

Only in America? Must Housing Booms Always End in Housing Meltdowns?

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Abstract

The past decade has seen rapid growth in housing prices in many industrialised economies, fuelled by credit expansion. But only in the United States did this result in a large fall in housing prices and rapid increase in mortgage delinquency rates without a prior macroeconomic downturn driven by other factors. I examine the limited international evidence available, to ask how the boom-bust cycle in the US housing market differed from elsewhere and what the underlying institutional drivers of these differences were. Compared with other countries, the United States seems to have: built up a larger overhang of excess housing supply; experienced a greater easing in mortgage lending standards; and ended up with a household sector more vulnerable to falling housing prices. Some of these outcomes seem to have been driven by tax, legal and regulatory systems that encouraged households to increase their leverage and permitted lenders to enable that development. Given the institutional background, it may have been that the US housing boom was always more likely to end badly than the booms elsewhere. Policymakers need to be aware of these institutional differences when interpreting housing market developments, especially in the elasticity of housing supply.

1 Introduction

The past decade has seen rapid growth in housing prices in many industrialised economies. Much of this growth was fuelled by an expansion in credit. It is therefore understandable that many observers viewed these developments as unsustainable.

Now that the global economy is contracting and housing prices have begun to fall in some of these economies, there is likewise a tendency amongst some commentators to

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expect that the countries that experienced the largest cumulative increases in housing prices will experience the most painful busts.

In this paper, I provide some evidence against this view, and make two interrelated claims.

First, not all these housing booms were the same, and the outcomes of their reversals should not be expected to be the same. The boom-bust cycle in the US housing and mortgage markets differed from those in other countries in a number of important ways. Compared with other countries, the United States seems to have: built up a larger overhang of excess housing supply; experienced a greater easing in mortgage lending standards; and ended up with a household sector more vulnerable to falling housing prices. Some of these outcomes seem to have been driven by tax, legal and regulatory systems that encouraged households to increase their leverage and permitted lenders to enable that development. The differences in the turn of events are discussed in Section 2, and the underlying institutional background driving some of these differences is documented in Section 3. In these two sections, I mainly compare the US experience with that of a peer group of countries that also had housing booms in recent years, including Australia, Canada, Ireland, New Zealand, Spain and the United Kingdom, so far as data are available.

Second, there is nothing in the existing theory of housing markets or in empirical experience that should lead one to expect mean-reversion in ratios of housing prices to household income, relative either to individual countries' historical experiences or to ratios in other countries. Therefore, as discussed in Section 4, there is no reason to expect that the housing price booms in other countries would necessarily end in an autonomous meltdown. Sharp falls in housing prices have historically occurred after or in tandem with macroeconomic downturns and not instigated them; in this sense, they are not autonomous. Likewise, even when housing markets bust and prices have fallen, in the post-war period the associated increase in mortgage delinquency rates has not been so large as to put a sizeable fraction of households out of their homes, except for the current US episode. On both these counts, the current meltdown in the US housing market is unusual: the rapid downturn in prices and increase in delinquency rates and foreclosures occurred *before* the economy turned down, and the absolute increase in delinquencies and foreclosures has been very large compared with experience elsewhere or in past decades.

The policy implications of these observations are discussed in Section 5. The first of these is that home mortgage markets outside the United States were very unlikely to have been the trigger for a financial crisis. A large increase in household indebtedness could exacerbate the effects of a macroeconomic downturn sparked by some other shock. But the household sectors in non-US economies were unlikely to have been the initial source of such a shock.

The second main policy lesson is that housing markets are inherently prone to price cycles because the supply of housing stock is inherently sticky. Not all price booms are actually driven by speculative bubbles, at least initially, and it could be damaging to policy credibility to treat all such booms as being the result of bubbles.

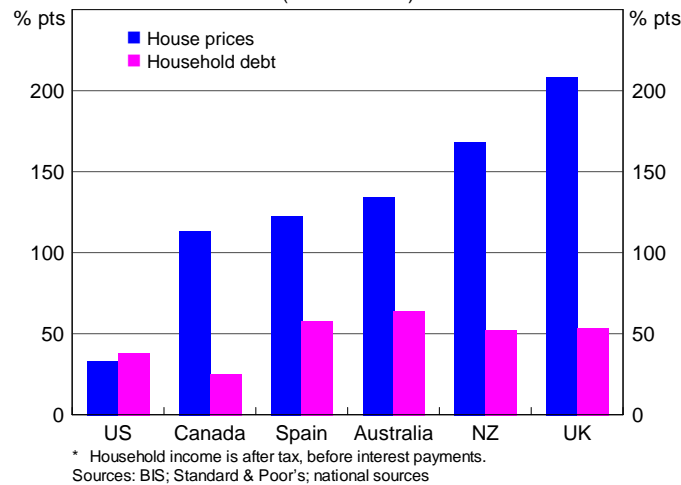
Another aspect of the stickiness of housing supply is that when extra supply does come onto the market, it remains in existence even if demand falls away again. This leads to the third main policy lesson, that housing markets can be vulnerable to the effects of a temporary excessive easing on lending standards for home mortgages. When lending standards ease in a way that is not sustainable, housing demand rises and extra homes are built. The extra supply will result in prices undershooting the earlier equilibrium when

lending standards tighten again. Economies with more flexible housing supply, such as the United States, therefore risk having more painful busts even though their boom phases look smaller viewed through the lens of housing prices.

2 What was different about the US boom and bust?

Figure 1 captures one commonly heard argument about the relative vulnerability of different countries' housing sectors to a boom-bust cycle: housing prices had not risen as much in the United States as in some other countries, so it can't have been as big a bubble as in those other countries.¹ Throughout the boom phase there were claims that the United States had become *less* susceptible to housing cycles over the years, because its mortgage finance system had become more national and less prone to regional shocks (McCarthy and Peach 2002, Schnure 2005). But that isn't how it turned out. Housing prices started to fall sharply and arrears rates rose significantly, long before the labour market turned down, as in past housing busts, and without a prior contraction in mortgage credit supply, as occurred in the latest UK downturn, for example.

Figure 1: House Prices and Household Debt
Percentage point change in ratios to household income*
(2000 to 2006)



The argument made in this paper is that the absolute increases in housing prices or their ratio to household income are not a sufficient statistic to assess deviations from fundamentals. Prices did not rise as much in the United States as in some other countries, partly because the US supply response is stronger. Moreover, the increase that did occur there was more fragile, driven by an unsustainable easing in mortgage lending standards.

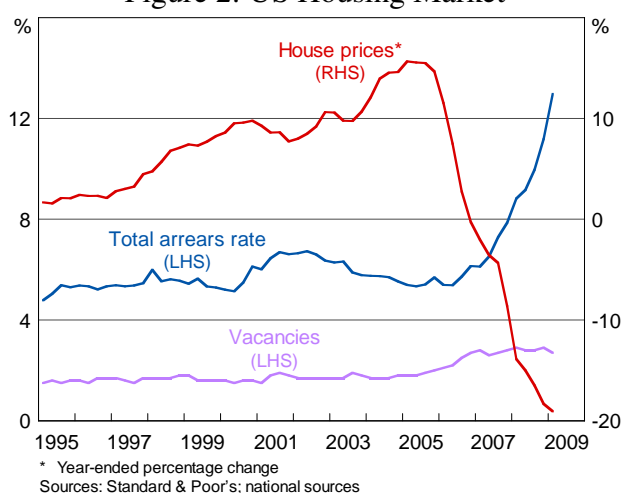
2.1 The construction boom created excess supply

The broad outline of the US housing bust is illustrated in Figure 2. House price growth began to slow in late 2005 and early 2006, around the same time as the stock of vacant, unsold homes started to rise. Housing construction peaked in early 2006, and housing starts

¹For example, the single-equation model used in the last few IMF *Global Financial Stability Reviews* involves a constant ratio between housing prices and income as the “medium-term anchor”. Popular commentary, for example in the *Economist* magazine, has used cumulated increases in housing prices quite explicitly as a metric of potential overvaluation.

had already fallen around 40 per cent by the end of that year. So far in 2009, housing starts are running at barely one quarter of the level seen in 2004 and 2005. Yet even a contraction of this size has not been enough to reduce the overhang of excess housing supply. The vacancy rate remains close to 3 per cent, roughly double the historical average and well above the peak rates reported over the previous fifty years.² The rate is even higher for homes built since 2000, suggesting that there is excess housing supply, brought about by earlier overbuilding.

