Real estate prices as financial soundness indicators

Robert Heath

I. Introduction

"Real estate has been a neglected area because it has always been treated as an independent sector. Now, the real estate sector is viewed as a significant contributor to the financial position of financial institutions in terms of mortgage loans as well as asset holdings. Thus, real estate prices are critical for the financial sector and in terms of measuring the wealth of the country. This is an area where information is lacking. In our country, there is no agency that collects real estate market prices."

This comment was received by the International Monetary Fund (IMF) in response to comments on the draft *Compilation Guide on Financial Soundness Indicators* (*Guide*) that was posted on the IMF's public website in March 2003. It sums up succinctly a common view of real estate prices from both the user and compiler perspectives. The data are needed but are lacking.

II. What are financial soundness indicators?

Financial Soundness Indicators (FSIs) are indicators of the current financial health and soundness of the financial institutions in a country, and of their corporate and household counterparts. They include both aggregated individual institution data and indicators that are representative of the markets in which the financial institutions operate. FSIs are calculated and disseminated for the purpose of supporting national and international surveillance of financial systems. In short, the development of FSIs is a key tool in the IMF work to strengthen financial system stability.

This initiative was prompted by the financial market crises of the late 1990s and the growing observation of the number of banking crises that has occurred globally in the last two decades. As has been well reported in research by the IMF, BIS, and others, there are significant costs arising from these crises, both direct (such as the cost of recapitalising the deposit-takers) and indirect (such as the loss of real economic activity), and this has demonstrated a need to develop a body of statistics that could support policymakers in identifying the strengths and vulnerabilities in their financial system and in taking action to prevent the likelihood of such crises occurring.

FSIs are only one part of the IMF's work in the field of crisis prevention, and of course the IMF's work itself is part of a larger international effort, including the Bank for International Settlements and others. Notably, FSIs are an input into the IMF-World Bank Financial System Assessment Program (FSAP). This programme is designed to identify financial system strengths and vulnerabilities and to help develop appropriate policy responses. More information on FSAPs, including the countries that have participated, is available at http://www.imf.org/external/np/fsap/fsap.asp.

III. Where do we stand with the FSI project?

The work began in 1999 with a conference of experts in the field of financial stability issues. That conference was similar to this one on real estate, with private and public sector experts exploring key user and compiler issues. Taking forward the outcome of that meeting, and after undertaking wide consultation, in 2001 IMF staff presented the IMF Executive Board with a list of FSIs, which it endorsed. The list (attached) is divided between core indicators and encouraged indicators in order to help prioritise future work at the national level. All the core indicators - FSIs considered to be useful in all countries and generally available - relate to deposit-takers, which are institutions that are central in all financial systems. The encouraged FSIs include real estate prices and the extent of deposit takers' exposures to residential and commercial real estate.

Subsequent to the 2001 meeting, and with Directors' endorsement, to support national compilation efforts IMF staff began preparing a draft *Guide*, collaborating with international and regional organisations, and national agencies interested in financial soundness issues. Following extensive public consultation this year, the *Guide* should be finalised in 2004. The text is available at http://www.imf.org/external/np/sta/fsi/eng/guide/index.htm.

IV. Where do real estate prices fit into FSIs?

From the very start of the work on FSIs at the conference for experts, it has been evident that for most economies monitoring real estate prices is important for financial stability analysis. Others will discuss this issue in more depth ahead so I will not dwell on the reasons why, but simply note that from the viewpoint of deposit-takers, and other sectors, there can be large exposures (both direct and indirect) to an asset whose price can be volatile not least because of the actions of lenders themselves. For this reason, residential and commercial real estate prices are included in the list of FSIs along with deposit-takers' lending on such real estate.

In the draft *Guide*, there is a chapter providing advice on compiling real estate prices. The chapter is modest in its ambitions. It acknowledges the relative lack of international experience in constructing real estate price indices, particularly in the official sector, and the costs involved in creating real estate price indices. Therefore, the chapter focuses on describing a range of techniques whose application can be based on local needs, conditions, and resources rather than recommending a single set of indices or compilation methods. The chapter is more focused on prerequisites than on providing detailed technical advice. We see this meeting as the beginning of a process of raising technical knowledge and capabilities in this field, and building on the start represented by the chapter in the *Guide*.

We expect that implementing the new *Guide* is likely to prove a medium-term rather than a short-term process. This is nowhere more true than in the field of real estate prices.

V. Types of questions raised

Finally, let me turn back to the author of the quote at the start of this presentation. The commentator went on to raise a number of possible technical issues that could be discussed. I leave them as examples of the types of questions that those who want to move forward with real estate prices are asking:

1. "How do we deal with the large diversity in residential and non-residential buildings?
2. Another problem is the lack of an inventory of residential/non-residential buildings. How is this compiled?
3. How are prices for real estate assets collected? Can unit values be used instead of actual prices? Does market price refer only to current cost of construction and land or the selling price of the real estate unit?
4. How do we deal with conversions of agricultural land to commercial properties? Prices can increase significantly."

Financial soundness indicators: the core and encouraged sets	
Core set	
Deposit-taking institutions	
Capital adequacy	Regulatory capital to risk-weighted assets Regulatory Tier I capital to risk-weighted assets Nonperforming loans net of provisions to capital
Asset quality	Nonperforming loans to total gross loans Sectoral distribution of loans to total loans
Earnings and profitability	Return on assets Return on equity Interest margin to gross income Noninterest expenses to gross income
Liquidity	Liquid assets to total assets (liquid asset ratio) Liquid assets to short-term liabilities
Sensitivity to market risk	Net open position in foreign exchange to capital
Encouraged set	
Deposit-taking institutions	Capital to assets Large exposures to capital Geographical distribution of loans to total loans Gross asset position in financial derivatives to capital Gross liability position in financial derivatives to capital Trading income to total income Personnel expenses to noninterest expenses Spread between reference lending and deposit rates Spread between highest and lowest interbank rate Customer deposits to total (non-interbank) loans Foreign currency-denominated loans to total loans Foreign currency-denominated liabilities to total liabilities Net open position in equities to capital
Other financial corporations	Assets to total financial system assets Assets to gross domestic product (GDP)
Nonfinancial corporate sector	Total debt to equity Return on equity Earnings to interest and principal expenses Net foreign exchange exposure to equity Number of applications for protection from creditors
Households	Household debt to GDP Household debt service and principal payments to income
Market liquidity	Average bid-ask spread in the securities market[1] Average daily turnover ratio in the securities market[1]
Real estate markets	Real estate prices Residential real estate loans to total loans Commercial real estate loans to total loans

[1] Or in other markets that are most relevant to bank liquidity, such as foreign exchange markets.

The importance of property markets for monetary policy and financial stability[1]

Haibin Zhu[2]

1. Introduction

The real estate sector has been a major source of strength for the global economy since the most recent economic downturn. This has been particularly true of the residential property sector: in most countries house prices have been quite strong over the past few years. Rising house prices, together with low interest rates, have boosted mortgage refinancing activities, encouraged consumer spending and supported macroeconomic performance. By contrast, real commercial property prices in most economies have remained well below their peak levels reached in the late 1980s and the early 1990s. Despite this, delinquency rates for commercial real estate loans have been much lower than their historical averages. As a result, banks' loan portfolios have remained in reasonably good shape overall and the share of non-performing loans has been relatively low (BIS (2003a)).

The strong performance of the property sector and the general resilience of financial institutions stand in sharp contrast to the experience of the early 1990s. In the previous episode, the boom and subsequent bust in the property sector, particularly on the commercial side, were a major contributor to the banking problems. Sharp downward corrections in commercial property prices caused a broad-based reduction in profitability and a widespread deterioration in asset quality in the banking industry, driving many financial institutions into distress.

Despite these obvious differences between the two episodes one decade apart, a common underlying theme is the sizeable impact of property markets on the soundness of financial institutions and on macroeconomic activity. This impact is of course not a new observation. It is generally believed that the boom-bust nature of property price fluctuations has played a role in past business cycles, fuelling the upswing and magnifying the downswing. Falling property prices tend to impose downward pressure on the banking sector, not only because of increases in bad debt expenses for real estate loans, but also because of a deterioration in the balance sheets of corporate borrowers that rely on real estate as collateral. Hence, questions about the movements of real estate prices and the extent to which they interact with the financial sector and the macroeconomy have come to the attention of monetary authorities and financial regulators.

Against this background, this paper has three major objectives. The first is to explore the determinants of real estate prices and to examine exogenous and endogenous factors that contribute to property price fluctuations. It is shown that, although property price movements share some similarities as belonging to the same class of assets, they can differ substantially across sectors and countries. The second objective is to discuss the policy implications of the real estate cycle for the conduct of monetary policy. Finally, the paper seeks to identify important channels through which bank performance would be affected by movements in property prices. The next three sections tackle these three issues sequentially.

---

[1] Revised: December 2003.

[2] Correspondence: Research and Policy Analysis, Bank for International Settlements, 4002 Basel, Switzerland. E-mail: haibin.zhu@bis.org. This paper was prepared for the IMF-BIS conference on Real Estate Indicators and Financial Stability, which was held on 27-28 October 2003 in Washington DC. I thank Claudio Borio and Philip Davis for insightful comments and Steve Arthur for data support. The views in this paper are mine and should not be interpreted as reflecting those of the BIS.

2. Real estate as a particular type of asset

The determinants of property prices are in many ways similar to those of other assets, namely the expected service stream (consumption service) or expected future cash flow (rents) and the required rate of return (the long-term interest rate plus the risk premium) as a discount factor. In the long run, property prices therefore depend on demand factors, such as national income and average discount rates, and on supply factors, such as cost of construction, land availability and the quality of the existing stock.

Nevertheless, property markets also have a number of distinctive features compared with other types of asset. The supply of property is intensively local; delivery of the new stock can take quite a long time owing to the length of the planning and construction phases; rents can be very sticky because of the use of long-term rental contracts; market prices lack transparency and most transactions occur through bilateral negotiations; the liquidity of the market is constrained because of the existence of high transaction costs; borrowers rely heavily on external finance; real estate is widely used as collateral; and short sales are usually not possible. These features cause property prices to behave differently. In particular, in the short run, property prices are more likely to deviate from their long-term fundamentals. And fluctuations in property prices can arise not only owing to cyclical movements in economic fundamentals, interest rates and the risk premium, but also as a result of the intrinsic characteristics of the property market itself.

The business cycle causes property price fluctuations for obvious reasons. Improvements in overall economic conditions tend to increase the average income of households and therefore boost the demand for new homes, putting upward pressure on house prices. Similarly, businesses see profitable opportunities and seek to expand the scale of their investments. Such an expansion implies a higher demand for office space and storage, driving up commercial property prices. In addition, the market perception of risk changes with the phases of the cycle. During a booming phase, the risk involved in a given project is considered to be lower than in a downward phase. The changing risk premiums, in combination with time-varying interest rates (decided by policymakers), determine the discount rates and by extension have a sizeable impact on real estate prices.

