The Global Housing Price Boom and its Aftermath

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The unprecedented global housing boom of 1995-2006 is now unwinding. It has affected almost all advanced economies and a very significant number of emerging economies. Housing prices have even accelerated during the period 2002-2006. What were the global structural factors that have been driving these synchronized national housing booms? How did the low interest rate era and the high rate of mortgage innovation induce significant behavorial changes among households and transformed mortgage markets? Why did these housing price booms differ between "global cities" and the others, and what has been the impact on the affordability of housing? In what way did poor regulation and supervision of US subprime lending innovations lead to a debacle? Why did US non-performing subprime loans trigger a much wider and deeper structured finance crisis? What are the prospects for the unwinding of this first global housing boom in different countries and for the global economy?

A historically unprecedented global housing boom is now unwinding. The financial crisis that has erupted in August 2007 marks the end of a major global credit cycle that has significantly benefited the growth of the housing sector and mortgage markets in most advanced OECD economies and in a large number of emerging economies as well. For several years, central bankers, bank regulators and economists monitoring global financial markets had worried about the widespread under-pricing of risk (BIS 2005 and 2006; IMF 2005). A financial crisis was seen as an accident waiting to happen somewhere in the global financial system. Opaque hedge funds were often mentioned. The actual trigger has been the US subprime mortgage market.

It is too early to tell in what manner and how soon global financial markets will recover their full stability. The dynamics of the US subprime market with its direct and indirect impacts on the performance of the US economy is also a distinct story of its own. Yet significant questions about this unwinding global housing boom can already be addressed: how strong has the global housing price boom been in different countries? What has been driving these synchronized housing booms? Why did rates of housing price increase vary across regions and cities of the countries experiencing these booms? How did these housing booms affect housing affordability for middle and low-income households? Will their unwinding seriously affect the economies of some of these countries, and the global economy?

The global housing boom of the decade 1995-2006

The global boom of 1995-2006 marks a new era for housing. Early analyses of the global boom by the Bank of International Settlements, IMF and OECD (BIS 2005 and 2006; IMF 2005; Girouard-OECD 2006) revealed increasingly correlated housing price increases among most – but not all – advanced economies that became very significant during the period 1995-2001. They also showed that housing prices in many countries accelerated further during 2002-2006.

Housing price indices vary in design, coverage and data quality across countries in advanced economies. In emerging markets they are often fragmentary. For the same market, there can also be several indices giving somewhat different readings as is the case in the US. Estimates of the growth of housing prices across OECD economies have also been made by analysts using different methodologies. As a result, rankings of countries in terms of housing price inflation vary for the countries in the middle range of price gains depending on methodology and choice of index. But most studies provide consistent results for the two extremes of the distribution of housing prices. At the bottom we find countries with no significant real price inflation such as Germany and Japan. At the top we find countries with extremely high real price growth such as Ireland, Spain and the UK.[2] The BIS data used in Figure 1 suggest that for most countries, real housing price increases have ranged somewhere between 50% and 120% during this exceptional boom. (Égert and Mihaljek, 2007).

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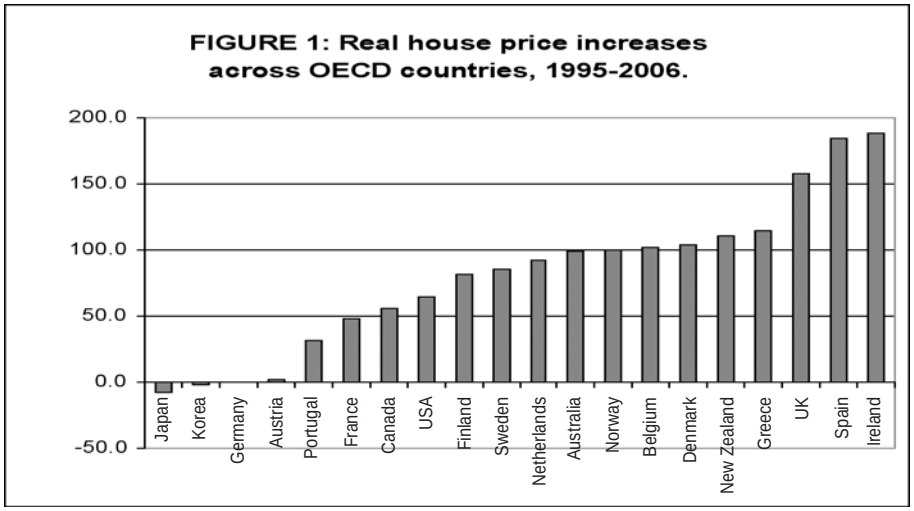
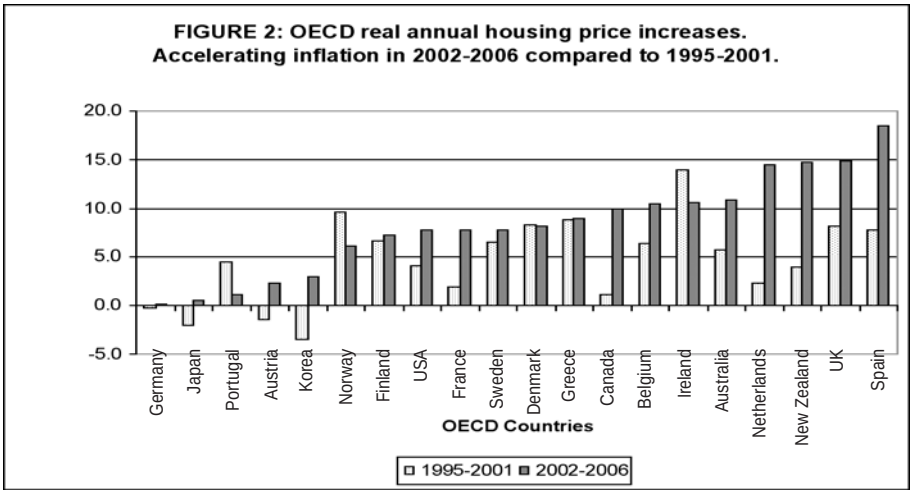
[2] FitchRatings [2007] gives a different ranking of real price increases from the BIS data. Miles and Pillonca (2007, Exhibit 9) give a third ranking of countries with a level of real price increases similar to the BIS data. Ahearne et al. [2005] covers real house prices between 1970 and 2005 in 18 countries that add up to 68.5% of the 2006 global GNP. This study gives somewhat different estimates of housing price increases by countries, significantly so in the case of France where prices would have risen by almost 200% between 1996 and 2005



