro policies", Report by the Contact Group on Asset Prices, BIS, Basel.

Bernanke, Ben S (2002): "Asset-price bubbles and monetary policy", speech given before the New York Chapter of the National Association for Business Economists, 15 October (http://www.federalreserve.gov/boarddocs/speeches/2002/20021015/default.htm).

Bernanke, Ben S and Mark Gertler (2000): "Monetary policy and asset price volatility", *Federal Reserve Bank of Kansas City Economic Review*, vol 84, 4th Quarter, pp 17-51.

——— (2001): "Should central banks respond to movements in asset prices?", *American Economic Review*, vol 91, May, pp 253-57.

Bordo, Michael (2003): "Stock market crashes, productivity boom and busts, and recessions: some historical evidence", unpublished, International Monetary Fund, Washington.

Bordo, Michael and Olivier Jeanne (2002): "Boom-busts in asset prices, economic instability, and monetary policy", *NBER working paper,* no 8966, National Bureau of Economic Research, Cambridge, Massachusetts.

Borio, Claudio and Philip Lowe (2002): "Asset prices, financial and monetary stability: exploring the nexus", *BIS working paper*, no 114, Bank for International Settlements, Basel.

Carmichel, Jeffrey and Neil Esho (2003): "Asset price bubbles and prudential regulation", in William Hunter, George Kaufman and Michael Pomerleano (eds), *Asset price bubbles: implications for monetary, regulatory, and international policies*, MIT Press, Cambridge, Massachusetts.

Cecchetti, Stephen, Hans Genberg, John Lipsky and Sushil Wadhwani (2000): *Asset prices and central bank policy*, Geneva Report on the World Economy 2, Center for Economic Policy Research, London and International Center for Monetary and Banking Studies, Geneva.

Drees, Burkart and Ceyla Pazarbaşıoğlu (1998): *The Nordic Banking Crisis: Pitfalls in Financial Liberalization*, *IMF Occasional Paper*, no 161, International Monetary Fund, Washington.

Freund, Caroline L (2000): "Current account adjustment in industrialized countries", *International Finance Discussion Paper*, no 692, Board of Governors of the Federal Reserve System, Washington.

Gourinchas, Pierre-Olivier, Rodrigo Valdes and Oscar Landerretche (2001): "Lending booms: Latin America and the world", *Centre for Economic Policy Research Discussion Paper*, no 2811, Centre for Economic Policy Research, London, UK.

IMF (2002): "Recessions and recoveries", Chapter 2 of World Economic Outlook, April, International Monetary Fund, Washington, D C.

——— (2003): "Real and financial effects of bursting asset price bubbles", in *Chapter 2 of World Economic Outlook*, April, International Monetary Fund, Washington, D C.

Ito, Takatoshi and Tokua Iwaisako (1995): "Explaining asset bubbles in Japan", *NBER working paper*, no 5358, National Bureau of Economic Research, Cambridge, Massachusets.

Kindleberger, Charles P (2000): *Manias, Panics, and Crashes: A History of Financial Crises*, John Wiley & Sons, New York, 4th ed.

McGrattan, Ellen R and Edward C Prescott (2002): "The stock market crash 1929: Irving Fisher was right!", *NBER working paper*, no 8622, National Bureau of Economic Research, Cambridge, Massachusetts.

Mishkin, Frederic S and Eugene N White (2003): "US Stock market crashes and their aftermath: implications for monetary policy", in William Hunter, George Kaufman and Michael Pomerleano (eds), *Asset price bubbles: implications for monetary, regulatory, and international policies*, MIT Press, Cambridge, Massachusetts.

Okina, Kunio and Shigenori Shiratsuka (2003): "Japan's experience with asset price bubbles: is it a case for inflation targeting?", in William Hunter, George Kaufman and Michael Pomerleano (eds), *Asset price bubbles: implications for monetary, regulatory, and international policies*, MIT Press, Cambridge, Massachusetts.

Pagan, Adrian R and Kirill A Sossounov (2003): "A simple framework for analyzing bull and bear markets", *Journal of Applied Econometrics*, vol 18, Issue 1, pp 23-46.

Schwartz, Anna J (1995): "Why financial stability depends on price stability", *Economic Affairs*, vol 15, Autumn, pp 21-5.

Shiller, Robert S (2000): *Irrational Exuberance*, Princeton, Princeton University Press, New Jersey.