Property price oscillations are also driven by endogenous factors, most notably supply lags and the historical dependence of investment decisions. On the one hand, the supply response in the property market is much slower compared with that of other goods, mainly as a result of limited land supply and the length of the approval process and the construction phase. On the other hand, the flow of information in the property market is usually inefficient. Because the turnover rate of properties is usually very low, the price information is rather limited and often inaccurate. In particular, much of the information that is important to understand the dynamics of property prices is related to knowledge of local markets, which is accessible only at a substantial cost. Therefore, it is usually very difficult, if not impossible, for market participants to forecast the future movements of property prices. In practice, market forecasts either rely heavily on current property prices or are computed by extrapolating past trends. This so-called “myopic” or “rule of thumb” expectation (Hendershott (1994) and Herring and Wachter (1999)) can contribute to endogenous oscillation of property prices or deviations from their long-run equilibrium values.

For example, during a booming period real estate prices continue to rise. Based on the past trend or current prices, constructors and developers decide to start new construction. However, as new construction may take several years to be completed, the adjustment process is slow. By the time the construction is delivered, the market demand may have fallen off. As a result, vacancy rates climb. The oversupply forces rents and real estate prices to fall, sometimes even below their fundamental values.

This “overbuilding” story can occasionally result from the distortion of private incentives by inappropriate or flawed government policies on both the regulatory and legislative fronts. One notable example is related to financial liberalisation after the 1970s in a number of industrial and emerging market economies (see Borio et al (1994) and BIS (1993)). Following liberalisation and deregulation, new financial institutions emerge and compete with existing lending institutions by offering loans on cheaper terms. As competition among lenders intensifies and more resources for financing real estate projects become available, the number of potential investors in the real estate sector increases and property prices will rise above their fundamental values. The distortion effect is even stronger when there are moral hazard problems in the market related to inappropriate policies such as overly generous guarantees and inefficient regulation. Guarantees against losses create an incentive for lenders to invest in high-return, high-risk projects, resulting in excessive risk-taking and overly

exuberant property assets. This mechanism of real estate cycles has attracted a lot of attention in the past two decades. It is widely believed that financial liberalisation has contributed to a series of real estate boom and bust episodes, including the collapse of the US thrift institutions in the late 1980s and the 1997 East Asian crisis.

Beyond these common characteristics, the dynamics of property prices can vary substantially across sectors (residential vs commercial, office vs retail, etc) and across countries as a result of differences in a number of specific demand and supply factors. For example, while housing prices on average have posted robust growth since the mid-1990s, experience has differed considerably across countries. House price growth has been particularly strong in Australia, Ireland, the Netherlands, Spain and the United Kingdom, followed by the United States and some of the Nordic countries. At the other end of the spectrum are Germany, Japan and Switzerland, where prices have remained rather flat or even declined over the past decade. A second example is the usual divergence between housing markets and commercial property markets. In the most recent economic downturn, the residential sector was very strong, reflecting the substantial role of low interest rates. Conversely, the commercial property sector seemed to be more constrained by the sluggish macroeconomic environment and posted capital losses in most industrial countries. Such national and sectoral differences can be attributed to asynchronous business cycles, as well as to distinctive local factors (elasticity of supply, funding methods, subsidy/tax polices, legal framework, etc).

2.1 Residential property prices

A house is a long-lived asset that delivers consumption services over many periods. In many respects it is more like a durable good than an investment asset. Given that residential property can provide accommodation to its owner, it has an intrinsic reservation value determined by the discounted value of the expected service stream. As a result, nominal housing prices are usually less likely to fall as sharply as equity prices and commercial real estate prices. Indeed, in many situations the downward pressure on the housing market is typically reflected in shrinking transaction volumes rather than in a collapse in nominal prices, as owners refrain from selling at a loss.

As noted, housing price fluctuations can be driven by macro factors and intrinsic characteristics of the housing market itself. Empirical evidence suggests that the market has its own distinct dynamics. On average, almost three fifths of the overall variation in housing prices can be explained by innovations in the housing market itself. The combined effect of other explanatory factors, such as GDP, interest rates, bank credit and equity prices, accounts for the rest (Graph 1).

However, Graph 1 also suggests that the importance of individual factors differs substantially across countries. This could be so for various reasons: the demand for houses is determined by demographic dynamics in each country; the supply of new homes can be constrained by land availability and the local land planning system; the financing cost of home purchases depends to a large extent on the housing financing system; and the liquidity of the housing market may be further constrained by the existence of transaction costs such as VAT, stamp duties and registration fees, as well as real estate taxes. All of these factors are local and specific to each market, leading to cross-country differences in housing price movements and in the relative importance of various factors.

An important factor that exhibits substantial cross-country variation is the responsiveness of supply. While house prices are determined by construction costs in the long run, the supply of new housing can only respond sluggishly to demand in the short horizon. Hence house prices may deviate from their long-term trends for a considerable period of time. The inertia of supply responsiveness depends to a large extent on local legislative and structural factors, as well as on tax and subsidy policies. The fact that new housing policy is less responsive to price movements in some countries, such as the Netherlands, the United Kingdom and some of the Nordic countries, has partially contributed to recent housing booms in these areas. Extreme cases are the Netherlands and the United Kingdom, which have witnessed actual reductions in the supply of housing during their latest round of housing booms. This pervasive development, which may be attributable to strict land development policies and caps on the supply of new housing, in turn drove housing prices even higher. By contrast, housing prices in Germany have remained flat in the past decade. Many believe that the flatness can at least be partly explained by the more flexible supply conditions in Germany relative to the other European countries.

The functioning of the housing markets also relies heavily on the housing financing system, where there is a bewildering variety of contract arrangements, policies, tax breaks and subsidies. First, the duration of the interest rate that anchors mortgage rates is different across countries. In particular,

mortgages in Australia, Canada, Finland, Ireland, Luxembourg, Norway, Portugal, Spain and the United Kingdom are mainly based on short-term interest rates, making house prices generally more responsive to short-term interest rates in these countries. By contrast, the majority of mortgage financing is tied to long-term interest rates in Belgium, Denmark, France, Germany, Italy, Japan, the Netherlands and the United States (see Borio (1995) and ECB (2003)). Second, the nature of the penalties on early repayment has a significant impact on how far households will be willing and able to refinance their mortgage debts when interest rates fall or when house prices rise. Refinancing in the United States is notably easier and cheaper than in other countries, not only because of smaller penalties but also due to innovations in mortgage securitisation introduced by Fannie Mae and Freddie Mac (see Deep and Domanski (2002)). Third, collateral valuation practices have potentially major implications for credit supply. Valuation methods that are very sensitive to market values, in combination with high loan-to-value (LTV) ratios, would generate a boom in credit supply when property prices rise and a credit crunch when prices fall (see Borio et al (2001) and G10 (2002)). Finally, lower transaction costs may stimulate turnover and enhance the responsiveness of housing markets to macroeconomic shocks. The ratios of transaction costs (including stamp duty, registration fees and real estate taxes) to house prices vary from a low level of 2% in the United Kingdom to exceptionally high levels of 20% in Belgium and 14% in France. Other things being equal, rising demand is more likely to have a larger impact on house prices in the group of countries with lower transaction costs (Graph 2).

While house prices are mainly determined by the above housing market factors, they can also be responsive to returns on other asset classes. An interesting issue that has drawn a lot of attention lately is the comovement between equity prices and housing prices. Given that equity holdings and housing are the two largest portfolio components of household wealth in developed countries, price inflation in one asset will influence the investment decisions of households; the resulting reallocation of portfolios will affect the price of the other asset. In theory, there might be two effects working in opposite directions. The substitution effect suggests that the two asset prices should move in opposite directions, as higher returns in one market will shift investment away from the other market and cause its price to decline. By contrast, the wealth effect predicts that an increase in equity (or house) prices, by increasing the value of household wealth, will allow households to expand their investment in both markets. As a result, the two asset prices will tend to move in the same direction. Depending on the relative importance of the two effects, the interaction between the two markets may be very different.

The connection between the two assets is supported by empirical evidence, which shows a clear pattern in the lead-lag relationship between equity prices and housing prices in many developed countries over the past 30 years. In particular, equity price fluctuations tend to be highly correlated with house price fluctuations six quarters later (Graph 3). Further evidence can be derived from impulse response analyses based on a VAR analysis (see Appendix). The results suggest that equity price fluctuations contribute to the variation in house prices, and the cumulative effect usually peaks after eight to 10 quarters (Graph 4). The fact that housing prices continued to rise three years after the collapse of the equity market in the most recent slowdown is mainly attributable to the current low interest rate environment, which partly offsets the downward pressure associated with falling equity prices. Overall, the substitution effect appears to have played a more important role lately as households which were disappointed with the prospects of equity market investments shifted a large proportion of savings into residential real estate.

2.2 Commercial property prices

Commercial property markets have some unique characteristics, such as longer construction lags, long-term leases and volatile income streams, which cause the commercial and residential property cycles to show distinct patterns. Moreover, commercial property cycles may be asynchronous across regions and sectors. Depending on the elasticity of supply, development lags, durability of assets and funding methods, different types of commercial property may themselves have varying dynamics.

Unlike residential real estate, commercial property is more of a pure investment asset and its value is determined by the discounted value of future rents. When macroeconomic conditions weaken, shrinking business activity cuts down the demand for commercial property and results in higher vacancy rates. Rising vacancy rates and lower rental rates lead to a deterioration of real estate market fundamentals and cause prices to fall. Compared with a residential property, the reservation value for a commercial property is much lower, because its consumption value is low while its maintenance cost is very high. As a result, commercial property prices tend to be more responsive to macroeconomic

conditions, and it is common to observe a sharp decline in nominal commercial property prices during an economic downturn. As Graph 1 suggests, the dynamics of commercial property prices are somewhat less "autonomous" than those of residential sector prices, in the sense that shocks in the commercial property sector explain only 50% of the variation in property prices while the equivalent figure in the residential sector is about 60%.

Graph 1 also reveals the importance of bank credit in determining commercial property prices. This might relate to the fact that commercial property has been widely used as collateral, so that property prices are closely connected with borrowers' financial positions. This idea has been formerly modelled in the seminal work of Bernanke et al (1994) and Kiyotaki and Moore (1997), who highlight the importance of credit market imperfections resulting from asymmetric information between borrowers and lenders. To overcome the adverse selection and moral hazard problems, banks choose to link the terms of credit to the net value of borrowers' balance sheets. In other words, the borrowers' borrowing capacity and cost of external finance largely depend on the value of collateral assets. This introduces a strong interaction between bank credit and the balance sheets of borrowers. Higher collateral (such as real estate) values improve the debtors' balance sheets and allow them to finance new projects on more favourable terms. The availability of extra credit in turn pushes the asset price even higher. By contrast, falling property prices weaken the financial position of borrowers, reduce bank credit to the real estate sector and push property prices even lower. This amplification effect, which is known as the "financial accelerator", can significantly contribute to the high volatility that has been observed in commercial property markets.