If we look at average annual rates of price increase, two other features of the boom emerge as shown in Figure 2.[3] First, with most house price increases well above 50% in real terms their growth has been much faster than the growth in average real incomes of almost all countries. Indeed housing markets are now often clearing at real prices that are about twice as high as they were ten years ago. Notable exceptions to these strong housing price booms are: Germany due to slow growth and the real estate problems after reunification with East Germany; Japan and its "lost decade" in the aftermath of its massive bubble; Korea due the 1997 financial crisis; and, Switzerland because of its unusual market structure and low ownership rate of 34% (Bourassa and Hoesli, 2006). Second, there has been a significant housing price acceleration during the second half of the boom over the period 2002-2006, except in a few countries like Ireland where the annual rate of real house price inflation had already been exceptionally high over the period 1995-2001.



[3] Figure 2 is based on data from Égert and Mihaljek [2007]

There has been a similar housing price acceleration in many emerging economies. For instance, in most economies of Central and Eastern Europe housing prices were stable during the 1990s. But since the early 2000s, many of these countries have experienced double-digit annual growth rates of real housing prices. In contrast, housing price increases have been less significant among East and Southeast Asian economies where real housing prices remain below their level prior to the 1997 financial crisis.[4] In major cities of emerging economies like China, India, Russia and Brazil, housing prices are also rising rapidly since 2000 while national mortgage markets remain of limited depth.

In the US, the rare housing price series compiled over the very long period 1890-2005 by Robert Shiller [2006] shows how exceptional the 1996-2006 housing boom has been in duration and amplitude by historical standards. Using the S&P/Case-Shiller national index, which is the best gauge of American house prices, US prices peaked in 2006 after rising by 134% in one decade. What is equally striking is that the US boom appears modest among OECD countries and is at the lower end of the price range in Figures 1 and 2. As another caution about the current quality of comparative housing market data, the Case-Shiller index suggests that the BIS data could be underestimating the overall magnitude of global house price gains.

What has been driving these synchronized national housing booms?

The national housing booms of 1995-2006 reflect the confluence of a number of factors: rising housing demand driven by income gains and demographic changes, historically low nominal and real interest rates; growing lender competition that became intense in the most developed financial markets; innovations in mortgage loan designs as well as in the delivery of these new mortgage products; and, most of all, by an abundance of capital from bank lenders and mortgage security investors. Expectations of rising housing prices on the demand side combined with expectations of lower risks on the lending side to fuel these powerful booms as is always the case in a housing boom. Then a mistimed financial stimulus can turn a boom that could be ready to unwind into a costly bubble, as happened in the US, see below. [5]

This global housing boom is an important outcome of the profound transformation of the global economy that started in the early 1980s with financial liberalization and new macroeconomic policies. Besides wars and reconstruction periods, economists now highlight three major periods in the global economic history of the 20th Century: the Great Depression of the 1930s, the Great Inflation of the 1970s, which gave way to the Great Moderation of the past two decades marked by declining GDP volatility and low and steady inflation. (Borio, 2006)

The benign economic environment of the past two decades results from deep interactions among megatrends that have fundamentally altered the structure of the global economy: rapid financial liberalization; the information technology revolution; a very high rate of financial innovation; trade liberalization and a rapid growth of global trade supported by major transportation innovations that have sharply lowered the costs of shipping goods and personal travel.

Financial globalization measured by gross external assets and liabilities relative to a country's GDP has about tripled since the mid-1970s (IMF, 2007). The depth of the global financial system measured as the ratio of total global financial assets to nominal world GDP has risen from 108% in 1980 to 316% in 2005 (McKinsey Global Institute, 2007). High income countries account for most of this increase in financial globalization. The Bank of England (October 2007, Figure A) estimates the size of the global financial markets at the end of 2006 at 149.1 trillion dollars. Meanwhile the global nominal GDP itself has grown from USD 10 trillion in 1980 to USD 48.2 trillion in 2006, with high income countries as defined by the World Bank representing $36.6 trillion.

Three major structural changes have been especially favorable to the global development of long-term finance and the deepening of mortgage markets. The development of securitization has added a new channel of funding to traditional forms of deposit-based funding by lenders. A new era of very low and stable inflation has drastically reduced the inflation risk premium in long-term lending. The volatility of advanced economies has been reduced by half, which has led to more stable employment and therefore more stable housing demand and improved efficiency in the sector.

First and foremost is the major innovation of mortgage securitization in the late 1970s.[6] Securitization creates a new funding channel for housing in addition to traditional forms of deposit-based funding that were prone to stop-go lending in the US, especially prior to financial liberalization in the 1980s. Over time, funding with residential mortgage backed securities (RMBS) expanded from domestic to international capital markets. Because securitization is a major way to contain capital costs for banks, the development of asset-backed securities (ABS) for non-housing loans like credit cards or car loans

[4] See for instance Figure 2 in Gyntelberg et al. [2007]

[5] There have been vigorous debates whether asset bubbles in progress can be spotted before they burst (Stiglitz ed.1990). Housing bubbles involve real assets, not financial assets. Some telltale signs of a housing bubble in progress are: a rapid multiplication of brokers well above the industry trend line, an accelerating rate of property transactions, a higher and rising percentage of investors as opposed to owner-occupants, a deterioration in the quality of loan underwriting and the offer of increasingly risky loans (Renaud, 1997). Housing price-rent ratios that sharply rise above historical trends are also significant red flags (Mikhed, Vyacheslav and Petr Zem_ik,2007)

[6] The first private RMBS was issued in 1977. See Lewis Ranieri, "The Origins of Securitization, Sources of its Growth, and Its Future Potential," Chapter 3 in Kendall and Fishman [1999].

developed quickly. Securitization is now a major pillar of the structured debt finance revolution in modern finance.
By expanding sources of funding, securitization can make new types of loans possible because no innovative mortgage product can be brought to market as a line of business without a sustainable way to fund it. The growth of the US subprime market is currently the most visible outcome of the securitization innovation with much debate about the strengths and "agency" problems of the "originate and distribute model".