Figure 2: US Housing Market



The ratio of housing construction to GDP was lower in the United States during the boom than in some other countries, such as Australia, Spain or Ireland. This led some observers to conclude that there was less of bubble in the United States than elsewhere. Yet there is little evidence of oversupply in these other countries. Time series data for vacancies only exist for the United States, but anecdotal reports and developments in rents suggest that vacancies are not rising noticeably elsewhere. The concern in those other countries has rather been *lack of supply*.³

What matters is not the absolute share of construction in GDP but how that relates to underlying demand for dwellings and the housing services they provide, which is determined by population growth, income growth and trend changes in household size (Egebo, Richardson and Lienert 1990). Ellis (2008a) presents graphical and econometric evidence suggesting that the flow of new dwellings (by number) into the US housing stock ran ahead of fundamentals in ways that were not seen in other boom countries. Unlike countries such Ireland and Spain, average US household size was not shrinking towards the developed-country average over this period. Thus there was no fundamental reason for the number of US dwellings built to run ahead of population growth as it did. In contrast to the United States, new housing construction barely kept pace with population and household formation in Australia and the United Kingdom.

Nor could the rate of new construction be reconciled to the growth in US household income, or even optimism about future income growth. As incomes rise, the average quality

²The vacancy rate is the Census Bureau's owner-occupier vacancy rate, defined as the number of homes that are vacant and for sale as a percentage of homes that are either owner-occupied or vacant and for sale.

³In the United Kingdom, the government commissioned the Barker Review of Housing Supply (Barker 2004). In Australia, concerns about housing supply and affordability led to inquiries by the Productivity Commission in 2003 (Productivity Commission 2004) and by a Senate Select Committee in 2008.

of new homes rises relative to those built in the past, and older homes offering lower levels of housing services are replaced. During the US housing boom, the quality of newly built homes increased much faster than in earlier periods when real household income growth had been faster. The median floorspace of newly built single-family homes increased at an average annual rate of around 1.6 per cent over the period 2000–2006, roughly double the rate seen over the 1990s. Unlike past and current booms elsewhere, though, the recent US housing boom did not seem to have any impetus from optimism about household income growth. Ireland and Spain have clearly been on convergence paths where a period of rapid growth in incomes could be expected; Australia and Canada have experienced large positive shocks to national income as their terms of trade have risen. Optimism about incomes growth (warranted or otherwise) also seems to have been one of the triggers of the booms in the United Kingdom, Australia and the Nordic countries in the late 1980s (Attanasio and Weber 1994, Drees and Pazarbasioglu 1998). No such optimism can be discerned either in the US household surveys or in the recent US data.

Figure 2 provides an additional sign that there was oversupply in the US housing stock: housing prices peaked before the economy turned down, and around the same time as vacancies started to rise. This clearly suggests that one reason for the downturn in prices was that the overhang of excess supply was weighing on them – in other words, the downturn was driven by factors internal to the housing market. In contrast, such declines as have been observed elsewhere seem to have been externally driven. For example, housing price growth moderated for four years in Spain before finally turning negative in the second quarter of 2008, and this only occurred after macroeconomic conditions had weakened considerably. Likewise, housing prices moderated in Australia and the United Kingdom in the mid-2000s without declining sharply. When UK housing prices did start to fall in earnest in last 2007, it was because the crisis had caused credit supply to contract severely.

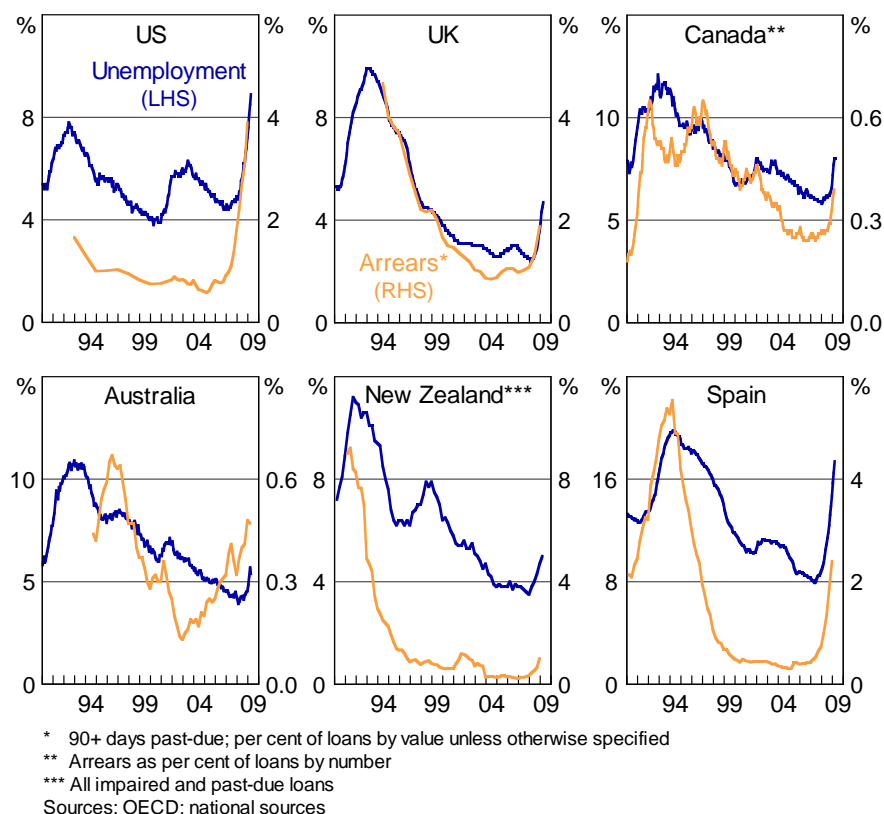
2.2 Arrears rates deteriorated *before* the US economy did

Figure 2 above also shows another key difference between the US housing bust and the downturns elsewhere. At the same time as US housing prices started to decline, arrears rates on mortgages began to increase rapidly across all market segments. After drifting up fairly gently since the end of 2004, both the Federal Reserve and Mortgage Bankers' Association measures of arrears experienced points of inflection in the third quarter of 2006. This was the same period that the Case-Shiller national house price index recorded its first quarterly fall of the current episode; the turning point in the serious (90-plus days) delinquency rate shown in Figure 2 was two quarters later. The increase took many observers by surprise, given that the increase occurred before the economy turned down and before credit tightened.

As the top left panel of Figure 3 shows, arrears rates started to rise rapidly at least a year before unemployment did. Even the arrears rate on prime mortgages increased by one-quarter between its trough in early 2005 and mid-2007, despite a decline in unemployment over this period. By the end of 2007, arrears rates were much higher than in the previous recession, and the increase has continued since then. All this occurred well before credit standards were tightened. The tightening in credit, especially the reduced availability of subprime and Alt-A loans, was a response to increasing delinquencies and defaults, not the initial impetus to them.

As Figure 3 also shows, this sequence of events is exactly the opposite to that seen either in previous housing busts or in the current downturns outside of the United States. Generally

Figure 3: Mortgage Arrears and Unemployment Rates



it takes a sizeable increase in unemployment before arrears rise much. Ellis (2008a) provides econometric evidence, using macroeconomic data for Canada, Spain and the United States, suggesting that rising arrears rates are associated with rising unemployment in previous quarters. In the current episode in the United States, though, housing price falls were more important. Because mortgage arrears data for Australia and New Zealand are not available for a whole economic cycle, the relationship with unemployment is difficult to pick up econometrically: movements in mortgage interest rates tend to show up as significant in simple macroeconomic regressions for Australia. Nonetheless, the data shown in Figure 3 do suggest that large swings in arrears rates are normally a result of macroeconomic fluctuations, and not instigators of them.

The scale of the increase in US arrears rates, relative to macroeconomic developments, seems extreme compared with the housing busts being experienced elsewhere. In the current housing busts in Ireland, Spain and the United Kingdom, arrears rates have risen, but only *after* the macroeconomies and labour markets had weakened, and the increases seem broadly in line with the historical relationships with unemployment. Indeed, the UK Council of Mortgage Lenders has revised down its 2009 forecast for home repossessions in that country.⁴

The current US experience is also at odds with its own history: although the United States did not experience a national housing downturn previously in the post-WWII period, several regions did. Even in those cases, it took a macroeconomic weakening before arrears rates started to rise significantly (Rosengren 2008).

⁴See <http://www.cml.org.uk/cml/media/press/2262>.