The close connection between bank lending and commercial property prices, however, may have been changed in the past decade in the wake of the emergence of new financing methods. A new trend since the early 1990s is that the commercial property sector has been less reliant on funds from traditional sources such as banks and insurance companies. As a substitute, capital market sources of financing, in both equity and debt form, have grown rapidly. This may have resulted in important changes in the dynamics of commercial real estate markets (see Zhu (2002)). On the equity side, the development of real estate investment trusts (REITs) has been particularly remarkable in Australia and the United States. In the United States, REITs have overtaken the pension funds to become the most important institutional investors in the real estate equity market. In Australia, the listed property trusts (LPTs) now control about one third of the commercial real estate assets in the country. On the debt side, securitisation of commercial mortgage-backed assets (CMBSs) has become very popular in both Europe and the United States.

The increasing importance of public real estate markets may lead to a closer integration between commercial real estate and the capital market. Some market participants have argued that this could, on balance, dampen the commercial real estate cycles. From the funding perspective, the development of new funding methods can help to even out the flow of capital into the commercial property sector. For example, in the early 1990s, when most US banks and thrifts were reluctant to extend commercial real estate loans, REIT and CMBS markets developed and successfully removed the potential risk related to financing uncertainty in the commercial property market. Moreover, the development of public markets can strengthen market discipline. Arguably, the low-leverage ownership structure of REITs makes them less likely to build aggressively for speculative future demand. Improved information disclosure and publicly observable prices reflect the changing preferences and concerns of market participants in a more timely manner, so that the market may be able to detect asset price imbalances at an early stage. If so, commercial property prices could be less prone to large swings owing to funding cycles, and their impact on bank performance will be weakened. Nevertheless, given that the integration of the commercial property sector with capital markets could introduce new sources of market volatility, the validity of such an argument remains to be tested.

3. Real estate prices and monetary policy transmission

Movements in property prices could affect aggregate demand and economic activity in various ways. First, rising property prices lead to more optimistic expectations of the returns on property investment. As a result, builders start new construction and market demand in property-related sectors increases. Second, rising house prices induce households to increase private expenditure and therefore provide a big support for private consumption. Third, changes in commercial property prices may significantly

change the investment decisions of those firms that are financially constrained. Similarly, movements in house prices influence the financial behaviour of homeowners and would-be home purchasers.

The role of real estate prices in the conduct of monetary policy has attracted much attention among researchers and policymakers in recent years. There has been extensive evidence that property price movements have a large impact on private consumption and the real economy. For example, Helbling and Terrones (2003) examine the downside effect of property price movements and find that house price busts are associated with output losses twice as large as equity bubbles. In addition, Graphs 5 and 6 demonstrate the cumulative responses of real GDP to 1% shocks in house prices and commercial property prices based on a structural VAR analysis (see Appendix). The results show that increases in property prices tend to have a positive impact on real GDP in many countries. Importantly, the magnitude of this impact is different across countries and sectors. The commercial property sector seems to have a larger impact on the real economy, reflecting the fact that it is more important in affecting the investment decisions and financial conditions of corporate firms. Besides, the national difference suggests that the role of property prices in monetary policy transmission might be influenced by local factors.

3.1 The investment channel

Real estate is an important investment asset in the economy. According to Tobin's q approach, the profitability of property investment depends on the ratio between property prices and property replacement cost. When property prices rise above the cost of construction, it is profitable for property developers and other non-financial firms to construct new buildings. Accordingly, the boom in the construction sector boosts employment and demand in property-related sectors. As real estate investment usually represents a significant proportion of the economy as a whole in most countries, the impact can be substantial.

The impact of property prices on construction depends on the importance of the real estate sector in the economy as a whole, the elasticity of property supply and credit conditions in the country. Owing to rigidities in supply, this impact often builds up gradually. The lagged effect can arise from constraints on the availability of land, the local land planning system or the competitive conditions in the construction sector. The lag is also affected by the ease of access to credit and the availability of new sources of funds. Particularly, a construction boom is more likely to take place in financially liberalised economies. With the entry of new financial institutions and intensified competition, property developers and builders can easily receive loans on favourable terms for new construction. Cheap loans then stimulate building activity, as exemplified in a number of countries (G10 (2002)).

In addition to the impact on the construction sector, fluctuations in property prices can have an important influence on investment decisions in other sectors via the liquidity effect or, equivalently, by changing the financial position of various economic agents. Increases in property prices improve the financial condition of property owners, enabling them to raise external funds to finance new projects. Empirical evidence suggests that the impact of financial conditions on investment decisions is greatest for financially constrained firms. Higher property prices can improve the capacity of these firms and allow the economy to invest to its full capacity.

The liquidity effect is, however, a double-edged sword. While rising property prices alleviate credit constraints for property owners, falling property prices can amplify the adverse effect through the interaction between the credit constraint and balance sheet conditions. An initially constrained investor will find it more difficult to access loans, as fewer loans are available in the credit market. The investor either has to give up the investment project or borrow at very high costs. Similarly, an initially unconstrained investor may find himself no longer able to finance new projects on the initial terms and conditions. Rising funding costs and limited accessibility force both groups of investors to cut back the scale of their projects.

3.2 The wealth effect

The argument for the wealth effect goes back to the permanent income hypothesis of the life cycle model. According to this hypothesis, the level of household consumption is determined by permanent income, which is the present value of all future incomes of the household. Given that housing and equity are the two most important financial assets for an average household in most industrial countries, with housing typically the greater of the two, an increase in house prices implies that

household wealth increases. As a result, owner-occupiers may reduce their savings and increase their expenditure.

The strength of the aggregate wealth effect, however, is uncertain and depends on several factors. First, it depends on whether the house price gains are perceived to be permanent or temporary. Second, the size of the wealth effect is also related to the home ownership rate in the economy. Rising house prices tend to increase the wealth of homeowners but make houses less affordable for those households that are planning to purchase their own homes. First-home buyers need to save more for higher mortgage payments and their consumption actually drops when house prices increase. Third, the ability of households to consume capital gains from houses depends on the flexibility of the housing financing system. In other words, whether refinancing is permitted, on what terms and at what cost - these are the main financial factors that determine the magnitude of the wealth effect. For example, an important channel through which households extract consumption from house wealth is the mortgage equity withdrawal (MEW) mechanism, which is mainly based on refinancing. In most euro area countries (except the Netherlands), MEW has been almost entirely absent, as the mortgage market is not very competitive, the cost of refinancing is high and households are rather reluctant to extract equity from their housing stock. In sharp contrast, MEW has been very prominent recently in Australia, the Netherlands, Sweden, the United Kingdom and the United States. In 2002, cash-out refinancing pumped an estimated USD 97 billion from home equity back into the economy in the United States, providing important support for consumer confidence and private consumption. Similarly, the ratio of MEW to disposable income in the United Kingdom hit a very high level of 6.7% by end-2002 (Graph 7).

3.3 Challenges for the monetary authorities

The link between property prices and aggregate demand suggests that the monetary authorities can benefit from monitoring developments in property markets. The view that policymakers should respond to excessive increases in property values which are manifestations of excess demand in the economy as a whole has received much sympathy within central bank circles. In particular, monetary policymakers need to identify the sources and nature of property price fluctuations in order to understand their implications for price stability and the general economy, and then to formulate the appropriate policy response. However, in practice, critical issues arise, suggesting that implementation is not an easy task.

First, it is often not straightforward to identify “excessive” property price inflation at an early stage. Lack of reliable data, diversity in valuation methods and unpredictability of market movements make it difficult for policymakers to design an early warning signal of asset price imbalances in the property market with a comfortable degree of confidence.

Second, it is technically difficult to predict the exact effects of monetary policy on the property market and on the macroeconomy. In many cases the monetary authorities find themselves in a dilemma, as price stability in the goods market and in the asset market (including the real estate market) may call for different policy responses. For example, in recent years many industrial countries have witnessed booms in housing markets, at the same time as macroeconomic performance was sluggish and inflation rates were very low. The coexistence of strong house price inflation and low inflation in the goods market has posed a serious dilemma for policymakers. The tightening consistent with stability in the housing market may risk excessive deflation in the goods market and a subsequent negative impact on an already weakened macroeconomy. On the other hand, the build-up of household debt, which has mainly been a result of low interest rates, has increased household indebtedness and may finally impair the ability of households to continue servicing their debts without adjustments in their expenditure.

On balance, whether the monetary authorities are able to use monetary policy to contain asset market imbalances remains debatable. The above two problems, namely “when to do it” and “how to do it”, need to be resolved before the monetary authorities can refine their policy framework to deal with asset market imbalances.

4. Real estate prices and financial stability

Bank lending is the primary source of real estate funding; not surprisingly, there are close connections between real estate prices and bank credit. On the one hand, sharp falls in property prices can lead to a large-scale deterioration in asset quality and in the profitability of the banking industry, particularly for those banks that are deeply involved in property or property-related lending businesses. They also undermine the value of bank capital, reducing the banks' lending capacity. On the other hand, banks' lending attitude has important implications for property prices. Bank credit to property buyers and constructors may change the balance between the demand and the supply side and cause property prices to fluctuate.

The linkage between property prices and bank credit is confirmed by empirical evidence based on the VAR analysis (see Appendix) in a number of countries. Graphs 5 and 6 show that increases in property prices often lead to expansion of bank credit and this impact is notably high in some countries. Recent studies by Hofmann (2001) and Davis and Zhu (2004) suggest that bank credit and property prices are positively related in the long run. They further point out that the impact of property prices on bank credit is significantly positive, yet the impact in the reverse direction in less clear.

4.1 Risks for banks

Movements in real estate prices can have a substantial impact on banking performance. In particular, falling property prices may lead the banking sector into distress via various channels, eg through increases in bad loan expenses in real estate loans, or through a deterioration in the financial conditions of borrowers and banks themselves, or indirectly through a contraction in financial transactions and in economic activity.

First of all, real estate lending is one of the most important components of bank loans. In most developed countries it accounts for one third, sometimes even more than half, of total bank loans. Declines in real estate prices imply a lower return in the property industry and hence real estate loans are more likely to default. This reduces the profitability of bank lending and increases the banks' bad debt expenses as well.