The steadily declining market share of 'portfolio lending' in the US and other markets is a good illustration of the impact of financial liberalization. It has been a significant part of the broader transition from government-led financial systems relying on 'special circuits' to finance housing prior to the 1980s to market-led financial systems. This transition was essentially complete in advanced economies by the mid-1990s when the global housing boom started.

Facing the prospects of rapid integration and growth of European capital markets, "covered bond" instruments have also been modernized and standardized. The covered bond market has been growing rapidly as it offers another attractive low-cost and transparent funding channel to chief financial officers (CFO) who must constantly secure alternative sources of funding -- as the failed business plan of Northern Rock in the UK has just illustrated. It is also generally agreed that the implementation of the Basel II Accord should stimulate the use of covered bonds by modifying the relative capital cost of issuing covered bonds compared to RMBS securitization.

The second major change is the transformation of central banking and of the monetary regime. The lesson of the Great Inflation of the 1970s is that there is no long run trade-off between price stability and achieving full employment and growth. It now defines a widely shared monetary policy consensus managed by independent central banks. (Goodfriend 2007). The past two decades have been a golden era of central banking that has produced steady economic growth at low inflation (Mishkin, 2007b; The Economist, 2007). A recent analysis of a sample of 21 industrialized and emerging economies compared to a control group of 13 industrialized economies shows that explicit inflation targeting by central banks improves economic performance. Explicit targeters reduced their inflation rates from an average of 12.6% to 4.4%. Emerging economies that suffered from higher inflation saw the biggest drop – to 6% after they began targeting inflation. Developed economies with inflation targeting did better, dropping to an average of 2.2 percent. Interestingly, developed economies that were only informal targeters not bound by a pre-announced inflation target did even better with 2.1% inflation (Mishkin and Schmidt-Hebbel , 2007). A global transitory factor that has been also very supportive of low inflation, but will not repeat itself again, was the massive entry of China and India into the global economy after decades of closed economy policies.

During an asset boom there is a feedback mechanism between rising asset prices and liquidity as strong asset prices strengthen the balance sheets of financial institutions that are more willing to lend. As a result, the risk premium embedded in interest rates was very low and liquidity was plentiful. As shown by new research in behavioral finance, euphoria often amplifies such liquidity effects (Shiller, 2005).

In the specific case of the US, monetary economist John Taylor has argued that the Federal Reserve set inappropriately low Federal Funds Rates during the period from 2003 to 2006 – these rates were even negative in real terms in 2002 and 2003 (Taylor, 2007). Because long-term rates respond to changes in expected future short-term rates, low short-term Federal Funds Rates may have also lowered interest rate expectations and long-term rates. The excess liquidity associated with this easy monetary policy turned the US housing boom into a bubble. Given the high level of integration achieved in global financial markets, the spillover effects of US monetary policies on global long term rates and other housing markets must have been significant and is the probable reason for the acceleration of global housing prices during the second phase of the boom between 2002 and 2006. Since August 9, 2007, liquidity and the risk premium have been adjusting sharply in the US and the global financial markets.

The third major change has been the significant decline in the volatility of output in advanced economies. Fluctuations in economic growth measured by GDP have fallen by half since the early 1980s. In the US, gains in reduced GDP volatility came from two main factors (McConnell et. al. 1999). The largest contributor is better inventory management linked to 'just-in-time' production supported by corporate IT innovation, the container transport revolution and air cargo. The second is lower residential investment volatility associated with the financial deregulation of housing finance marked by the ending of Federal Reserve's Regulation Q and access to new funding through securitization.[8] A third and lesser factor was trade liberalization and more stable trade flows.

[7] In Continental Europe, capital market funding of mortgage loans goes back to the middle of the 19th century. Denmark has a mortgage bond history that goes back to 1797. It has long operated under a mortgage law going back to 1850 that was substantially upgraded by the Danish Mortgage Credit Act of 1970. Today, Denmark has the deepest residential mortgage bond market in the world representing 98% of GDP in 2006. However, Switzerland has the largest ratio of total mortgage debt outstanding to GDP of 132% in 2006, see Figure 3 below.

[8] Regulation Q is a financial regulation put in place by the Glass-Steagall Act of 1933. It limited the interest rates that banks could pay, including a rate of zero on demand deposits. As interest rates rose with inflation, Regulation Q accentuated a stop-go pattern in the funding of housing. Regulation Q ceilings for savings accounts were phased out in the early 1980s by the Monetary Control Act of 1980.

A recent study shows that 16 out of 25 OECD economies including the largest ones such Australia, UK, France, Germany and Spain have also experienced marked improvements in economic volatility (Cecchetti, el al. 2006).

Building on these three structural transformations, the global surge in housing prices between 2000 and 2005 is associated with a strong demand for housing supported by exceptionally low nominal and real interest rates and by the highest annual growth rates of the global economy on record. Long-term interest rates that drive mortgage markets remained surprisingly low -- a monetary issue that became known as Federal Reserve Chairman Alan Greenspan's "conundrum". In addition, securitization and the accelerated use of credit derivatives as new types of credit risk transfer (CRT) instruments were thought to be improving significantly the efficiency of financial markets.

Innovative mortgage products

Global economic growth and the strong effective demand for home ownership in combination with these three major structural changes have eased mortgage credit rationing. In addition to securitization, additional improvements in the mortgage markets allowed the shift to risk-based lending. In particular, the development of credit bureaus lowers information asymmetry between lenders and borrowers. There has been a significant expansion in the volume of mortgage loans, an increased diversification of loans products with more floating rate loans, and the introduction of hybrid products with an initial fixed-rate period followed by a variable rate period.