2.3 Lending standards eased more in the United States

Mortgage lending standards eased in many countries in recent years, but the limited available cross-country evidence does suggest that the process went further in the United States. Standards are difficult to measure because different aspects need not all move together (Gorton 2008, Bhardwaj and Sengupta 2008), but the observed increase in early payment defaults in the United States (but not elsewhere) provides direct evidence that it occurred (Kiff and Mills 2007); Gerardi, Lehnert, Sherlund and Willen (2008) provide further detail on the easing in lending standards.

That US mortgage lending standards eased more than elsewhere is also evidenced by a number of specific products and developments seen in the United States but not in other countries that experienced housing price booms over this period, or at least not to anywhere near the same extent. Only in the United States were negative amortisation mortgages available, along with “silent seconds” (undisclosed second mortgages) and downpayment assistance charities, often funded by vendors. Likewise, only in the United States did certain markers of fraudulent behaviour, such as appraisal fraud, the use of straw buyers, and the “renting” of credit scores, become so widespread.

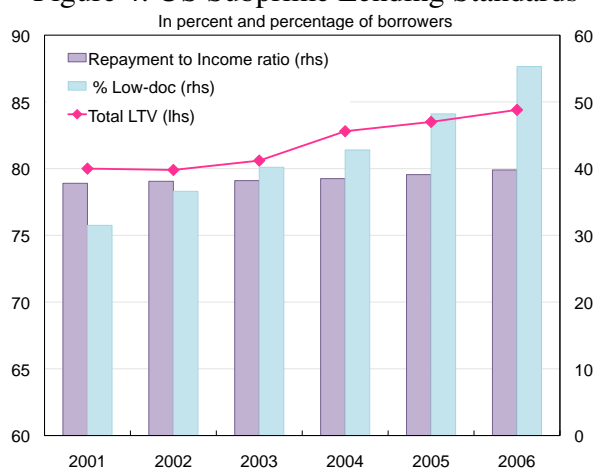
A major reason why US mortgage lending standards eased was that non-traditional subprime and so-called “Alt-A” mortgages became more important. These market segments expanded as specialist lenders, including the mortgage-lending subsidiaries newly acquired by major investment banks, pursued increased market share. Lending to “subprime” borrowers with worse credit records than “prime” borrowers by its nature constitutes an easing in lending standards. In addition, the loans offered by specialist subprime lenders have long tended to include features that worsen loan performance and boost default rates, such as prepayment penalties and balloon payments (Quercia, Stegman and Davis 2007).

On top of the shift towards lenders whose business models involved easier underwriting standards, the standards of individual lenders eased as well. First, and perhaps most importantly, requirements for documentation of income and assets became progressively laxer. Instead of assessing borrowers’ abilities to service their loans, lenders ended up focusing on collateral values, in effect betting on rising housing prices (Gorton (2008) makes a similar point).

Figure 4 shows that amongst securitised subprime loans, the share of 2001 originations that were “low-doc” stood at around 30 per cent. For the 2006 cohort, the share increased to more than half (Demyanyk and Van Hemert 2007). Amongst Alt-A pools of loans, the picture is even starker: only around 40 per cent of fixed-rate mortgages and one-quarter of Alt-A adjustable-rate mortgages (ARMs) had full documentation as at May 2008. While low-doc (self-certified) mortgages are available in the United Kingdom and Australia, they have been much more prevalent in the United States. In 2005, low-documentation loans represented around 10 per cent of new and 5 per cent of outstanding mortgages in Australia (RBA 2005), compared with more than one quarter of US mortgages originated in recent years, as the above-mentioned figures imply.

Figure 4 also shows that loan-to-valuation ratios (LTVs) also increased substantially over the boom period. This development was not unique to the United States: mortgages for 100 per cent or more of valuation also became more common in the United Kingdom and the Netherlands in recent years, for example. But even in these countries, borrowers with initially high LTV ratios remained a small minority of the total during the first half of this decade (Benito 2006).

Figure 4: US Subprime Lending Standards



Source: reproduced from Table 1 in Demyanyk and Van Hemert (2007)

While easier standards in terms of documentation and LTVs were arguably partly compensated for by requiring higher credit scores for these loans (Bhardwaj and Sengupta 2008), this trade-off probably made the overall subprime mortgage loan book more resilient to idiosyncratic income shocks (as captured by FICO scores), but less so in the face of lower housing prices. Falling housing prices were implicated in many of the early defaults on US mortgages recently (Haughwout, Peach and Tracy 2008). The trade-off in lending standards might have seemed reasonable given credit risk assessments using historical data that only covered periods of rising prices. Allowing for the risk of falling housing prices, though, this shift should be interpreted as a net easing even within the subprime market.

As mentioned earlier, some of the easing in standards took the form of mortgage products and practices not seen outside the United States. Negative amortisation loans (often known as Option ARMs) became quite popular, accounting for 7.3 per cent of securitised purchase loans originated in the first quarter of 2007 according to LoanPerformance data. (A further 33.7 per cent were interest-only, a much higher fraction than in other countries.)

Another practice apparently not seen outside the United States was the use of so-called “silent second liens”. These are piggyback loans that were not disclosed to the originator of the first mortgage. Piggyback loans (second mortgages taken out at the same time as the first), disclosed or otherwise, became increasingly common during the boom years (Avery, Brevoort and Canner 2007, GAO 2007), in part because they were more attractive than paying for mortgage insurance (see Section 3.2). Many US households were able to obtain 100 per cent financing in this way. In other countries, explicit (insured) 100 per cent financing is normally necessary. An increasing fraction of US borrowers with piggybacks did not disclose them: by 2006, more than one-quarter of securitised subprime and nearly 40 per cent of securitised Alt-A first mortgages had a silent second, according to LoanPerformance data, compared with much less than 1 per cent of subprime and Alt-A loans originated in 1999 (Ashcraft and Schuermann 2008). It seems likely that many first mortgages originated during the boom were mispriced, because the originator did not know the borrower’s true loan-to-valuation ratio, and thus their true risk.

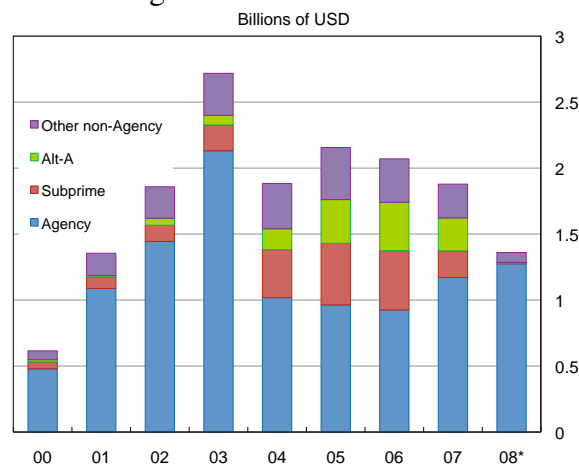
Third-party contributions to fund downpayments are another US-specific practice that seems to have become widespread during the boom, especially for more marginal borrowers. Until the practice was finally banned by the *Housing Rescue and Foreclosure Prevention Act* of 2008, seller-financed downpayments were involved in one-third of the Federal

Housing Administration’s (FHA) insured portfolio (Montgomery 2008). Downpayment assistance raises effective LTVs; where the assistance is provided by vendors, sometimes channelled via charities, it also seems to be associated with prices being inflated by the amount of the assistance (Concentrance Consulting Group 2005). Unsurprisingly given the potential for price inflation, such loans are three times more likely to go into foreclosure than other FHA mortgages.

Two developments seem to have spurred this easing in US standards. First, a range of legislative and policy changes had been made to encourage the development of a non-conforming (Alt-A and subprime) lending sector, lying outside the model defined by the government-sponsored enterprises (GSEs, Fannie Mae and Freddie Mac). Part of the motivation for this was a desire to ensure that home ownership was accessible to households who had historically been under-served by mortgage lenders (Gramlich 2007). In addition, the administration had wanted to reduce the GSEs’ domination of the mortgage market. Following problems with accounting and governance at both institutions, the GSEs’ capacity to expand lending was capped by new regulatory limits on their activities (Kiff and Mills 2007).

Second, origination volumes had fallen following the end of the the refinancing wave of 2003. The low rates on long-term fixed-rate mortgages available in 2003 had allowed borrowers to cut their interest rate significantly. Total originations peaked at around \$4 trillion, with mortgage-backed securities (MBS) issuance not much less than that (Figure 5). As a result, around half the outstanding mortgage stock turned over through moving or refinancing in that year. According to the Federal Reserve’s 2004 Survey of Consumer Finances, 45 per cent of households with a first mortgage had refinanced within the previous three years (Bucks, Kennickell and Moore 2006). Once rates stopped falling and the refinancing wave ended, though, lenders faced a substantial decline in fee income, and the industry would have shrunk if new business had not been found. Lenders seem to have responded by easing underwriting standards to attract new borrowers.