The complexity of the credit risk channel increases given the prevalent use of collateralised lending in real estate loans. On both residential and commercial property markets, mortgage loans are often collateralised by the underlying property. Nevertheless, the use of a low LTV ratio does not necessarily shelter banks from loan losses. When property prices decline sharply, even ratios that were initially considered to be very conservative may turn out to be insufficient. In particular, when a high LTV ratio is used in combination with the market value (defined as the expected price if the target asset was traded on the date of valuation), it could be very risky for mortgage lenders because default risk could be extremely high during a downward phase.

The credit risk exposure of property loans also depends largely on the usage of these loans. Residential mortgage loans are usually considered to be very safe, as a home is more like a consumption good and the repayment of these loans often comes from household income, which is relatively stable. By contrast, loans to developers and constructors for commercial purposes are much riskier. The repayment of these loans is backed by the sale prices or rents generated from the property upon its completion. Declines in property prices imply a deterioration in the financial position of developers and constructors; therefore they are not able to borrow new funds that are essential for the completion of the project. When the property under construction is left unfinished, the value of collateral drops close to zero and the commercial mortgage loan is deemed to default. In fact, increases in non-performing loans in the commercial property sector have been a major contributor to a number of banking crises, such as the financial distress in the early 1990s in many industrial countries and the 1997 East Asian crisis.

The credit risk, however, is not confined to the real estate sector. Because real estate assets are also widely used as collateral for other types of loans, fluctuations in property prices would have a broader impact on the banking industry through the balance sheet effect as noted above. When real estate prices fall, a typical borrower is more likely to face financial constraints in the form of reduced borrowing capacity. These constraints restrict the scale of new investment and reduce the profitability of corporate firms. As a result, the credit risk exposure of other types of bank loans increases as well, exacerbating the fragility of the banking sector.

This credit risk channel and its interaction with financial constraints become even more complex under certain conditions. One example is that the banks' lending criteria are arguably procyclical. Banks tend to underestimate the default probability of property-related loans in a real estate boom for various reasons, including poor risk management practices, poor data and perverse incentives linked to the safety net. This "disaster myopia", as defined by Herring and Wachter (1999), can be a major contributor to the build-up of asset price inflation and increases in banks' credit risk exposure. Another worrisome situation occurs when one bank or a particular type of financial institution has extremely high concentration in the real estate sector, as exemplified by the US thrift institutions and the Japanese "Jusen". This concentration of property-related risk turned out to be very dangerous in both cases. The collapse of property prices easily dragged down these specialised institutions, and generated systemic risk for the whole financial system.

In addition to the credit risk effect, declines in property prices would also lead to a reduction in bank profitability via indirect channels. During the downward phase of property markets, banks' capital base is weakened because of increasing provisions and declines in the value of fixed assets. As a result, banks' lending capacity is limited and inevitably their interest income will fall. Moreover, as construction and borrowing activity shrink, banks' fees and commission income from real estate related transactions decline. Finally, as noted above, declines in property prices may generate a negative feedback on the overall economic conditions. This type of risk, because of its nature, is more difficult to hedge and is likely to affect the sector as a whole.

Table 1

Banking profitability at different stages of property cycles:[1] 1979-2001

	Return on equity		**Return on assets**		**Loan loss provisions (% of total loans)**		***Memo: Number of years***	
	Up swing[2]	**Down swing**	**Up swing**	**Down swing**	**Up swing**	**Down swing**	***Up swing***	***Down swing***
Australia	12.44	9.61	1.27	0.85	–	–	*9*	*7*
Belgium	12.22	12.31	0.37	0.36	0.32	0.62	*15*	*6*
Canada	18.71	17.24	0.98	0.90	0.72	0.71	*10*	*10*
Finland	6.75	6.30	0.46	–0.02	0.41	0.23	*15*	*8*
France	11.07	1.77	0.41	0.04	0.56	1.04	*7*	*7*
Germany	10.86	12.74	0.51	0.60	0.63	0.87	*12*	*11*
Italy	15.21	12.61	0.99	0.71	0.88	1.16	*9*	*9*
Japan	17.67	–3.65	0.48	–0.13	0.06	0.70	*13*	*10*
Netherlands	16.34	14.41	0.73	0.51	–	–	*15*	*8*
Norway	15.13	–37.78	0.87	–0.72	0.24	2.47	*14*	*8*
Spain	10.50	7.89	0.96	0.75	0.81	1.30	*13*	*10*
Sweden	15.82	11.53	0.86	0.60	0.49	0.15	*12*	*11*
Switzerland	10.96	9.26	0.70	0.54	–	–	*12*	*11*
United Kingdom	21.47	15.64	1.05	0.67	–	–	*13*	*5*
United States	17.03	16.02	1.34	1.12	0.90	0.87	*14*	*9*
Average	14.15	7.06	0.80	0.45	0.55	0.92		

[1] Aggregate property prices are constructed as a weighted average of real house prices and real commercial property prices. [2] "Up (down) swing" refers to the years when real aggregate property prices in the country concerned increase (decrease).

Sources: OECD; BIS; author's calculations.

Table 1 computes the average levels of banking profitability and loan loss provisions during the upward phase and downward phase of property markets in a number of industrial countries. On average, the profits of banks almost halve and loan loss provisions nearly double in "bad" years. A striking example is Norway, where bank performance was dramatically affected by property market conditions. Similarly, it is widely believed that the large exposure of the banking industry to the real estate sector and the collapse of land prices have been at the heart of Japanese banking problems, contributing to the increase in non-performing loans in the banking sector and distorting the performance of the real economy.

In sum, given the large effect of property prices on bank profitability, booms and busts in real estate prices have important implications for financial stability. Even if large swings in property prices do not necessarily bring the banking sector into distress, they do feature in a number of banking crises in industrial and emerging market countries alike (see Herring and Wachter (1999)). Typical examples in recent decades are Spain in the late 1970s and early 1980s, the Nordic countries in the late 1980s, Mexico in the early 1980s and mid-1990s, Japan in the whole past decade, Thailand in 1994-97 and a number of other episodes (see Hilbers et al (2001)). An important observation is that the financial system is more vulnerable to property market movements in financially liberalised economies where effective prudential regulation is not fully developed. After financial liberalisation, lending rates tend to be driven down as a result of the entry of new financial institutions, intensified competition among lenders, and removal of interest rate control and administrative control on credit growth. As net interest margins shrink, banks come under pressure to search for new opportunities and may tend to underestimate the risk of new loans. Especially if an effective prudential regulation system is not in place, excessive competition can easily lead to a build-up of financial imbalances. The unwinding of financial imbalances at a later stage triggers the onset of a banking crisis.

4.2 Implications for risk management

Risk management is at the heart of all financial activities. It is crucial for managers and financial regulators to measure accurately the credit risk exposure of banks and to make sure that such risk does not jeopardise the stability of the financial system. In the current revision of the capital adequacy framework by the Basel Committee on Banking Supervision (BCBS), the main theme is to improve measurement of the credit risk exposure of banks.

Given the important share of real estate loans and property-related loans in bank portfolios, banks need to have a clear understanding of the impact of property market movements on their balance sheets. However, owing to lack of reliable data and the heterogeneity of property markets, the task is typically a difficult one.

The difficulty arises first from the regional and sectoral differences mentioned above. For example, real estate loans can have different maturities; they can be granted at fixed or floating interest rates; and the levels of household debt and debt service burden vary across countries. All these features make property assets non-comparable across national boundaries. To understand the risk involved in individual loans, including default risk and prepayment risk, requires a thorough knowledge of local markets and market dynamics. These national differences imply that the risk weights, which are used to decide the level of economic capital, should vary across countries and differ between residential and commercial mortgage loans. Even within the same category of residential mortgage loans (in the same country), the credit exposure for principal residence and that for second-home investors can be quite different in the event of a housing price decline.

Default correlations add another layer of complexity. The correlation is relevant in at least three dimensions. First, mortgage loans tend to have a substantial systematic component in that the default correlation is high. Although mortgage loans on average have a lower default probability, the defaults usually come together, when a national market falls into distress. This high correlation is particularly important in small economies, where the national market offers only limited diversification opportunities. By contrast, default correlations will tend to be lower in large countries with more regional economic profiles.

The second dimension is the relationship between probability of default (PD) and loss-given-default (LGD). While most credit risk models, including those underlying the Basel Accord, treat PD and LGD as independent, empirical evidence suggests a strong positive correlation between these two variables. This result is not surprising, as default rates are usually higher during economic downturns. Such periods also tend to go hand in hand with depressed property prices. The procyclical relationship

between the two variables raises questions about the market practice of assuming a zero correlation, as the latter would underestimate the expected loan losses in bad times.

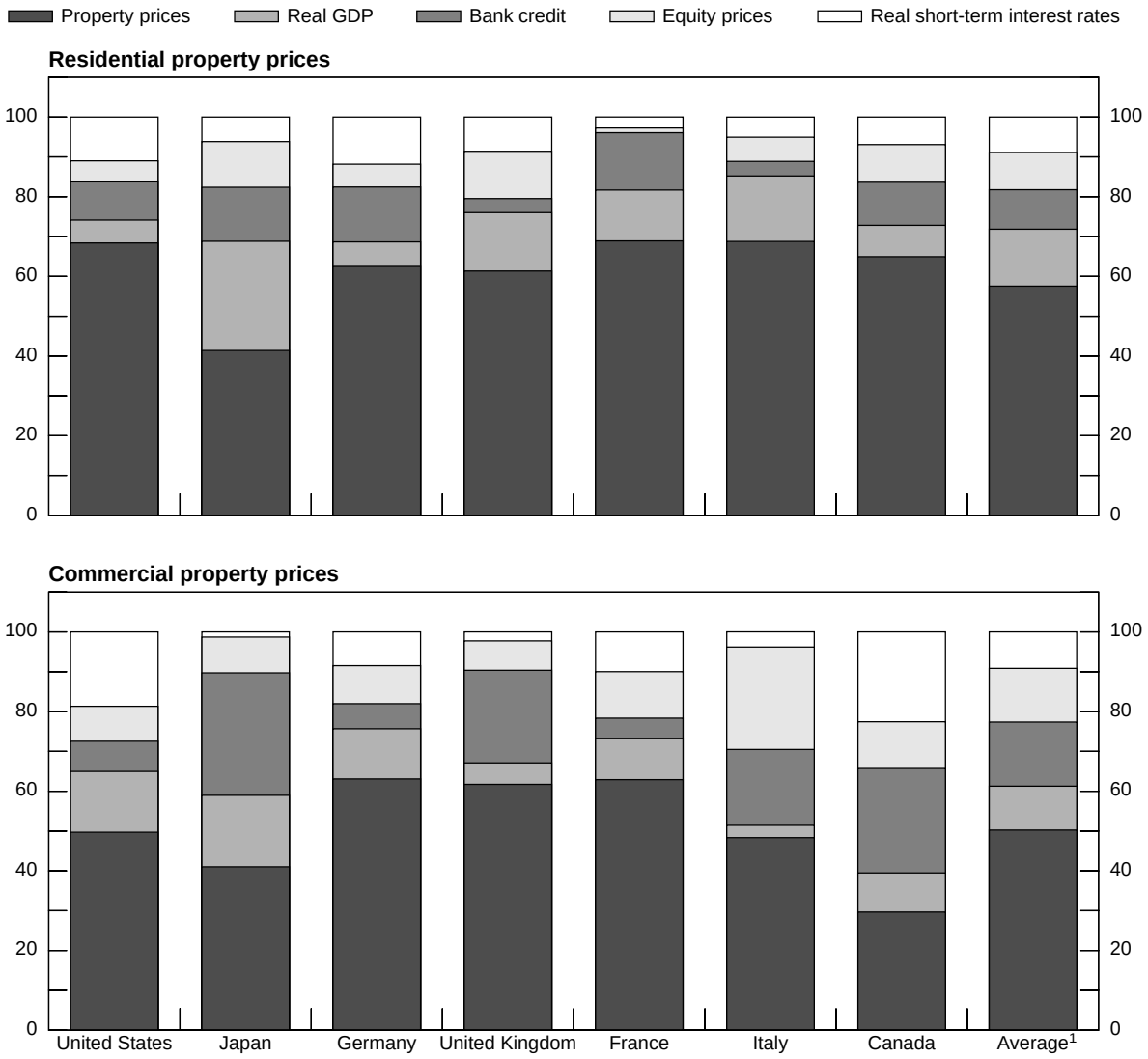
The final dimension relates to the potential for cross-country diversification. Cross-border real estate investment has traditionally been considered a strategy to achieve diversification benefits, and has been on the increase in the past decade. However, empirical evidence (Graph 8) suggests that global commercial property markets have become more integrated since the mid-1980s, even though a significant diversification benefit from global housing markets is still present. Case et al (2000) find that the high correlation across national commercial property markets links strongly to effects of changes in GNP, suggesting that real estate investments are akin to a bet on fundamental economic variables that are correlated across countries. Ignoring the trend of global market convergence will also lead to an underestimation of the capital reserves that are needed for a sound banking system.