Competition among different types of lenders has reduced interest margins on housing loans and has lowered interest rates for borrowers. In the highly developed UK mortgage market, supply has diversified into a very wide continuum of mortgages in terms of degree of fixity of repayments and associated prices. Lenders also attempt to differentiate themselves from the competition. The landmark Miles study reports that "estimates of the number of products in the prime market are consistently over 4,000". Obviously, many of these products have almost identical underlying financial features. Yet the number of financially different loans itself is very large.[9]

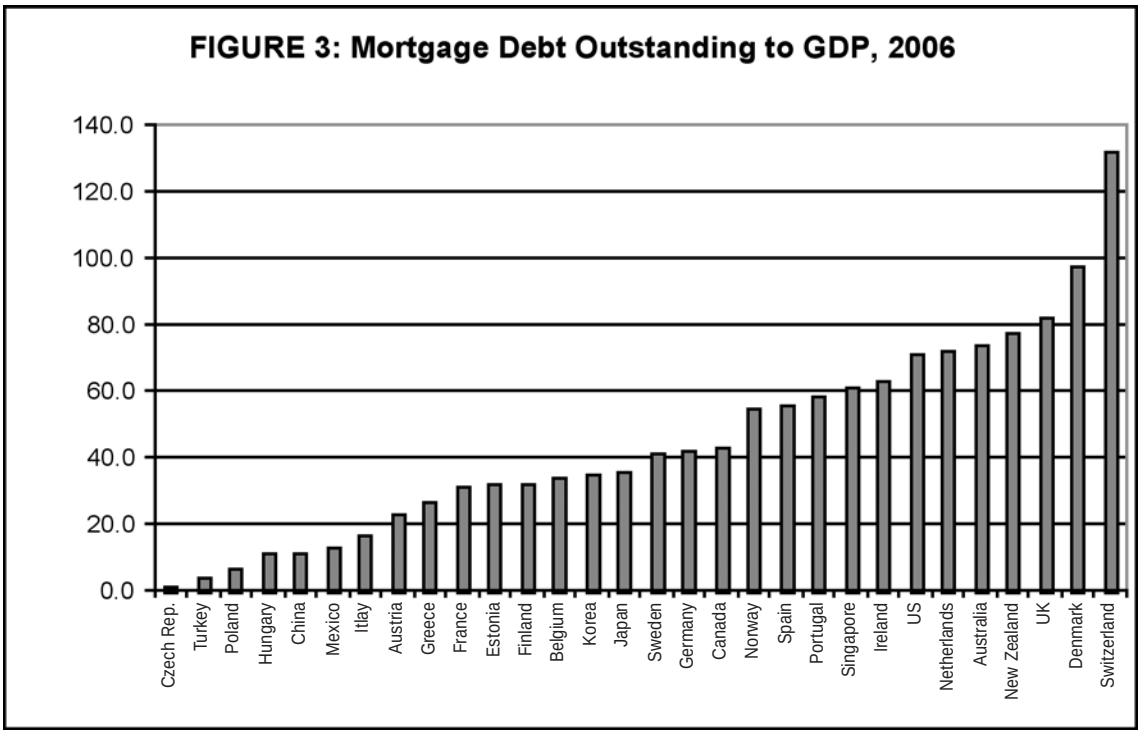
Given the rapid pace of innovation and the proliferation of new and more complex mortgage loans, in many countries the mortgage choice decision is an important consumer issue. Many borrowers do not pay much attention to the likely future relative costs of different mortgages. Hence, the central role played in consumer protection by the concept of the annual percentage rate (APR) as a summary measure of the overall cost of a mortgage -- but not an indicator of possible future risks in the case of adjustable loans. The hidden true future cost and risks of loans made to financially uneducated borrowers is a major dimension of the subprime mortgage crisis, among several other disturbing aspects of the subprime lending boom for such a leading financial system as the US.

Mortgage markets have deepened significantly in almost every country during the global boom, with Germany and Japan being exceptions. Within Europe, mortgage market depth still ranges very widely across countries. Yet, with the sustained integration of global markets variability of the cost of mortgage debt is much lower than before 1995. Within the Euro area, there is now relatively little variability across countries after adjusting for the design features of the mortgages used in each country. Already in 2003, the spread in effective mortgage rates was about 65 basis points (Mercer Oliver Wyman, 2003). Retail mortgage markets may remain differentiated, but wholesale funding markets are well integrated. Figure 3 shows the wide range of ratios of mortgage debt outstanding (MDO) to GDP in 2006 across 30 countries representing 81.5% of world GDP. Now MDO/GDP ratios in advanced economies are often a multiple of what they were in 1980.

The low interest rate era has induced significant behavioral changes among households leading to major changes on both sides of the household balance-sheets with much larger house values on the asset side and larger mortgage debt on the liability side. Regarding cash flow, the three factors affecting housing demand are: lower nominal and real mortgage credit rates, higher LTV ratios that reduced prior savings requirements and widespread lengthening of loan maturities and amortization periods. The net effect was lower debt-to-income ratios. The public policy question in each country now is whether the balance-sheet and cash flow position of the household sector has become more resilient to an economic shock and a housing downturn.

One vivid example of a market transformation is the housing boom in Spain (Renaud, 2005a). There, the nominal mortgage rate dropped from 17% in 1991 to 4% in 2005 while real mortgage rates dropped from 12% to 1%. At the same time loan maturities increased from 10 to 25 years. The impact has been very powerful. The average volume of annual housing construction has tripled from 200,000 to 600,000 housing units and the share of residential construction in GDP has more than doubled from 4% in 1995 to over 8% in 2006. The MDO/GDP ratio has risen from 15% in 1995 to 56% in 2006. Gross household debt that includes other consumer debts has risen from 41.6% of disposable income in 1995 to 140% in 2006. On the other side of the balance-sheet, real housing prices have risen by about 170% from 1996 to 2006. The national ratio of housing prices to household income has climbed from 2.8 to 5.5 times suggesting a significant decline in ownership affordability for young households and lower income groups, as discussed further below.

[9] Miles [2003] p. 49. In 2003, the UK's Financial Services Authority (FSA) identified 260 different mortgage loan products falling into seven main financial categories of loan design, Miles [2003], Table 4.1 page 53.