Figure 5: US MBS issuance



In trillions of US dollars; * Figure for 2008 is for the first quarter, annualised.
Source: UBS

2.4 US households were more prone to end up in negative equity

A key reason why US mortgage arrears rates rose so rapidly and to such an extent was that lending standards eased in particular ways that enabled high initial and ongoing LTVs.

If homeowners can no longer pay their mortgages, because of a negative income shock, but they still have positive equity in their homes, they can sell or perhaps refinance. These options are not available to borrowers with negative equity, so they can only default.⁵ If more households have very high LTVs at the peak of housing prices, the larger is the fraction of households that will fall into a negative equity position given a fall in prices of a given size; Ellis (2008b) provided quantitative illustrations of how important this effect can be. As a result, more households will be liable to default if they run into repayment difficulty. This is the situation that US households found themselves in to a much greater extent than in other countries.

Current LTV ratios for mortgages that were not originated recently can often only be calculated approximately. Houses that are not currently on the market will not have a recent market price to refer to; appraisals might also contain some estimation error. No comprehensive, official data sources exist on current LTV ratios for existing borrowers. Nonetheless, private-sector estimates suggest that as many as one in every ten US mortgage borrowers are in negative equity, much higher than the experience of current and past housing busts in other countries.⁶ Macro-level flow of funds data also imply that a sizeable minority of US households must have had very little equity in their homes, even at the price peak. The average gearing on the US housing stock rose steadily over the period 2000–2006, exceeding 50 per cent by the end of 2007 as prices fell; this is almost double the ratio in Australia.

The unusual prevalence of negative equity in the United States could have been driven by several factors. Firstly, because of the pattern of frequent refinancing, the stock of outstanding mortgages is quite young and borrowers have had little time to pay down principal. Even with a normal amortising mortgage, the principal is only paid down slowly in the first few years. Secondly, as was noted above, interest-only and negative amortisation loans seem to have been more common in the United States than elsewhere in recent years. Their popularity has meant that more households could have higher ongoing LTV ratios for a given starting LTV ratio. They were therefore more likely to fall into negative equity if house prices fell.

Negative amortisation products – commonly known as Option ARMs or Pay-Option ARMs – are particularly prone to sending borrowers into negative equity if prices stabilise or fall (Ellis 2008b) and have been pointed out as a primary driver of the deterioration in the performance of Alt-A category mortgages. Borrowers of this type of mortgage can nominate a payment which does not even cover the interest. Any shortfall would be capitalised into the loan balance, up to a pre-specified limit relative to the original loan size. At that point, the required payment would be recalculated (“recast”) to be the amount needed to fully amortise the loan over the remaining term. On top of the payment shock effects of these recasts, which are still largely in the future at the time of writing, negative amortisation products imply a greater risk of default because they can end up in negative

⁵Most current academic literature on mortgage default accepts that a pure equity model of default does not fully describe homeowner behaviour: households do not normally treat their mortgage as having a put-option to default. Empirical research has generally found that borrowers default far less often than the pure option-theoretic model would predict (Vandell and Thibodeau 1985, Vandell 1995, Foote, Gerardi and Willen 2008) and that trigger events – such as changes in the ability to pay – influence borrowers’ decisions to default (Kau and Keenan 1995, Duygan and Grant 2006).

⁶For example, the Bank of England estimated that less than 5 per cent of UK households with mortgages (and an even smaller proportion of all households) would end up in negative equity following a fall in prices 20 per cent from the peak in late 2007 (Bean 2008).

equity even if housing prices do not fall. All that is required is that housing prices rise by less than the rate of interest capitalised during the negative amortisation period.

Another factor that could have driven the apparently high prevalence of negative equity was that the boom-bust cycle was concentrated in a few areas. The incidence of negative equity depends on the number of borrowers in the tail of the distribution where the fall in prices exceeds the percentage of the home's value they had in home equity when prices peaked. A small price fall on average will result in more borrowers falling into negative equity if the distribution of price falls includes a tail of extremely large falls, than if the price fall is more evenly distributed. Thus the national price indices probably understate the percentage of households with negative equity in the most affected areas. The overall incidence might therefore be greater than simulations using national data imply. Again, this seems to have been a particular issue for the United States.

3 How did the underlying institutions differ?

3.1 Supply of new housing is relatively flexible

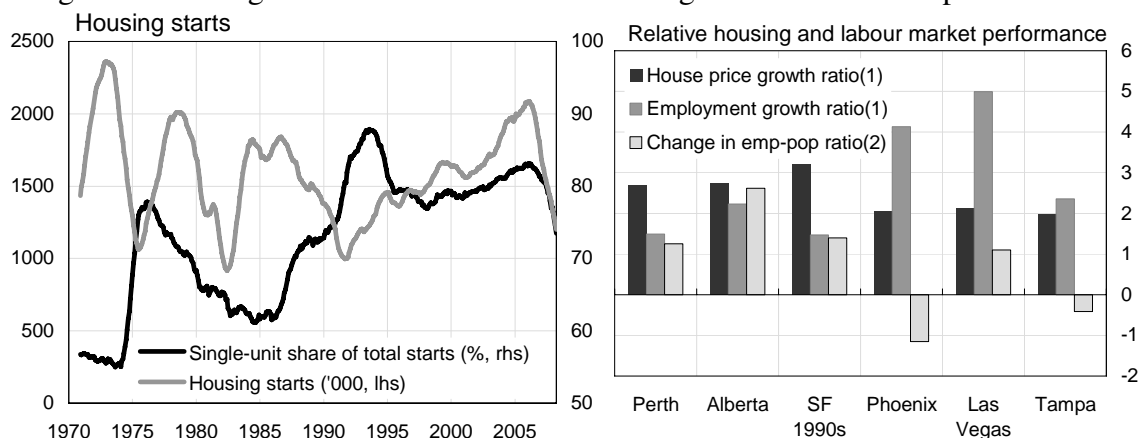
The build-up of oversupply US housing documented in Section 2.1 likely resulted from cross-country institutional differences. Essentially, the elasticity of housing supply is higher in the United States than in countries such as the United Kingdom, and the long-term response is less drawn out than in Australia. With a larger quantity response, housing prices rise by less in the face of a given increase in demand for housing. Normally, this flexibility is held to be a good thing because it limits the price overvaluation that can occur when demand for housing increases quickly, given inherently sluggish supply. When the increase in demand is temporary, however, for example driven by a temporary easing in credit standards, it is not so obvious that this supply flexibility is unreservedly beneficial.

One reason why the US supply elasticity is relatively high is that less of the housing stock is subject to tight zoning laws and other restrictions that are widely held to restrict supply and boost housing prices (Glaeser and Gyourko 2003). While such restrictions are important in a number of high-cost, mainly coastal centres in the United States, in many inland regions, new supply is relatively unrestricted. Regions with tighter zoning restrictions also tend to be the ones where geographical constraints on building (oceans, steeply sloped areas) are greatest (Glaeser, Gyourko and Saiz 2008), so the pattern of supply elasticities would probably exist even without zoning laws.

In the most recent US housing boom, the increased demand for housing did seem unusually concentrated in regions where supply could accommodate it most rapidly, namely as single-family homes built in exurban regions such as southern California's Inland Empire, or the regions around desert state cities such as Phoenix (Arizona) and Las Vegas (Nevada). Indeed, in contrast to the 1980s boom (Glaeser *et al* 2008), recent evidence suggests that the "bubble" component of US housing prices was greatest in some cities, such as Las Vegas, where the elasticity of housing supply is higher than the national average (Goodman and Thibodeau 2008). Other centres such as Atlanta had relatively small price booms, because supply could respond, but have not thereby avoided the subsequent bust. By contrast, in high-demand coastal cities, prices rose but there was little pick-up in housing supply and, significantly, subprime and other non-conforming lending was much less prevalent (Mayer and Pence 2008).

Figure 6 (left-hand panel) shows how unusual the recent US housing supply cycle was relative to those of the past. In past upswings, the single-family share of housing starts

Figure 6: Housing construction and relative housing and labour market performance



Figures for Perth (Australia) and Alberta (Canada) are for January 2003–December 2007; for San Francisco, January 1997–December 2000; for Phoenix, Las Vegas and Tampa, January 2002–December 2006. Employment growth and change in employment to population ratio for Las Vegas refer to Nevada state.