5. Final remarks

The nature of real estate price dynamics and their relationship with financial stability and monetary policy are much debated questions among academics and policymakers alike. They pose important challenges for risk management, financial regulation and policy design. These issues may not be fully resolved in the near future, mainly because of the complexity of the market and varieties of market functioning. To a large extent this is a consequence of inadequate data and weak analysis. The collection of reliable and comparable data on property markets has proved very difficult, restricting the scope of meaningful analysis. Looking forward, there is a need for action aimed at improving the quality of property data and enhancing the comparability of national statistics across countries.

Graph 1

Contribution of different factors in explaining the variation in property prices

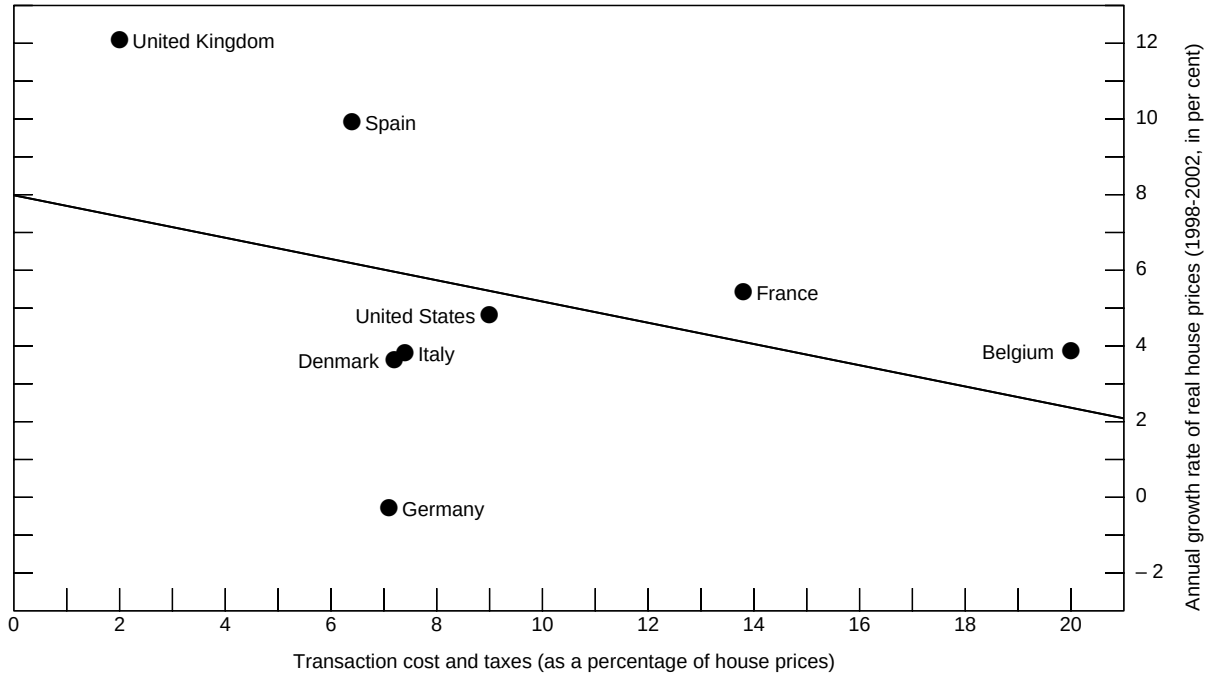


[1] Of the G7 countries plus Australia, Belgium, Denmark, Finland, Ireland, the Netherlands, Norway, Spain, Sweden and Switzerland.

Source: Author's calculations.

Graph 2

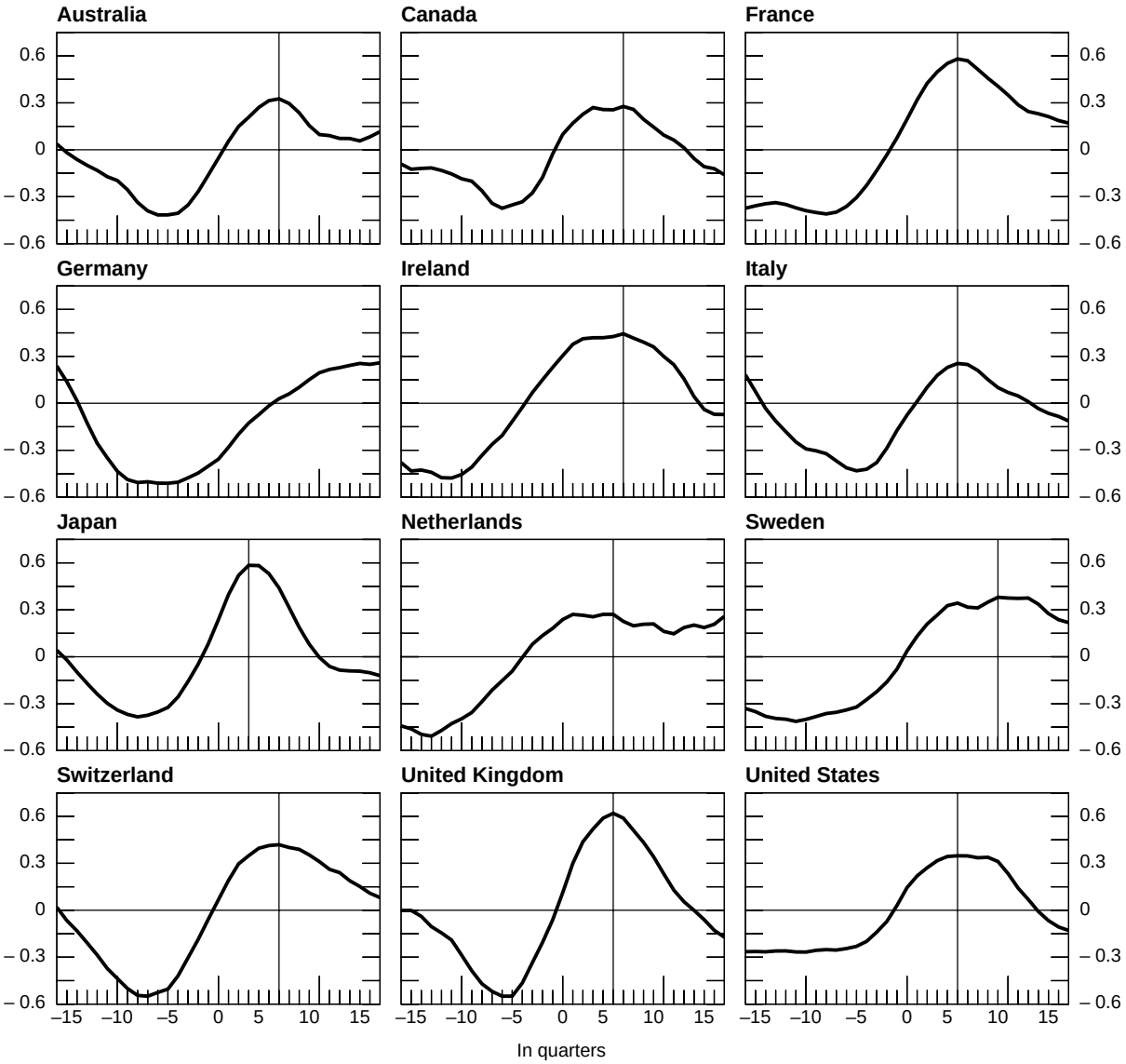
Transaction cost against house price variation



Sources: Maclennan et al (1998); national data.