Source: Miles and Pillonca (2007) with additional countries added.

Spatial differentiation of housing price booms: "global cities" and the others

Finance is global but housing is local, and so is the price elasticity of housing supply that is determined by local land use regulations and access to urban land. Lower housing supply elasticity leads to higher price volatility. This spatially selective dynamics is particularly visible in large countries like the US where "in 2005, seven states account for 47% of the nation's total real estate values and land values are even more concentrated" (Case, 2007). The impact of the boom has been sharply differentiated across cities as illustrated by Figure 4.

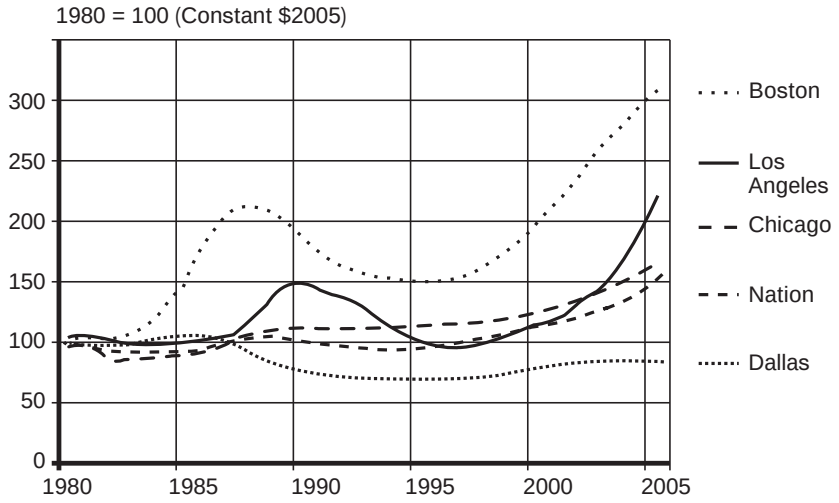
Major differences in real estate market performance and the rise of metropolitan competition in the global economy have led to the concept of "superstar cities" (Gyourko et al. 2006). 'Superstar cities' are defined as cities that succeed in attracting a disproportionate share of highly skilled, high-income and high net-worth households that are able and willing to pay a high price for housing. Gyourko et al note that "differences in house price and income growth rates between 1950 and 2000 across US metropolitan areas have led to an ever-widening gap in housing values and incomes between the typical and highest-priced locations". "Scarce land leads to a bidding-up of land prices and a sorting of high-income families relatively more into the desirable, unique, low housing supply markets of these superstar cities." Continued growth in the number of high-income families in the US provides support for ever-larger differences in house prices across inelastically supplied locations and income-based spatial sorting. This spatial sorting occurs not only at the metropolitan area level but also internally at the sub-metropolitan level.

Proponents of the 'superstar city' concept argue that these housing market processes are a long-term structural phenomenon (1950-2000) that goes beyond the current 1995-2006 global housing boom.[10] Concerned with potential contagion effects on the macroeconomy caused by the credit crunch for large "jumbo" mortgage loans, Federal Reserve Chairman Bernanke has unexpectedly proposed to raise the size limit of 'conforming' loans that can be securitized by Fannie Mae and Freddie Mac from $417,000 to $1.0 million.[11] Such a regulatory move would also favor high-price superstar cities and superstar neighborhoods.

[10] Shiller discounts the "superstar cities" argument as merely reflecting the psychology of the housing boom and a wishful thinking bias. See Shiller "The Myth of Superstar Cities", Project Syndicate, May 20, 2007. Yet a 50-year trend is not easily ignored, nor is recent analytical work on metropolitan competitiveness in the global economy.

[11] Chairman Ben Bernanke's testimony to the US Congress, 8 November 2007.

FIGURE 4: Housing Price Booms Differ Across US Cities



Source:Wheaton and Nechayev, 2006.

Rigid urban planning regulations can have a major impact on local housing supply elasticity. In the UK, a high rate of financial innovation has collided with a very inelastic housing supply to produce some of the highest international rates of housing price appreciation. The causes were detailed by the Kate Barker report to HM Treasury (Barker 2004). The Netherlands have experienced a similar outcome. In Spain, the devolution of urban planning to local governments implemented in the early 1990s has led to an unexpected fall in the elasticity of housing supply in major Spanish markets due to increased regulations by local authorities.

The global housing boom has affected the affordability of housing ownership

Housing markets and institutions differ significantly across countries, even across the 18 high-income countries that are the focus of comparative studies by central banks. Yet, in most markets the sharp surge in housing prices – especially during the period 2000-2006 - contrasts with earlier decades when indices of real housing prices, real rents and construction costs were moving closely together and remained not much higher than CPI inflation. As a result of the continuing rise in house prices, the initial affordability benefits of lower interest rates and longer loan maturity for middle and low-income households were eventually dissipated by rapidly rising prices as wage gains were not commensurate. Housing became a channel of wealth redistribution (Muellbauer 2005).

Two important factors in the decline of affordability have been the competing demand from investors and the type of lending available. In France, a study indicates that by 2004 the capacity to borrow of many households was no longer large enough to match the rising prices of existing housing (Boisvieux and Vorms, 2007). In New Zealand, a central bank study concludes that "the decline of real interest rates is likely to be the cause of the rise in housing prices and the decline of homeownership rates in New Zealand since 1990" (Coleman, 2007). The study attributes this outcome in New Zealand mainly to the ability of richer investors to outbid lower-income households and young families. Generalizations across markets are risky, yet it is an obvious hypothesis to expect affordability problems to be most pronounced in the markets where housing prices have risen the highest such as Ireland, Spain, the UK, Australia and the Netherlands. Then the question will be what policies might mitigate the problem in each market.

It is worth keeping in mind that even if there had not been strong price increases, low inflation, taxation and monetary policy can affect lower income groups negatively by increasing their user cost of housing capital in comparison with higher income groups (Quigley and Raphael, 2004). Most advanced economies are facing significant affordable housing issues, especially in the superstar cities. Rental markets also matter. Pushing homeownership irrespective of buyer qualification is part of the current US subprime problems.