(1) Ratio of percentage change in house prices / employment over period, to corresponding percentage change for the whole nation.
 (2) Difference between change in employment-population ratio for the city/region and that for the whole nation, in percentage points. Population figures are whole population, not working-age population.

remained fairly steady. It only ratcheted up during the subsequent downswing in overall activity, as condominium projects were canceled disproportionately. Over the period 2000–2006, however, both housing starts and the single-family share within them rose, pointing to an unusual concentration of the increase in suburban and exurban regions.

Data limitations, especially on city-level construction costs, preclude a cross-country comparison of city-level supply elasticities along the lines of Goodman and Thibodeau’s (2008) results for the United States. Nonetheless, the right-hand panel of Figure 6 provides some suggestive evidence that the apparently regional booms reflected US households moving where the houses were, rather than being motivated by more traditional labour market incentives. The first three cities/regions in that panel show the patterns that emerge when a particular city or region experiences a regionally specific demand shock that encourages inward migration. In the case of Perth (Australia) and Alberta province (Canada), the shock is the current mining boom (2003–end-2007). For San Francisco in the 1990s, the shock was the tech boom (1997–end-2000). In each of these cases, housing prices rose more rapidly than the national average: the cumulated growth over the boom period was more than double that of the nation as a whole. Employment and population growth also exceeded the national figures. But the source of the inward pull is also clear: even though the ratios of national employment to total population increased by around 2 percentage points over these periods, the employment-population ratios in Perth, Alberta and San Francisco increased even more.

By contrast in the three cities on the right of the panel – Phoenix, Las Vegas and Tampa, Florida – housing prices also rose at around double the national rate over the period 2002–2006, despite the housing stock expanding substantially over the same period. All three cities were attracting large numbers of new residents: employment increased by around 20 per cent in Phoenix and nearly one-quarter in Las Vegas, compared with 5 per cent nationally. However, the employment-population ratio increased by only 1.2 percentage points in Las Vegas, and actually fell in Phoenix and Tampa (the national ratio was broadly flat over this period). New homes were being built to house the new residents, but the picture seems to be that these new households were going to where the new, higher-quality

homes were, rather than being pulled to a region of high job opportunities, perhaps because many of them were already retired. This was probably further encouraged by the apparently high geographic mobility of the US population.

No wonder that the housing price boom was initially characterised as being regional in nature (Greenspan 2005, for example). With hindsight, a better characterisation might have been of strong demand for housing nationally, stimulated by easier credit, that manifested itself where supply could accommodate it the most. By concentrating the increases in both demand and supply geographically, the US institutional and geographical structures seem to have maximised the potential for build-up of excess supply in at least some regions. Now that the boost to demand from easier credit has been withdrawn, prices have fallen substantially in these regions, but oversupply still seems in evidence.

3.2 Tax system encourages higher leverage and flipping

In the United States, interest on mortgages for owner-occupied homes is deductible against income tax. The imputed rent from owning one's home and not paying rent to a landlord is likewise free of tax. Both of these aspects of the tax system encourage households to buy their own home. The US system differs from many others in that it has both features: only Spain comes close, and the tax credits there do not apply to all borrowers.⁷ Numerous countries – including most other English-speaking countries – do not tax imputed rent, but do not allow interest on owner-occupied mortgages to be deducted. In countries such as Switzerland and the Netherlands, mortgage interest can be deducted against tax, but households also pay tax on the estimated imputed rent or the value of the home. In either case, the implicit subsidy to homeownership through the tax system is less than in the United States, though by how much depends on the relative tax rates and the way that imputed rents are calculated.

Encouraging home ownership has long been an explicit policy goal in the United States, so these differences in taxation arrangements are not surprising. But they have resulted in US households having less incentive to pay off an owner-occupied mortgage quickly. Because they are paying it out of pre-tax, not post-tax, income, they are more likely to find it worthwhile to borrow against their homes and accumulate more non-housing assets. The value of prepaying a mortgage ahead of schedule is also lower than if the interest is non-deductible. US households therefore have more incentive to keep the loan-to-valuation ratio high on an ongoing basis. This might explain some of the differences described in the previous sections, namely that interest-only mortgages are more prevalent and that negative equity became very common. Mortgage interest was also tax-deductible in the Nordic countries at the time of their credit booms in the 1980s; this is thought to have contributed to the boom in household borrowing there (Drees and Pazarbasiouglu 1998).

These differences interact with the greater tendency to refinance described below in Section 3.6. When mortgage interest is paid out of pre-tax income, the opportunity cost of refinancing the mortgage to a higher amount is less than if interest cannot be deducted. As the boom wore on, it seems that many households were repeatedly refinancing to liquify the increasing value of their homes. Even some long-standing home owners were left with little equity cushion.

These tax arrangements also imply that speculative demand is more likely to manifest as “flipping” (buying and selling soon afterwards), rather than renting the property out to a

⁷See Ellis (2008a) for a table documenting these details. Although not all US taxpayers itemise deductions (Himmelberg, Mayer and Sinai 2005), it seems reasonable to suppose that the marginal borrower does.

tenant. In contrast, in countries where mortgage interest is deductible against rental (and maybe other) income for a buy-to-let property, but not for an owner-occupied property or second home, it is preferable to actually let the property out. An inability to rent the property out will therefore constrain the incentive to speculate in property, even if expected capital gains are still strong. By contrast, where speculation in property occurs through flipping, as in the United States, an overhang of excess housing can build up before lower sale prices signal this fact to investors. This could take some time, given time-to-build lags and the noisy price signals coming from heterogeneous individual properties.

This is not to say that speculative demand from buy-to-let investors has played no role in housing price booms elsewhere. Small property investors have been identified as an important driver of demand in the booms in Australia (RBA 2003) and the United Kingdom. Even so, because landlords in these countries have to make the property available for rent to claim the tax deduction, they received earlier signals about excess supply by being unable to find a tenant or by observing falling rents. Flippers, by contrast, will only learn that excess housing supply is building up once they or other investors start trying to sell the properties again, and prices start falling; this is especially true if they are concentrated in newly built districts with few comparable sales early on.

Even apparently small details of the tax system can influence outcomes in the mortgage market and hence credit quality. Avery *et al* (2007) point out that one reason for the popularity of piggyback second mortgages in the United States might be that interest payments on these mortgages are separately tax-deductible, while borrower payments for lenders' mortgage insurance were not, until recently. Borrowers who could only make a small downpayment, especially those in higher tax brackets, would therefore prefer to take out a piggyback loan than mortgage insurance for the whole amount, even if the cost of the higher interest rate on the piggyback was the same as the insurance premium.

3.3 Legal system is swift but generous to defaulters

Households' decisions to default on their mortgage, and the financial sacrifices they are willing to make to stay current, are clearly related to the sanctions they face on default. In a pan-European comparison, Duygan and Grant (2006) found that the propensity to fall into arrears or to default in the face of an adverse income shock is closely related to the punishment incurred by doing so, which in turn depends on the legal framework.

The United States has long had a reputation for penalising defaulters less than elsewhere. It has a relatively generous bankruptcy system (a federal matter), though this was tightened in 2005. Indeed, under the law prevailing when arrears began to rise, mortgage debt could not be reduced as part of a bankruptcy agreement. Foreclosure law varies across states (Crews Cutts and Green 2004). It is often assumed that home mortgages are non-recourse in the United States – in other words, if the borrower defaults, the lender gets the home as collateral, but cannot pursue the borrower for any deficiency between the home's value and the remaining debt. In fact, deficiency judgements are possible in 44 of the 50 states, and in at least one of the six with non-recourse mortgages (California), this only applies to purchase mortgages and not refinancing. On paper, the US system therefore resembles those in countries such as the United Kingdom, where borrowers retain personal liability for the debt.

In practice, however, lenders tended not to seek deficiency judgements because they were seen as costly relative to the value that might be recouped. Around half of all US states (and of the states that prohibit deficiency judgements, all bar South Dakota) have a

non-judicial foreclosure process – generally quicker and cheaper than systems where court action is required. Many lenders would take the view that it would be better to retrieve the collateral alone in a lower-cost process, than to incur the legal costs of pursuing defaulting borrowers for any deficiency.