Graph 3

Lead-lag correlation between real residential property prices and real equity prices[1]

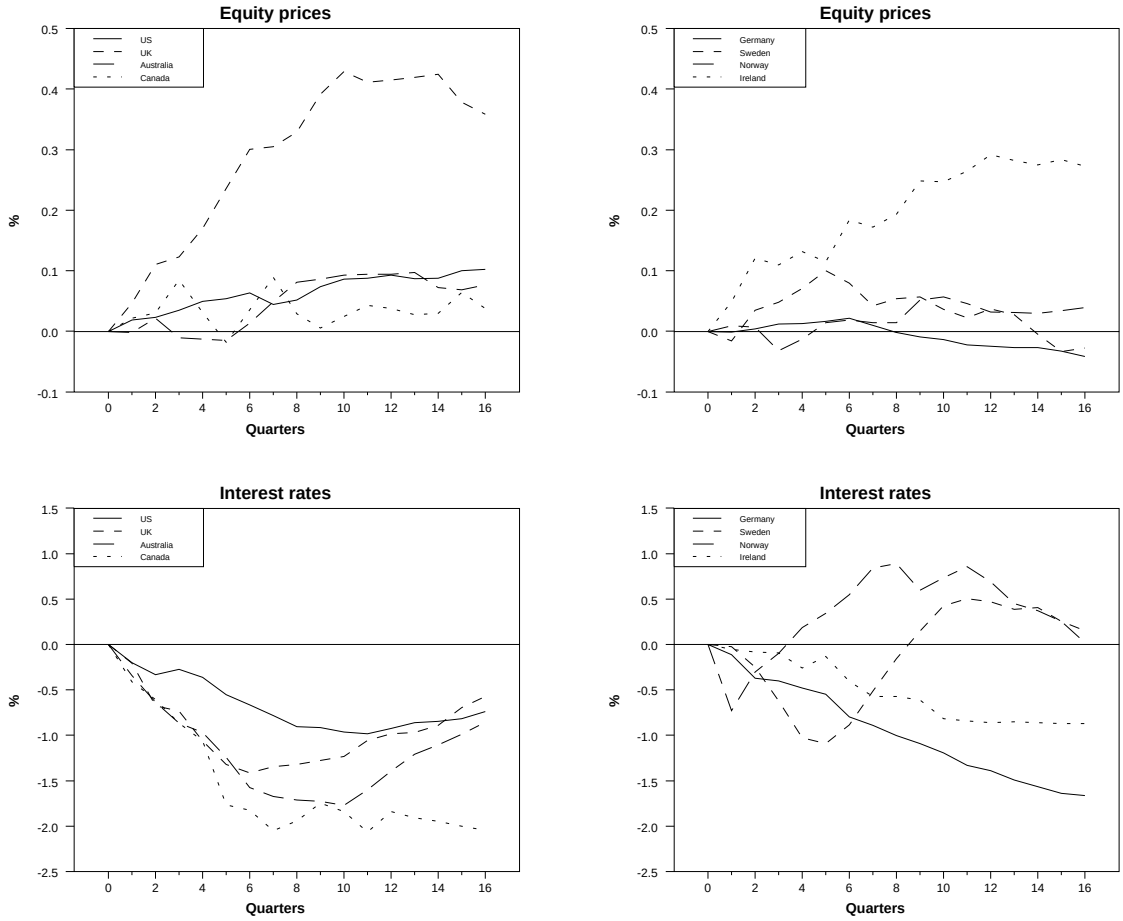


[1] Based on the detrended ratio of both series. The vertical line indicates the time of maximum correlation (for Germany, after 16 quarters). The x-axis refers to the number of quarters that equity prices lead (positive values) or lag (negative values) residential property prices.

Source: Author's calculations.

Graph 4

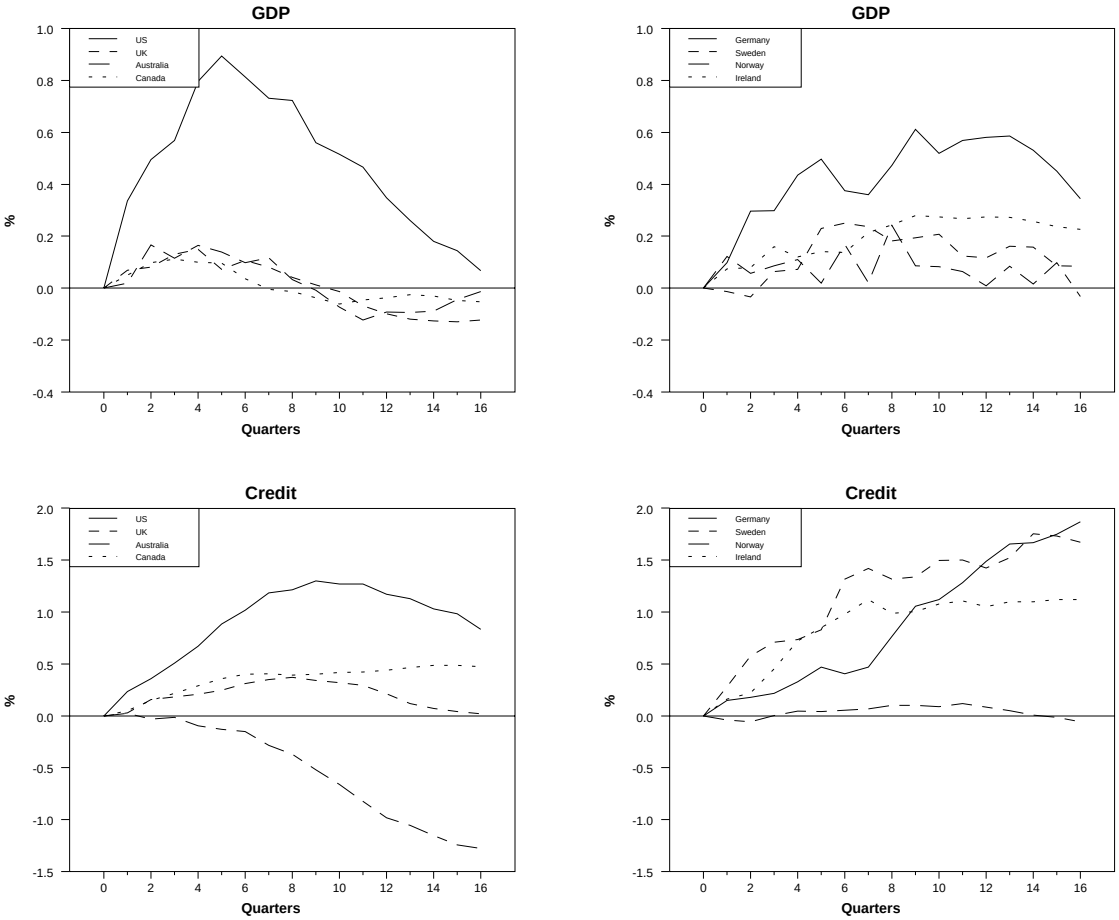
Cumulative responses of house prices to a 1% shock in:



Source: Author's calculations.

Graph 5

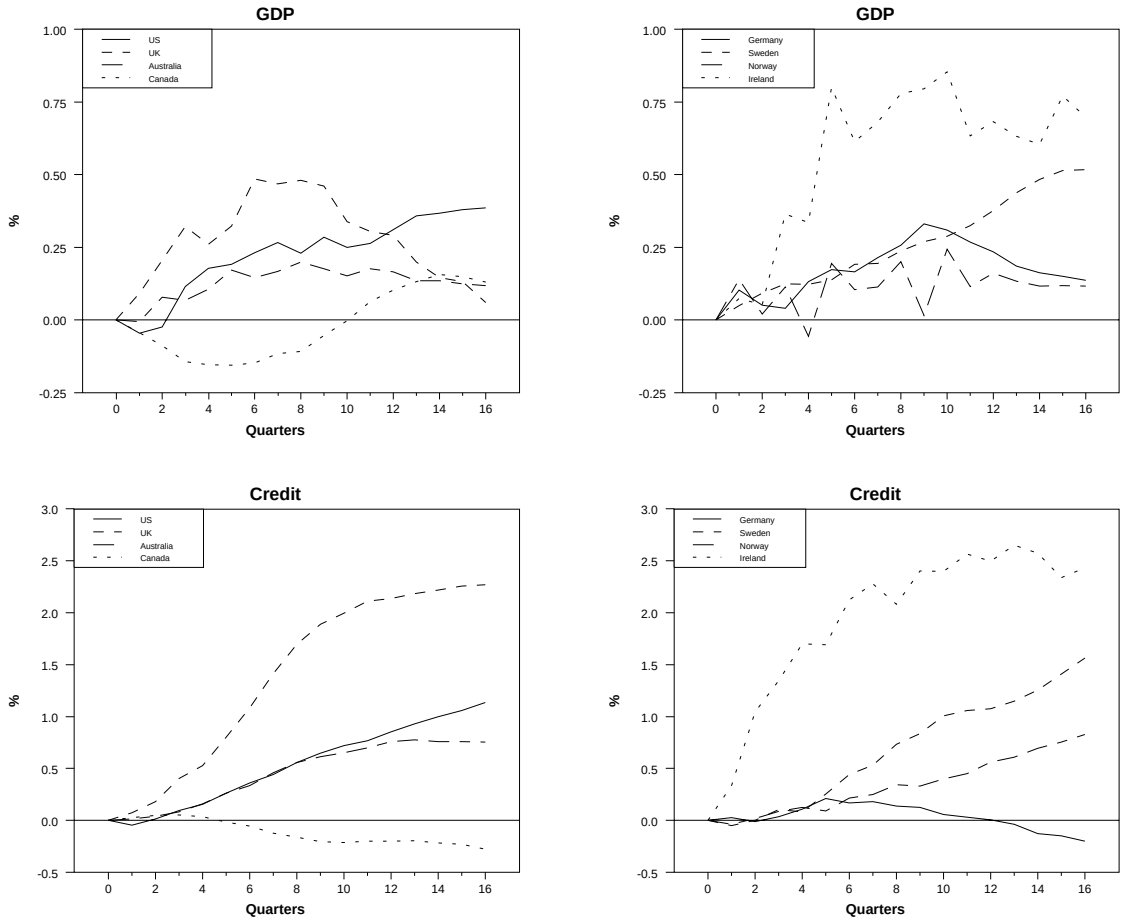
Cumulative responses to a 1% shock in house prices



Source: Author's calculations.

Graph 6

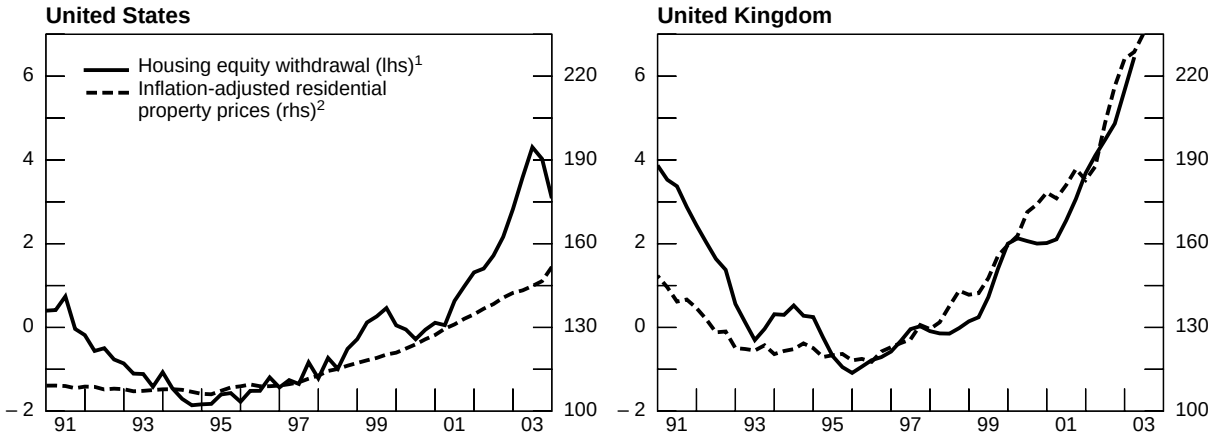
Cumulative responses to a 1% shock in commercial property prices



Source: Author's calculations.