The case of the US subprime market

The US subprime market deserves special attention on two different accounts. First as a market segment where financial innovation appeared to be very successful in addressing the affordability problem and extending access to home ownership to new social groups, which is a challenge that few other countries were meeting

(FDIC, 2006). Second, the subprime crisis has been the trigger of the much wider financial crisis and credit crunch that is still unfolding.

Low and moderate-income households and racial and ethnic minorities have been at the center of the subprime boom (Gramlich, 2007) . "Subprime" lending refers to higher-interest loans that involve higher credit risk. A primary criterion is a FICO credit score below 620 based on the credit risk scale developed by Fair Isaac and Co (FICO). Even with a higher score, other factors such as the down payment, income characteristics and their documentation, or the property collateral can make a borrower ineligible for a prime loan. An "Alternative-A", or Alt-A loan, can be made to borrowers with marginal to good credit who are at the borderline of the underwriting guidelines for fully complying prime loans. Non-prime lending that covers both Alt-A and subprime loans rose rapidly from 11% of all new mortgages in 2003 to 40% in 2006. At the peak of the boom, the quality of mortgage loans deteriorated significantly. "Risk layering" is an informal expression that has gained wide currency. It refers to the inclusion of several distinct risky design features into the same loan whose interactions in the actual overall credit risk can be underestimated for various reasons, including a lack of adequate historical data.

After 2003, strong price appreciation and declining affordability had induced a rapid expansion of the use of "non-traditional mortgage" products (NTMs) designed to stretch the buying capacity of borrowers, both prime and non-prime, in metropolitan areas with the highest housing prices and also facing higher risks of a price decline. These new loans include "interest-only" or (I-O) loans with no principal payment for the first 5, 7 or 10 years and sharply higher payments thereafter. "Option ARMs" are I-O loans where the borrower has various payment choices every month. "Minimum-Payment" loans do not cover the full loan interest and lead to negative amortization. "Piggy-Back" loans or "simultaneous second lien" loans combine a "conforming" loan saleable to Government Sponsored Enterprises (GSEs) with a home-equity line of credit (HELOC) from the same or a different lender. Their goal is to maximize the LTV ratio while avoiding private mortgage insurance. Piggy-back loans are poorly reported "silent second loans" whose share doubled during the final years of the boom. The average size of these "piggy-back loan" packages was some 40% larger than single loans. Due to the current ceiling of $417,000 on conforming loans it has been the riskier and more costly HELOC second loan that has grown the fastest.

The US subprime case is a good illustration of the paradoxical deterioration of housing affordability during this long boom, as discussed earlier. What did not need to happen and is specific to the US is an almost laissez-faire regulatory framework resulting from the patchwork of federal and state regulators, and legislatures subject to various degrees of industry lobbying. This environment invited regulatory arbitrage and eventually facilitated unethical and fraudulent behavior by poorly regulated state-licensed lenders and unlicensed new mortgage brokers on a very large scale at the peak of the boom. There was also the lack of adequate consumer protection for the financially least-educated segments of the population. This environment encouraged the very visible deterioration of lending standards, flawed or fraudulent property valuations, manipulations of credit scores and income documents, and other problems. Gramlich (2007) has pointed out the irony of devoting the best federal regulatory work to the most mature and least risky part of the mortgage markets while leaving essentially unregulated critical elements of a new and much more risky market segment. The reputational impact for the entire US mortgage market on global financial markets has been very sharp.

The US subprime market has grown to 7¾ million loans representing 14% of the total US mortgage debt outstanding, which was estimated at about $13 trillion at the end of 2006. [12] Delinquency rates on subprime mortgages have increased sharply and tripled since 2005. Distress is concentrated among the two-third of subprime borrowers with variable-rate mortgages. Some 17% of them are already in serious delinquency including foreclosures that have amounted to 320,000 loans per quarter in 2007, a 33% increase over the previous two years. [13] Four factors are at play: unemployment is rising in middle-west states like Ohio and Michigan; stable or falling local housing prices that would prevent borrowers from refinancing even when their contracts permits it; the poor quality of loans originated in late 2005 and 2006. Most importantly, substantial payment increases at the time of the interest rate reset have been of the order of 25% to 30% for the now notorious "2/28" loans because the first two years of payments were set at interest rates below market as "teaser rates".

Many of the subprime mortgage loans that went bad in 2007 did so before their interest rate reset. Some of these loans had gone to speculators who planned to flip their houses but no longer could, others went to borrowers that should never have been qualified for a loan, and still others had elements of fraud. The bulk of interest rate resets has yet to come. Each quarter until the end of 2008 more than 400,000 subprime loans will be reset compared with 200,000 resets per quarter during the first half of 2007. A major and

[12] FRB Governor Randall S. Kroszner remarks "The Challenges Facing Subprime Mortgage Borrowers," November 5, 2007 on the FRB website.

[13] For a loan level analysis based on about 50% of all subprime loans, see Yuliya Demyanyk and Otto van Hemert "Understanding the Subprime Mortgage Crisis", Federal Reserve Bank of St Louis, 9 October 2007 [draft]. "Over the past five years, high loan-to-value borrowers increasingly became high-risk borrowers, in terms of elevated delinquency and foreclosure rates. Lenders were aware of this and adjusted mortgage rates accordingly over time. Second, the below-average house price appreciation in 2006-2007 further contributed to the crisis."

pressing systemic challenge facing the US market is how to manage loss mitigations and avoid foreclosures as much as possible, preferably on a mass basis rather than through the current slow and costly case by case process The social benefits for the households and the financial savings for lenders will be very large: current industry estimates are that 40% to 50% of the unpaid mortgage balance is lost in a foreclosure. The spillover effects for some housing markets could be large and in turn affect the US economy.