The US foreclosure process also seems somewhat swifter than in some other countries. According to the data compiled by Crews Cutts and Green (2004), foreclosure proceedings can start in three months or less in half of all US states, and the minimum delay exceeds six months only in Illinois and Vermont. The limited data available suggest that lenders in other countries must wait longer on average to start and to complete foreclosures and repossessions (Committee on the Global Financial System 2006). Delinquency data for the United Kingdom show that some lenders will still hold mortgages that have been delinquent for over a year.

The legal and mortgage systems in the United States have therefore interacted to produce a different tradeoff between speed and full asset recovery than elsewhere. As a result, when house prices are rising, many US lenders' incentives are tilted more strongly in favour of lending on the basis of collateral rather than affordability, than those of lenders elsewhere. If it turns out that the borrower cannot afford to repay the loan, the lender can access the collateral relatively quickly in at least half of all US states. Taking this together with differences in consumer protection regulation of mortgage lending itself, as described below in Section 3.5, it is no surprise that a lending sector with a collateral-based business model (and *de facto* non-recourse lending) developed in the United States, and not in countries like the United Kingdom.

3.4 Lenders could rely on external credit scores

Another important difference between the US legal system and those of some other countries that experienced housing booms in recent years is that positive credit reporting is permitted and privacy laws allow this information to be widely shared. Credit reporting agencies can collect the entire history of a household's credit events and build up a comprehensive credit score such as the FICO score. By contrast in Australia, the Privacy Act permits only so-called negative credit reporting, of events such as missed payments and bankruptcy. This limits the amount of third-party information lenders can use in developing a widely available credit score. As a result, a US-style system, where a small number of scoring systems dominate across a range of different lending markets, has not emerged. Comprehensive credit reporting is possible in the United Kingdom, but lenders seem to construct their own credit scores rather than share them. MBS investors cannot then use a third-party score as a substitute for their own analysis.

While credit scoring clearly reduces costs and increases transparency in mortgage origination (Committee on the Global Financial System 2006), it holds a number of potential dangers. Firstly, analogously to credit ratings for structured products, households' credit scores can be used for purposes for which they were not designed. The FICO score was designed to assess risks on credit cards and other short-term consumer credit, but was also used for mortgage lending. The short-term nature of the FICO score is especially apparent in the lower ranges mainly served by subprime lenders. Crews Cutts and Van Order (2004) present data from the late 1990s showing that 30 per cent of people with sub-600 FICO scores had improved their score by more than 20 points within three months.

3.5 Financial regulation did not prevent riskier lending

If lenders faced tight regulation that enforced highly prudent lending, the inherent tendency to higher LTV ratios driven by the US tax system, as described above, might not have actually manifested in substantially higher LTV ratios. US households would then not have ended up in negative equity in such numbers. More generally, how lenders are regulated has obvious implications for the riskiness of mortgages offered and the propensity of borrowers to default.

The US mortgage market is subject to an array of laws and different regulators. The regulated GSEs enforced quality control in the conforming market, but the rest of the mortgage market was more lightly regulated. Mortgage lenders that were not also depositories were the lightest regulated of all. As one example of the relatively light regulation of many mortgage lenders, consider the new regulations announced by the Federal Reserve in December 2007 and approved in July 2008, as part of its role of enforcer of the *Home Ownership and Equity Protection Act*. Among the practices newly banned by these regulations were “coercing a real estate appraiser to misstate a home’s value” and “making a loan without regard to borrowers’ ability to repay the loan from income and assets other than the home’s value” (Federal Reserve Board 2008). The implication is that these practices *were* permitted in the absence of the new regulation, and were common enough to merit an explicit ban. Had all US mortgage originators been bound by a requirement to consider the affordability of the repayment explicitly – as is the case under Australia’s Uniform Consumer Credit Code or the requirements of UK legislation, for example – it seems unlikely that no-documentation (stated-income) mortgages or “exploding ARMs” would have become so prevalent.

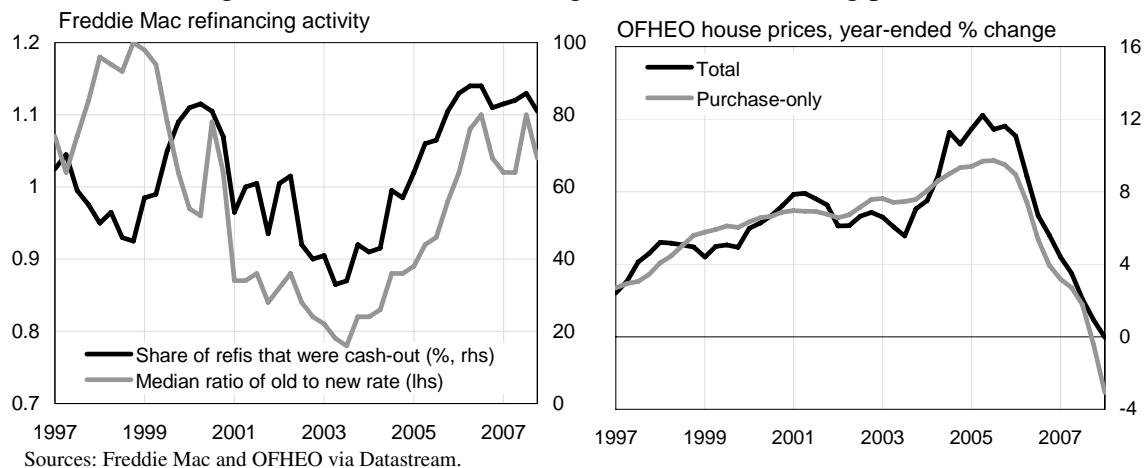
In addition, following intervention in 2004 by the Office of the Comptroller of the Currency (OCC), federally regulated lenders were exempted from state legislation which was in many cases stricter than that at the federal level. Some of the practices banned under some states’ law included the prepayment penalties and balloon payments that have been shown to raise default rates, independent of the borrower’s credit score (Quercia *et al* 2007).

3.6 US mortgages were predominantly fixed-rate and often refinanced

The mortgage market in the United States has several unusual features that are seen in few other countries. As described in Green and Wachter (2005) and elsewhere, the US mortgage system evolved to receive indirect government support via the GSEs. The GSEs were long able to fund themselves in capital markets at advantageous rates. They insure mortgages with standardised features and risk characteristics. A particular feature of the US system is that it allows long-term fixed-rate mortgages (FRMs) to be refinanced at low cost. This means that US households can take advantage of falls in long-term rates while being protected from increases, something that is only possible in the United States and Denmark (Frankel, Gyntelberg, Kjeldsen and Persson 2004). Housing market outcomes differ materially when mortgages are predominantly at fixed rates rather than variable rates (Tsatsaronis and Zhu 2004). In particular, house prices respond less to monetary policy, and more to shocks to private-sector credit. An easing in credit standards could be such a shock, with clear implications for the US economy’s sensitivity to lending booms.

Fixed-rate mortgages have to be explicitly refinanced to obtain a lower rate. US prime borrowers in particular will refinance aggressively when current fixed mortgage rates fall far enough below the rates they are currently paying. Once rates start to rise again, most borrowers will only refinance if they wish to take cash out (Figure 7, left-hand panel).

Figure 7: Cash-out refinancing and OFHEO housing prices



The US mortgage system therefore seems to have evolved to be set up for a higher ratio of origination to outstandings, than systems where loans are mostly ARMs, or where refinancing is either expensive or not permitted. Origination capacity would have increased even more relative to market size during the refinancing wave of 2003 (see Section 2.3). It cannot be ruled out that brokers and lenders subsequently sought to keep volumes up by pursuing ever more marginal borrowers, rather than scaling their operations back again.

The shift towards adjustable-rate mortgages (ARMs) with initial teaser interest rates should perhaps be seen in this context as well. As documented in Foote, Gerardi, Goette and Willen (2008), teaser rates on many subprime mortgages were not that low, and most borrowers of these loans refinanced before or soon after their rate reset. Both lenders and borrowers seemed to understand that this was the intention. Rather than being a means of reaping a higher post-reset payment from borrowers, teaser rates seem to have been a device to maintain origination volumes through refinancing. On top of the incentives provided by origination fee income, Gorton (2008) points out that subprime mortgages were designed to force frequent refinancing, because this limited the horizon of lenders' exposures to these borrowers. The combination of teaser rates and prepayment penalties thus effectively shifted the option to default from the borrower to the lender (by choosing not to refinance).