Graph 7

Housing equity withdrawal and residential property prices



[1] Change in housing finance less households' investment in housing as a percentage of household disposable income; three-quarter moving average. [2] 1985 = 100.

Sources: Bank of England; Board of Governors of the Federal Reserve System; national data.

Graph 8

Rolling average correlation of global property markets

The sample comprises 17 countries: Australia, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, the Netherlands, Norway, Spain, Sweden, Switzerland, the United Kingdom and the United States. The average correlation is calculated in two steps. First, I compute the correlation matrix of property price series (either real house prices or real commercial property prices) in the 10-year window (year $t-9$ to t). In the second step, the average of all bivariate correlations is defined as the world average.

Appendix:
The VAR framework

A standard VAR system is the reduced form of a linear dynamic simultaneous equation model in which all variables are treated as endogenous. This framework is employed in this paper to study the joint behaviour of property prices (either house prices or commercial property prices), national income, short-term interest rates, bank credit and equity prices.[3] Each variable is regressed on a number of lags (eight quarters in this study) of itself and of all other variables in the information set.

The VAR model is estimated for each country. In the next step the aim is to provide some quantitative estimates of the dynamic interaction among the variables of interest. To do this, I orthogonalise the estimated reduced-form model to identify the effect of the innovations of the variables in the system in isolation from each other. In this paper the identification uses Sims' lower triangular ordering (the standard Choleski decomposition), and the ordering of the variables is: GDP, bank credit, property prices, equity prices and interest rates.

The justification of the ordering is as follows. Real GDP is considered to affect all other variables within the same quarter, but it does not respond contemporaneously to innovations in any of the other variables. And the interest rate is ordered last because policymakers may react quickly to all innovations but it usually takes a while for the policy to become effective. These assumptions are fairly standard in existing literature. The trickier part is the ordering among bank credit, property prices and equity prices. The logic of the current ordering[4] is: (1) equity prices can respond immediately to shocks in other variables; (2) property prices are relatively more sticky than equity prices; (3) financing conditions (bank credit) may affect property prices contemporaneously, but there is a lag between the changing property prices and their effect on bank credit, owing to decision lags and loan processing time.

Based on the identifying assumptions embodied in the specified ordering of the variables, the key outputs of the VAR model are the variance decomposition and impulse responses. The variance decomposition is able to break down the variance of the forecast error for each variable into components that can be attributed to each of the endogenous variables. In addition, the impulse response functions are computed and the results show the interrelationship between any two of the variables of interest. With a model of five variables, this model generates 25 solutions. Therefore, only a few key results are presented here (Graphs 1, 4, 5 and 6).

[3] All variables are in real terms. Except for interest rates, all of them are measured as first log differences (equivalent to percentage changes) because the series in levels are non-stationary.

[4] I also experimented with other orderings and the results do not change significantly.

References

Bank for International Settlements (1993): "Asset prices and the management of financial distress", *63rd Annual Report*, Basel, pp 155-81.

——— (2003a): *73rd Annual Report*, Basel.

——— (2003b): "Monetary stability, financial stability and the business cycle: five views", *BIS Papers*, no 18.

Bernanke, Ben, Mark Gertler and Simon Gilchrist (1994): "The financial accelerator and the flight to quality", *Review of Economics and Statistics*, vol 79, pp 14-31.

Borio, Claudio (1995): "The structure of credit to the non-government sector and the transmission mechanism of monetary policy: a cross-country comparison", in *Financial structure and the monetary policy transmission mechanism*, compiled by the Bank for International Settlements, Basel.

Borio, Claudio, Craig Furfine and Philip Lowe (2001): "Procyclicality of the financial system and financial stability: issues and policy options", *BIS Papers*, no 1.

Borio, Claudio, Neale Kennedy and Stephen Prowse (1994): "Exploring aggregate asset price fluctuations across countries: measurement, determinants and monetary policy implications", *BIS Economic Papers*, no 40.

Borio, Claudio and Patrick McGuire (2004): "Twin peaks in equity and housing prices?", *BIS Quarterly Review*, March.

Case, Bradford, William Goetzemann and K Geert Rouwenhorst (2000): "Global real estate markets - cycles and fundamentals", *NBER Working Papers*, no 7566.

Davis, Philip and Haibin Zhu (2004): "Bank lending and commercial property cycles: some cross-country evidence", *BIS Working Papers*, no 150.

Deep, Akash and Dietrich Domanski (2002): "Housing markets and economic growth: lessons from the US refinancing boom", *BIS Quarterly Review*, September.

European Central Bank (2003): *Structural factors in the EU housing markets*, mimeo, March.

G10 Contact Group on Asset Prices (2002): *Turbulence in asset markets: the role of micro policies*, mimeo.

Helbling, Thomas and Marco Terrones (2003): "Real and financial effects of bursting asset price bubbles", *IMF World Economic Outlook*, Chapter II, April.

Hendershott, Patric (1994): "Rental adjustment and valuation of real estate in overbuilt markets: fundamental versus reported office market values in Sydney, Australia", *NBER Working Papers*, no 4775.

Herring, Richard and Susan Wachter (1999): "Real estate booms and banking busts: an international perspective", *The Wharton Financial Institutions Center*, WP 99-27.

Hilbers, Paul, Qin Lei and Lisbeth Zacho (2001): "Real estate market developments and financial sector soundness", *IMF Working Papers*, WP/01/129.

HM Treasury (2003): "Housing, consumption and EMU", *working paper*.

Hofmann, Boris (2001): "The determinants of private sector credit in industrialised countries: do property prices matter?", *BIS Working Papers*, no 108.

Kiyotaki, Nobuhiro and John Moore (1997): "Credit cycles", *Journal of Political Economy*, vol 15, no 2, pp 211-48.

Maclennan, Duncan, John Muellbauer and Mark Stephens (1998): "Asymmetries in housing and financial market institutions and EMU", *working paper*.

Zhu, Haibin (2002): "The case of the missing commercial property cycle", *BIS Quarterly Review*, September.

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

Thomas F Helbling[2]

I. Introduction

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

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

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

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

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

---

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

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

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

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

II. Housing price booms and busts

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

---

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

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

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

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

Table 1

Housing price bull markets and booms

Median over all events in category

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

Source: Author's calculations.

Table 2

Housing price bear markets and busts

Median over all events in category

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

Source: Author's calculations.

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

Table 3

Housing price boom-bust cycles

Median over all events in category

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

Source: Author's calculations.

III. Housing price booms and busts and economic activity

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

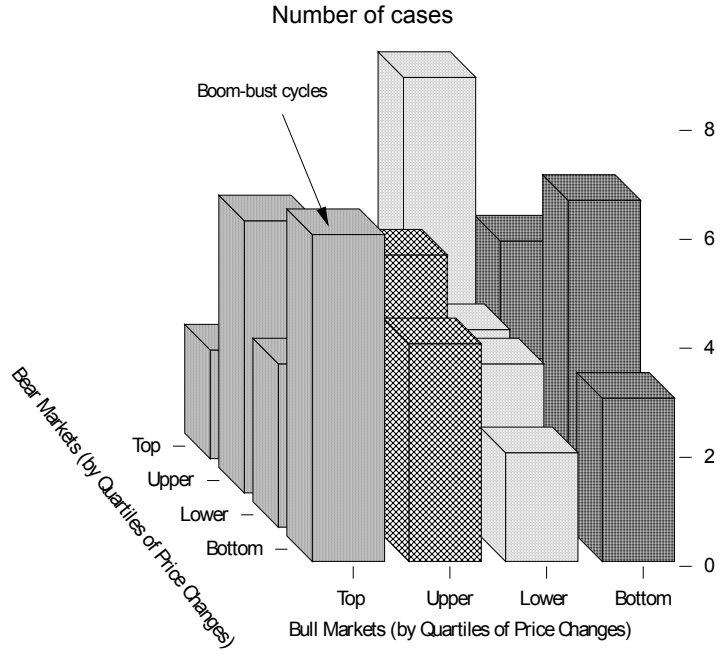
Are these presumptions relevant for housing price booms and busts? Does it matter whether busts were preceded by a boom? Following standard event study methodology, the behaviour of real GDP before and after a housing price bust (the event) is used as a yardstick to assess the effects of housing price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

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

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

Figure 1

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

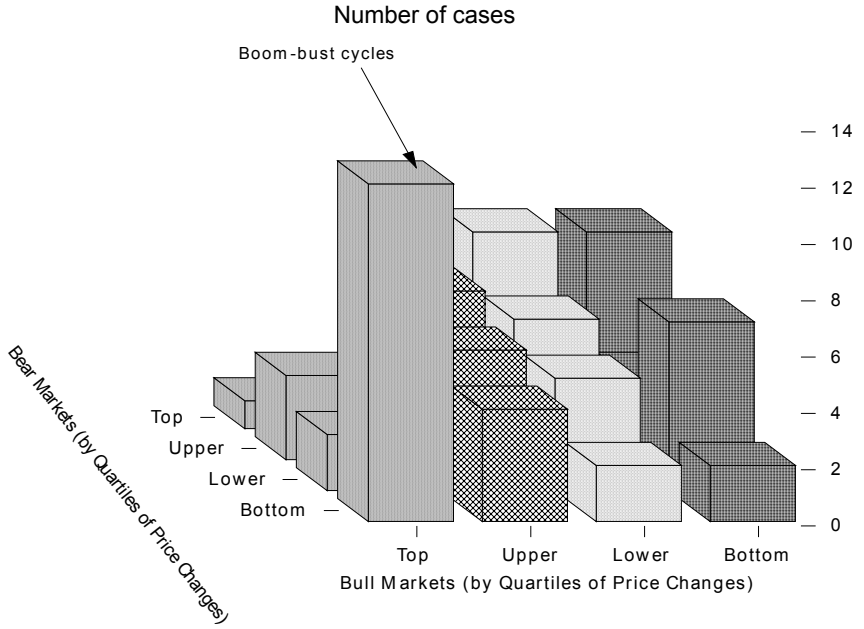


Note: The figure shows the combinations of market constellations for broad housing prices according to quartiles. Booms are defined by price changes in top quartile for bull markets while busts are defined by price changes in the bottom quartile.

Source: Author's calculations.

Figure 2

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



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

Source: Author's calculations.