Financial innovation, global securitization and the US subprime market

While the US Savings and Loans crisis of the 1980s was about interest rate risk faced by various types of banks, the 2007 financial crisis is about credit risk diffused throughout the global securities markets. It is not limited to a sub-sector of the banking industry. Bad subprime loans have been the catalyst revealing much broader systemic problems with risk evaluation, risk pricing and ratings of structured finance products (Mason and Rosner, 2007b). Central banks and regulators are not well equipped to address present liquidity and solvency problems because these problems arise mostly outside regulated banks in unregulated and poorly documented private capital market institutions. The magnitude of problems has been even harder to estimate than in earlier financial crises. In his Congressional testimony of 8 November 2007, FRB Chairman Bernanke ventured that "a ballpark estimate" of the losses was $150 billion. If the history of past financial crises is any guide, this early figure is an underestimate.

Securitization had made the funding of US subprime loans possible because in the low interest environment prior to 2007, capital market investors were willing to assume much greater risk in their search for yield. To maximize their return on capital in a low-margin loan environment, banks moved forcefully to fee-based activities and derivatives trading. An explosive growth of derivatives markets and the creation of increasingly complex credit risk transfer (CRT) instruments took place during the last five years.

What has surprised some observers is "how toxic the securitization of [US] subprime mortgages has turned out to be for the [global] financial markets".[14] Indeed, how could credit problems in such a small segment of the global securities markets have such a disruptive and widespread impact on the global financial system? In its Financial Stability Report of October 2007, the Bank of England has put the subprime securities markets in perspective (Bank of England, 2007, Figure A). The BoE estimates that subprime securities outstanding amounted to $ 0.7 trillion in total global securities markets of $149.1 trillion at the end of 2006, which is less than 0.5% of the global securities markets. [15]

What the US subprime crisis has done is to reveal systemic flaws in the way global structured debt markets currently operate ie how these securities are structured, priced, rated and traded. This market had grown at an exponential rate since 2004. In an interesting image, Gillian Tett, Capital Markets Editor of the Financial Times, has compared the explosive growth of mortgage credit derivatives to candy floss: "mortgages are being reused to create vast volumes of securities removed from the core original asset." The global derivatives markets grew with the slicing and dicing of mortgage loan risks first through RMBS whose tranches were then further restructured into complex, opaque, hard-to-price CDOs (Collateralized Debt Obligations) often to be purchased by SIVs (Special Investment Vehicles) sponsored by banks but kept off their balance sheet (Mason and Rosner, 2007a). Banks were pleased to collect structuring fees through the entire process. So were rating agencies. In parallel to CDOs, banks created CLOs (Collateralized Loan Obligations) to fund corporate loans and IPOs. It is estimated that by the end of 2006 the gross notional value of outstanding derivatives contracts of all types had reached $453 trillion (*Financial Times*, derivatives markets review, February 2007). [16]

The subprime crisis has had a freezing effect on global capital markets much beyond the volume of subprime loans outstanding in August 2007. The reason was that nobody could tell exactly where subprime risks were held. These subprime risks had been diffused in such a complex and opaque way that investors were unable to determine which CRT instruments had been contaminated by these loans. The large impact on global credit markets in August 2007 was due to the way the highly leveraged SIVs had been funding themselves on the short-term asset-based commercial paper (ABCP) markets that various conservative institutions use to manage their short-term liquidities. These investors refused to invest in any security involving private US mortgages. The only US mortgage-related securities that the global markets will consider are those issued and guaranteed by the three US GSEs (Fannie Mae, Freddie Mac, and the Federal Home Loan Banks). Because the crisis has reached directly and indirectly into so many segments of the structured debt markets and involves assets on a large scale, its resolution may not be quick and easy. Once again, traditional behavioral dimensions of past financial crises are present: bad lending, risk mispricing, excessive leverage, agency problems and euphoria.

[14] Martin Wolf, "Securitization: life after death", weekly column, Financial Times, 2 October 2007.
[15] If we add to the $0.7 trillion of subprime RMBS securities, Alt-A securities RMBS of $0.6 trillion, jumbo loans RMBS of $0.5 trillion and non-mortgage backed ABS securities of $3.5 trillion we reach only 3.5% of the total global securities markets, (Bank of England, 2007, Figure A).
[16] The notional value of a derivative is the total value of the underlying assets. The notional size of the highly leveraged derivatives sector should not be confused with the size of the global securities markets itself of $149.1 trillion as already noted.

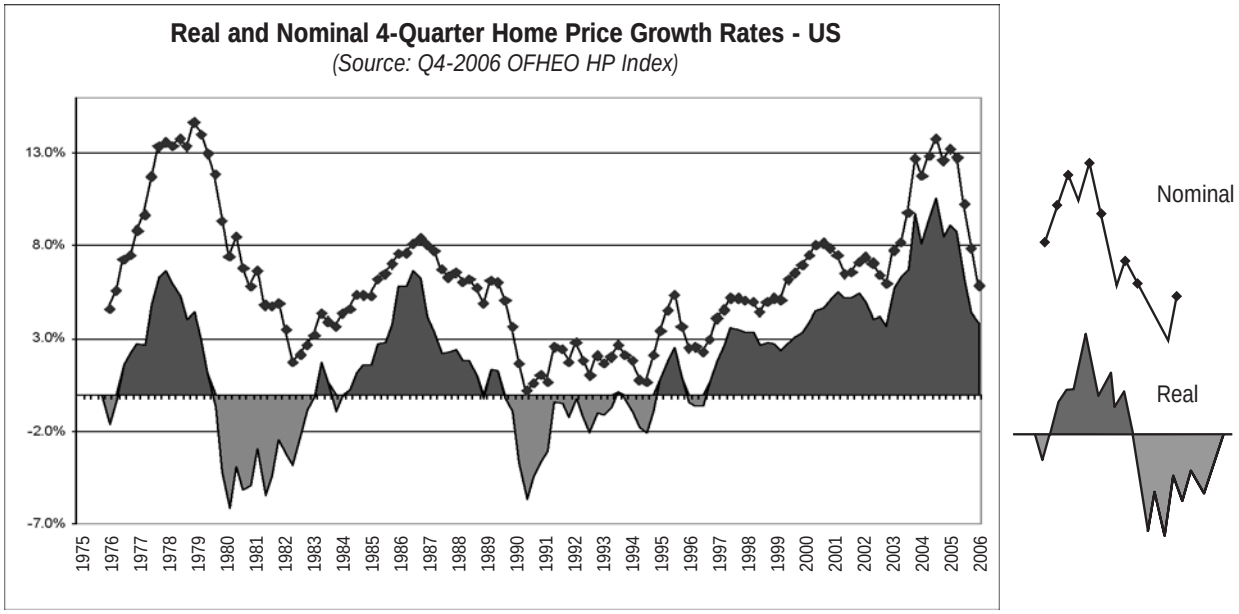
Housing and the macroeconomy as housing booms unwind