The differences between ARMs held for long periods and frequently refinanced fixed-rate loans are especially apparent when non-price lending conditions tighten. A borrower with an adjustable-rate loan is immediately exposed to interest rate changes. If the fixed-rate borrower wants to refinance, however, they also have to meet current non-price lending conditions like loan-to-valuation ratios. In contrast, if maximum LTV ratios are cut for adjustable-rate loans, existing borrowers are not affected, only new ones. Thus the US system might be more susceptible to tighter credit standards than those in countries where refinancing is less common.

If refinancing is inexpensive, so is cash-out refinancing. When households refinance more often, they have more opportunities to raise their loan balances. Around 90 per cent of recent subprime (securitised) refinance loans involved some cashing out (Mayer and Pence 2008). Frequent cashing out implies that ongoing LTV ratios would be higher in the United States for a given initial LTV ratio.

Frequent refinancing also means that more mortgages are originated based on appraisals rather than market prices. If appraised values of refinanced homes had been overstated

compared with sale prices during the boom, refinancing borrowers would end up more vulnerable to falls in market prices. Some evidence of appraisal inflation is apparent in the divergence between the OFHEO house price index including refinancing (based on appraised value) and the purchase-only index (Figure 7, right-hand panel). Moreover, these data refer to prime loans refinanced by the GSEs; if the figures had included subprime and other non-conforming mortgages, this difference would probably have been even larger.

3.7 Structured finance enabled subprime and other non-conforming lending

All securitisation markets face information asymmetries that can encourage lax lending standards (Ashcraft and Schuermann 2008). Investors in MBS therefore need to conduct due diligence to prevent asymmetric information turning into imprudent lending. In the recent credit boom, however, many seemed content to rely on ratings rather than doing their own risk assessment of either the MBS or the structured securities based upon them.

Analogously, MBS investors also relied too heavily on FICO scores as an indicator of mortgage borrower creditworthiness. This provided another incentive for originators to relax lending standards. As documented by Keys, Mukherjee, Seru and Vig (2008), a score of 620 or above had traditionally been the threshold above which a mortgage would be eligible to be bought by the GSEs. The same threshold became the standard one for private-label (non-GSE) securitisation as well. Therefore mortgage originators would know that if the borrower had a score of 620 or above, market practice implied that it was more likely that the loan could be securitised.

Keys *et al* (2008) showed that lending standards were noticeably laxer and subsequent loan performance worse, slightly above the 620 threshold, compared with the mortgage loans where the borrower's score was slightly below 620. Their findings provide direct evidence that lenders eased standards significantly if they thought the loan was likely to be securitised, which implies that the information asymmetries inherent in the securitisation process were *not* being corrected by investor due diligence in this period. Most securitisation deals contained "put-back" clauses that meant that lenders had to buy back early delinquencies out of the MBS structures. These clauses were intended to give mortgage originators the incentive to lend prudently (Gorton 2008), but the wave of bankruptcies of subprime lenders in late 2006 and early 2007 suggests that they did not appreciate how risky their own lending had become. Alternatively, it may have been that put-back clauses did not meaningfully discipline lenders that had no balance sheets of their own, and therefore had neither the capacity nor the intention to honour put-backs.

This shift in underwriting practices occurred at the same time as credit conditions globally were relatively easy. Demand for structured credit products increased rapidly over the decade; mortgages and MBS often served as the underlying assets behind these products. Loans labeled as subprime started to be securitised more often (Mayer and Pence 2008), whereas prior to the lending boom, subprime lenders had been less likely to package their loans for securitisation than prime lenders (Crews Cutts and Van Order 2004).

Demand for structured credit products did not just influence the behaviour of existing mortgage lenders; it also encouraged entry into the market. Many major US investment banks and some international ones acquired subprime lending subsidiaries during the boom. They also provided wholesale funding lines to other lenders, which encouraged existing lenders to enter new geographical markets. Dell'Ariccia, Igan and Laeven (2008) found that one reason subprime (and to a lesser extent, prime) lending standards deteriorated was that some large national players entered new local markets. As competition intensified,

it encouraged incumbent lenders to ease their lending standards, with similar results to the easing by manufactured housing lenders some years earlier (Committee on the Global Financial System 2005). In contrast, there were fewer new entrants into the UK or Australian markets recently, for example, since these had already seen an increase in competition in the 1990s.

This raises the deeper issue of why there were new entrants in US mortgage market but not in other countries to the same extent. While the investor appetite for asset-backed instruments encouraging the securitisation boom was global, it manifested itself the most in the market where securitisation was used the most. Whether this was due to the size of the underlying mortgage market, its denomination in US dollars, or the willingness of lenders there to ease standards to meet that demand, is not immediately clear. However, many non-US issuers of RMBS did so in US dollars (and swapped the currency risk) without seeing the same decline in loan quality. This suggests that the disproportionate rise in US-originated issuance may well have something to do with the willingness of US originators to ease underwriting standards.

One reason why the strong demand for structured finance led to the structuring of specifically US-domiciled assets might have been that the externalisers of the credit risk were primarily US-domiciled entities such as municipal bond insurers (monolines). These entities were willing to insure the senior tranches of the structures more cheaply than other means of providing credit protection, including over-collateralisation and traditional mortgage insurance on the underlying mortgages, which remained common for securitisations in other countries. In turn, monoline bond insurers were concentrated in the United States because their primary business in the municipal bond market is concentrated there. In many other jurisdictions, higher-rated state and national governments underwrite local government bond issuance, or even raise funds on their behalf. The services of the monolines was therefore not required to the same extent outside the United States.

4 Must boom always turn to bust?

In this section, I recount the reasons why movements in simple ratios of housing prices to income or rent are not necessarily speculative or unsustainable, and that further analysis is required before such a conclusion can be reached. The essential point is that these ratios are not “deep parameters” handed down by theory. A number of factors other than income determine housing price fundamentals, and these factors can differ both through time and across countries.

4.1 Fundamentals can change through time

The standard model of housing demand and price fundamentals implies an arbitrage condition that relates housing prices to drivers such as income, interest rates, taxes and – importantly – credit constraints, for example as in (1) reproduced from Meen (2006).

$$\Delta \ln(g) = \gamma_1 \Delta \ln(g)_{-1} + \gamma_2 \Delta \ln(X) + \gamma_3 [\ln(g) - \gamma_4 \ln(X)]_{-1} + \mu$$

$$X' = [RY, W, HH, H, M, i, ph^e]$$
(1)

where

$$\begin{aligned}
 g &= \text{real purchase price of dwellings} \\
 RY &= \text{real personal disposable income} \\
 W &= \text{real wealth} \\
 HH &= \text{number of households} \\
 H &= \text{housing stock} \\
 M &= \text{measure of mortgage rationing} \\
 PH &= \text{nominal housing price} \\
 \dot{p}h^e &= \pi + \dot{g}^e/g
 \end{aligned}$$

Certainly income helps determine demand, but the equilibrium ratio of housing prices to income that falls out of this relation will depend on the other factors as well. Consistent with this, empirical work on the topic has been unable to find a cointegrating relationship between housing prices and household income (Gallin 2003, Klyuev 2008). In addition, (1) describes individual behaviour. As noted by Meen (2002), since not all households enter the market in every period, and those that do face credit constraints, the standard aggregation conditions are violated. It is therefore not correct to apply this arbitrage condition to aggregate data. The distribution of income will matter, in particular the income received by newly formed households and those in the main home-buying age groups. Ortalo-Magné and Rady (1999) found that shifts in the distribution of income by age explained much of the 1980s boom-bust cycle in the UK housing market.

In the case of the United States, distributional considerations should have held prices and homeownership rates *down* over the boom period. Real wages growth was subdued, and median household incomes were weaker than the average: income growth was concentrated on the top percentile of households by income.⁸ Countries where disposable income growth was more evenly distributed over this period, such as Australia, could be expected to sustain larger increases in housing prices than would have been feasible in the United States, even if aggregate income had grown at the same rate.

Because households are credit-constrained, how much they can pay for housing depends on more than their income. Both real and nominal mortgage interest rates therefore enter into housing demand fundamentals (Modigliani 1976). A permanent disinflation should therefore be expected to raise the equilibrium housing price relative to income, because homebuyers can then service a bigger mortgage with the same repayment.