How will the various national housing booms unwind? Where will there be soft landings? Where might there be hard landings? Where are the shock absorbers in each country? How could a country's macroeconomic imbalances come into play? Could this first global housing boom now be followed by a global recession or merely some degree of global slowdown? How soon and at what price will the current financial storm dissipate? These are challenging times for central bankers and governments given the lead time of 18 months to two years that a housing downturn may take to slow down the economy while other conflicting issues such as exchange rates and commodity price inflation will also shape the proper monetary policy response (Mishkin, 2007a).

A study by FitchRatings released in July 2007 attempted to compare the risk prospects of 16 OECD countries along two main dimensions: the relative likelihood of a housing correction occurring; and, how severe the effects of lower prices and higher interest rates would be on households and on the wider economy. It finds that Italy, Japan and Germany are at the low risk end while Denmark, New Zealand and the UK are the most vulnerable to shocks. In general, it finds that Nordic and "Anglo-Saxon" economies have a higher vulnerability score. It also finds that Canada and the US score relatively favorably in the analysis. Yet it warns that "housing overvaluation and increased household vulnerability are prevalent in almost all the advanced economies". An important gap that this study acknowledges is the impact of the construction sector and the degree of balance in housing supply conditions.

Actually, the first economy to be exposed to a major shock is the US housing market through the dual impact of the subprime crisis and the pro-cyclical mortgage credit crunch in progress. The US housing sector attracts global attention not merely because of its subprime market problems and the financial crisis it has triggered, but because the US economy has so far been the leading engine of global economic growth this decade – with China playing that leading role for the first time in 2007. With a GDP of $13.2 trillion, the US economy represents 27.4 percent of global GDP in 2006. The US financial system itself with $50 trillion in assets represents 36% of the $140 trillion global financial system in 2005 (McKinsey Global Institute 2007). The odds of a hard lending in the US are rising fast with potential negative consequences for the global economy. Comparing the unwinding of the two US housing booms of the 1970s and the 1980s, the current housing price downturn could become quite severe, see Figure 5.

FIGURE 5: Current US housing price boom compared to 1970 and 1980 booms



Source: Man CHO, April 2007

Among the channels of transmission of a housing downturn to the macroeconomy the most important is new housing construction. Edward Leamer in his extensive research on US business cycles found that a decline in housing construction has been a precursor to 8 out of the 10 past recessions. The two exceptions were when the Korean and Vietnam wars provided an offsetting stimulus to demand (Leamer, 2007). So far, US housing starts have fallen from an annual rate of 2.27 million units in January 2006 to 1.33 million in August 2007, a very large drop of 41.5% (Case and Quigley, 2007). The likelihood that housing construction also plays a major role in the business cycles of other OECD countries is rather high as the multiplier effects of new construction are large everywhere. Another channel of transmission of somewhat lesser magnitude than new construction is the new income generated by sales of existing housing units for brokers, mortgage lenders, appliance companies and others (Case and Quigley, 2007). In spite of the withdrawal of some units, the inventory of unsold houses has risen sharply since 2006.

There is a significant debate about the impact of the wealth effect of rising housing values on consumption (Case, Quigley and Shiller, 2005; Muellbauer 2007; Feldstein 2007). This effect also depends on the structure of mortgage markets. The possibility of extracting housing capital gains through mortgage instruments or "mortgage equity withdrawals" (MEW) has been high during the boom in Australia, Canada, the Netherlands, the UK and the US, but not in France, Germany, Italy, Japan or Spain (Girouard et al, 2006a). Because of the very high rates of appreciation of housing since 2000 combined with the very low cost of mortgage equity withdrawals it seems very likely that the present boom has induced additional consumption, especially in the US where net MEW funds rose steadily and significantly during the second phase of the boom reaching $914 billion and 10.1% of disposable income in 2005 while the personal savings rate became negative (Greenspan and Kennedy, 2005 and 2007). The disappearance of this wealth effect in the US now can only dampen consumption significantly. The additional impact on consumer confidence also needs to be considered.

The third important factor affecting the US economy is the feedback from the financial sector on housing through the significant tightening of mortgage lending by all banks and the suspension of net new lending to the subprime sector. The mortgage credit crunch adds to the probability of a US hard lending and a recession, unless effective policies can be identified and implemented in a timely manner.

What are the prospects regarding the unwinding of this first global housing price boom? In the US, new construction peaked in 2005 and the housing price downturn that started in 2006 is expected by some officials to reach bottom only by the end of 2009. The intensity of the price correction will differ across cities and segments of the housing market. Regarding the broader prospects of a housing-led US recession, the jury is still out. In spite of recent Federal Reserve actions, the odds of a US recession rather than a soft landing have increased very significantly due to the financial crunch triggered by the subprime crisis and the difficulties in containing financial institution losses and restoring liquidity in the financial markets. At the global level, the housing downturn has already begun in most countries. The data also suggests that some countries are in better position than others to experience a much preferred soft landing.

Another major dimension of the unwinding of the global housing price boom comes from the damage inflicted upon global structured debt markets by the US subprime crisis, which is real but of unknown scope yet. There is a growing risk that the impact of this financial crisis will be felt on the real economy side of the US and also other advanced economies through a credit crunch of unknown intensity combined with higher interest rates. Given the important role of expectations, rapid currency shifts and volatile commodity prices, much will depend on the skills and ability of central banks and governments to cooperate as well non-financial external events. A failure of these corrective policies could be quite costly for the long-term growth of the countries involved, and for the global economy (Cerra and Saxena, 2007).

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