Theory provides more support for the idea that there is an equilibrium ratio between housing prices and rents. If there were no capital-market imperfections or financial regulation, the total (risk-adjusted) return on housing assets, comprising rental income R_h and (expected) capital gain \dot{H}^e , should arbitrage to that on other assets, as shown in (2), taken from Meen (1990). But if the degree of capital market imperfection changes, so will the equilibrium rent-price ratio.

$$R_h + \dot{H}^e - \delta = (1 - \tau)i - \pi \quad (2)$$

In addition, the arbitrage relationship (2) applies to a particular dwelling from a heterogeneous stock. In most industrialised countries, rental properties differ from those that are owner-occupied, because the resources and requirements of renters versus owners

⁸See, for example Saez (2008) and other work by the same author with Thomas Piketty.

differ. If the compositions of the rental and owner-occupied housing stocks are broadly stable through time, these differences in quality, size and location will affect the equilibrium value of the rent-price ratio but not change it over time. But many factors can shift those distributions and thus the equilibrium rent-price ratio, including changes in the owner-occupation rate, population or the distribution of income.⁹

4.2 Fundamentals can differ across countries

For all the reasons described above, ratios of housing prices to income and rents to prices cannot be expected to be the same in different countries, and there is no *prima facie* reason to expect that these ratios should converge to international averages over time. The distribution of income, age profile and especially patterns of credit constraints all vary across countries. So do long-run average values of owner-occupation rates and distribution of quality across the dwelling stock. The composition of the housing stock changes very slowly, because the flow of new dwellings added is small relative to the existing stock. As a result, differences in national price-income ratios can open up because of long-past policies. One example of this might be the decision of past Australian governments to provide housing for returning WWII veterans primarily in the form of detached houses. As a consequence of this and other urban planning decisions in past decades, Australia has a much larger fraction of detached houses in its dwelling stock (79 per cent) than Canada (56 per cent), for example, with the expected implications for the price-income ratio.

One particular factor that can cause price-income ratios to vary across countries is the geographic distribution of population (Gabaix 1999). Housing prices are one of the costs limiting city size, so it is to be expected that, although incomes are usually higher in large cities than in smaller centres, housing prices should be higher still. Residents in large cities will therefore pay higher prices for housing, even relative to their higher incomes; Kohler and Smith (2005) confirmed this empirically. A corollary of this observation is that countries where a relatively large fraction of the population live in large cities – for example Australia, New Zealand and the United Kingdom – will have higher national average ratios of housing prices to income than countries such as the United States where the urban population is more dispersed (Ellis and Andrews 2001).

4.3 Sluggish supply can mean cycles without bubbles

The geographic dispersion of population will affect the responsiveness of housing prices to shocks, as well as the long-run equilibrium. Firstly, a region-specific shock to housing demand will affect national averages more if there are fewer other regions for households to move away to and disperse the shock. Secondly, any given-sized shock to national housing

⁹For a simple numerical example of this effect, suppose that the quality of the dwelling stock is distributed lognormally, with the standard normal $N(0, 1)$ as the underlying distribution. Further suppose that the arbitrage condition (2) holds for every individual property, but that all rental dwellings are strictly lower quality than owner-occupied dwellings, i.e. the quality distribution is split cleanly between rental and owner-occupied dwellings. The ratio between average observed rents and prices in this world has a humped-shaped profile in the owner-occupation rate, peaking around 30 per cent. The ratio is around two-thirds of its peak at an owner-occupation rate of 72 per cent and around half its peak when the rate reaches 90 per cent. If the owner-occupation rate rises from 65 per cent to 70 per cent, the rent-price ratio must fall by around 6 per cent. To the extent that this effect goes through for real-world dwelling stocks, it might suggest that the US rent-price ratio should have been falling (i.e. prices rising faster than rents) in the late 1990s and early 2000s, when the owner-occupation rate was rising. But the owner-occupation rate peaked in late 2004, implying that this effect ought to have gone into reverse in the late stages of the boom, perhaps helping to induce its end.

demand is probably harder to digest across a small number of large population centres than across a larger number of smaller, less-crowded centres.

This effect is one aspect of a broader point: the flow of new housing supply is small relative to the stock. Thus in the very short run, the supply curve for the housing *stock* is near-vertical. Any positive shock to demand – from income, interest rates, lending standards or some other source – will boost housing prices for some time, even without a speculative element. How far prices rise, and how long it takes for supply to catch up depends on the elasticity of supply. This is probably not a choice variable but depends on geophysical constraints as much as institutional ones (Glaeser *et al* 2008). Countries with many population centres and relatively flexible supply, such as the United States will have smaller overall increases in prices that do not last as long. But they will also end up with excess housing supply if the positive demand shock is temporary.

5 Policy implications and concluding remarks

As has been pointed out many times elsewhere, the recent financial turmoil was propagated globally because of an increase in risk-taking. The problems in the US mortgage market could just be seen as the trigger for the more generalised turmoil. By this view, the initial shock could easily have been from somewhere else. It is still worth asking why the US mortgage market *was* the trigger. Home building and prices have boomed in many countries of late. Other than in the United States, though, housing prices only began to fall in earnest, and arrears rates rise, following shocks external to the housing market, such as a macroeconomic contraction or a collapse in mortgage credit supply.

Many of these countries are arguably at least as far along in their housing cycles as the United States, or not much behind it, so this is probably not just a matter of lags; instead it suggests that the downswings have not had the same implications for housing mortgage arrears. Housing markets have contracted in countries such as Ireland, Spain and the United Kingdom, because of the macroeconomic downturn, not as an instigator of it: this is the opposite sequence of events to what happened in the United States, where rising arrears rates spurred tighter credit. And some other features of the US meltdown – a substantial oversupply of housing, early payment defaults, abuse of stated-income loans and so on – did not occur in most other countries.

The available evidence presented in this paper supports the idea that a housing meltdown would happen only in the United States because the contributing factors all went further there. There was more overbuilding, lending standards eased more and arrears and negative equity rates responded more as housing prices fell. The United States was therefore more likely to experience a sharp fall in prices than some other countries, even before credit supply tightened. And only in the United States was there such a rapid expansion of subprime, no-deposit, stated-income, teaser and negative-amortisation mortgage products (sometimes all of these features in the one loan). Households were therefore more likely to fall into negative equity, and if they did, to default on their mortgages.

Lying behind these proximate factors, though, the US housing–finance system was particularly sensitive to such an easing in credit standards. Geographic factors and the land-use planning system allowed builders to expand the housing supply more than elsewhere. The tax system encouraged households to maintain high ongoing LTV ratios, and the legal and other regulatory apparatus enabled lenders to ease lending standards and thereby further encourage households to increase their initial LTV ratios, and keep those ratios relatively high. Given all these factors working in the same direction and interacting with

each other, the United States could well have experienced a painful bust and rising arrears rates, even if credit standards had only eased as much as in other countries.

The recent distress in US mortgage markets has shown how damaging a temporary easing in lending standards can be. One lesson from this episode is that institutional differences shape the response to global financial developments, and institutional details can interact to affect the end result substantially. In countries where housing supply is more flexible, and where tax and finance systems treat housing favourably, an easing in credit standards on home mortgages might have particularly costly consequences, especially once standards tighten again. This suggests that mortgage underwriting standards should be regulated more strictly in those countries compared with elsewhere, to prevent standards easing too much in the first place.

Another lesson from the US housing meltdown is that because housing supply is sluggish, some price cycles are unavoidable; it might well be undesirable for policy to resist them, let alone attempt to reverse them. I do not claim that housing bubbles never happen. Events in the United States clearly show that they can. Rather, I would simply argue that not all rapid increases in housing prices are bubbles, and that absent a negative shock to incomes or credit supply, housing price booms can and do sometimes go out with a fizzle rather than a bang.

It is therefore incumbent on policymakers and other observers to go further than measuring the size of the price boom, when trying to assess if it is a bubble or not. “Soft” signals are especially useful: for example, the presence of overt speculative activity, or the availability of mortgage products that the borrower cannot reasonably sustain over its full life. In particular, policymakers should monitor underwriting standards of both mainstream and fringe lenders, and the importance of the latter in the market.

If housing prices rise and then fall substantially, one could well ask if it matters whether it’s a bubble or a price cycle. After all, households will still have lost wealth, and some will have negative equity in their homes. Recent experience in the United States and elsewhere suggests that it does matter. Bubbles can burst of their own accord; they do not need a macroeconomic shock to end them. If speculative activity has also encouraged an oversupply of housing to develop, prices will fall further in the downturn. By contrast, non-bubble price cycles seem to need an outside shock to make them end. Fewer households over-extend themselves in a price cycle than in a bubble, so – as the UK data appear to be bearing out – fewer households will end up in negative equity for any given fall in prices. Likewise, fewer will default on their mortgages, with obvious implications for the health of the financial sector.

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