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

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

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

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

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

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

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

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

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

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

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

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

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

V. Conclusions

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

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

---

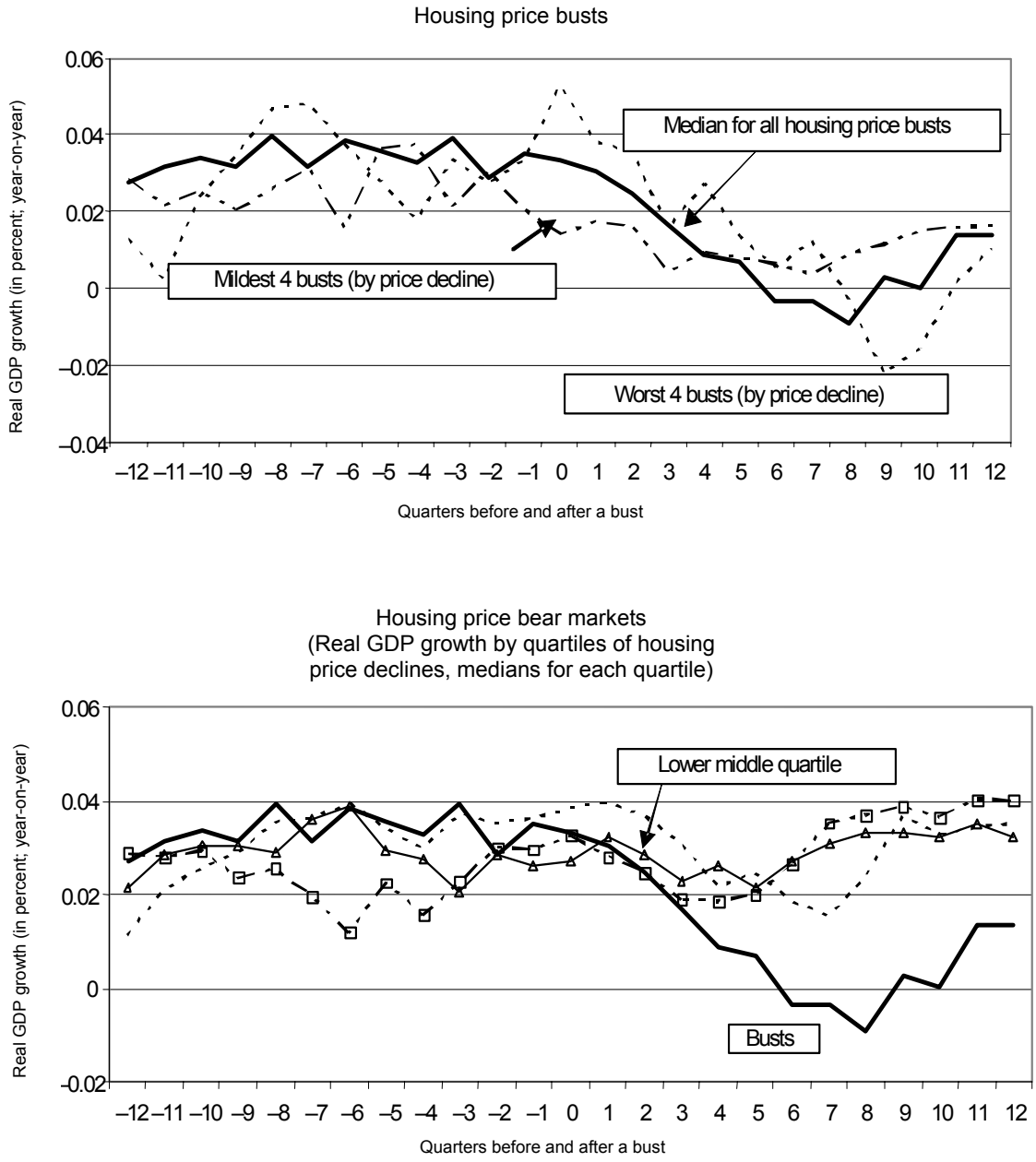
[15] Schwartz (1995) argued that sustained inflation encourages speculative investments, especially in real assets, because investors expect rising prices, which reduces the real value of their borrowing but not of their investments.

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

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

Figure 3

Housing price declines and economic activity

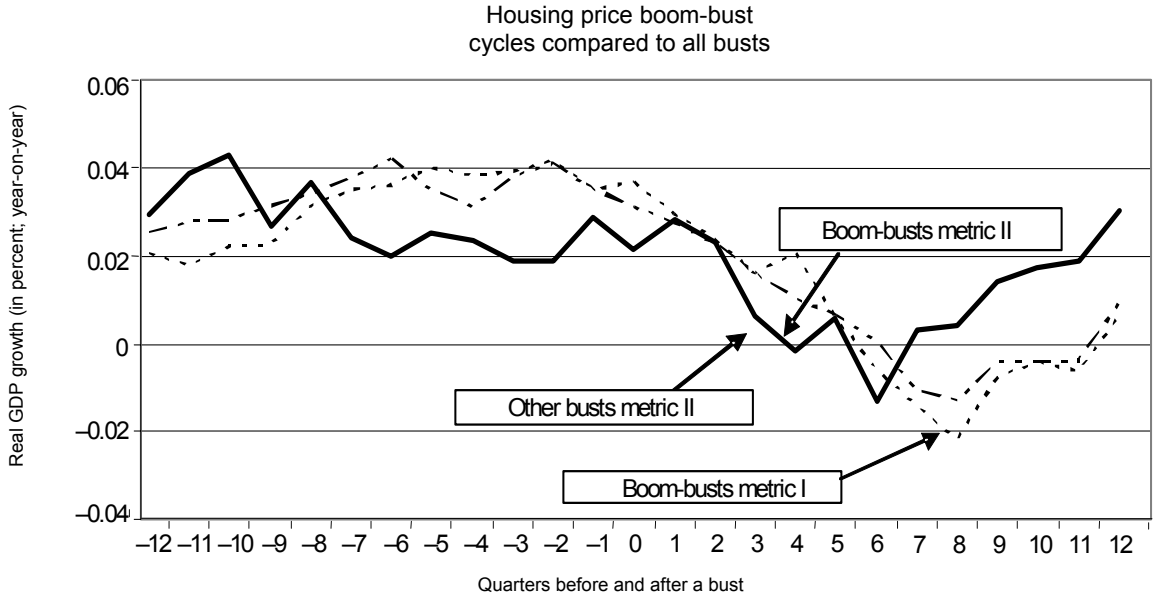


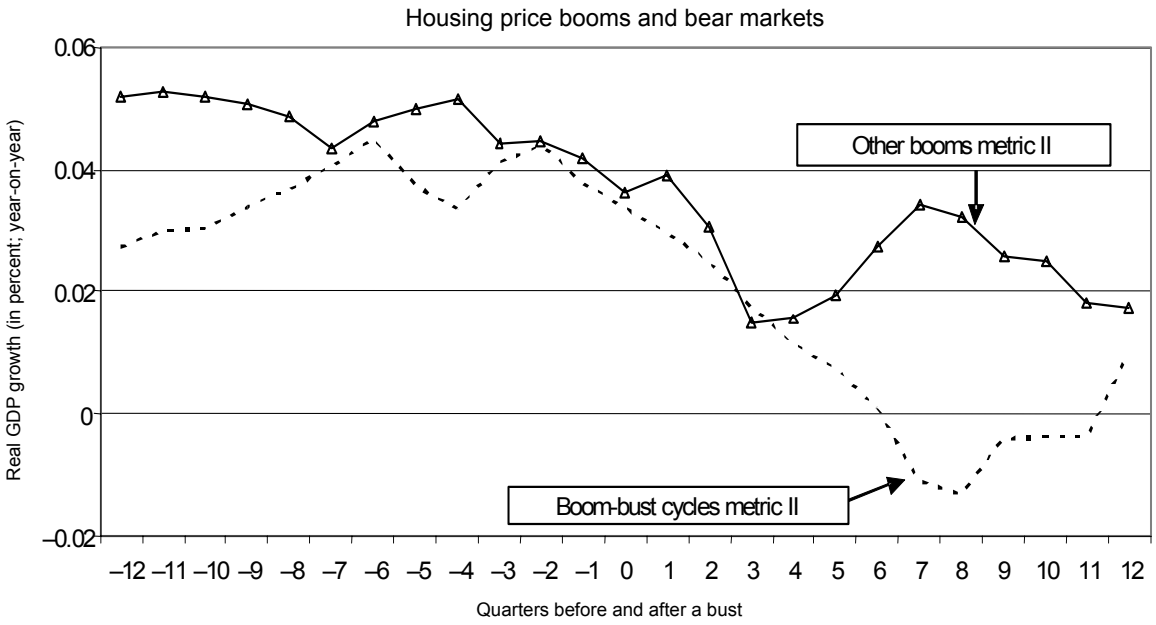
Source: Author's calculations.

Figure 4

Housing price boom-busts and economic activity

Medians over all events in categories



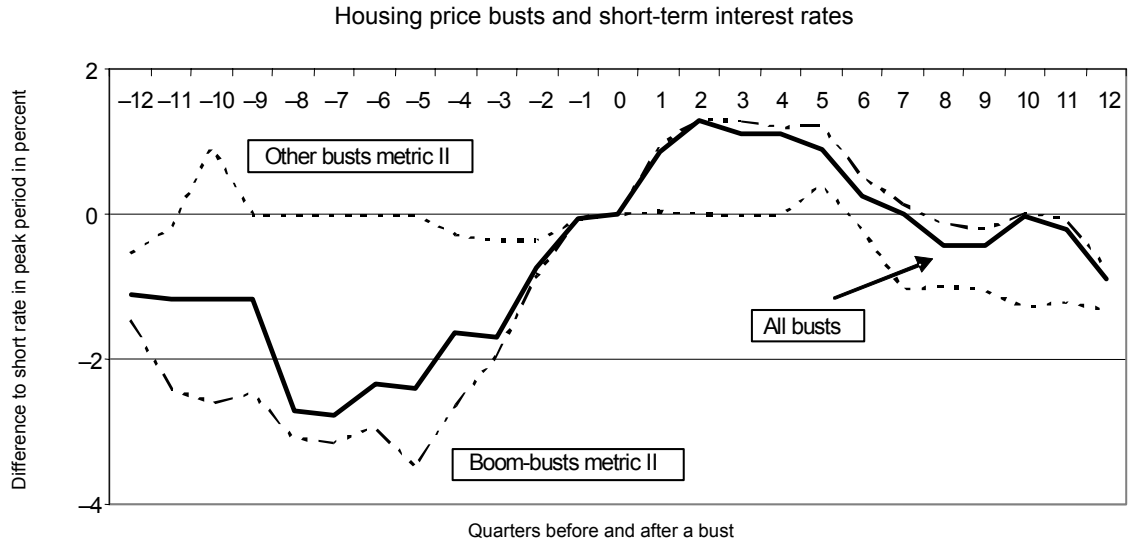


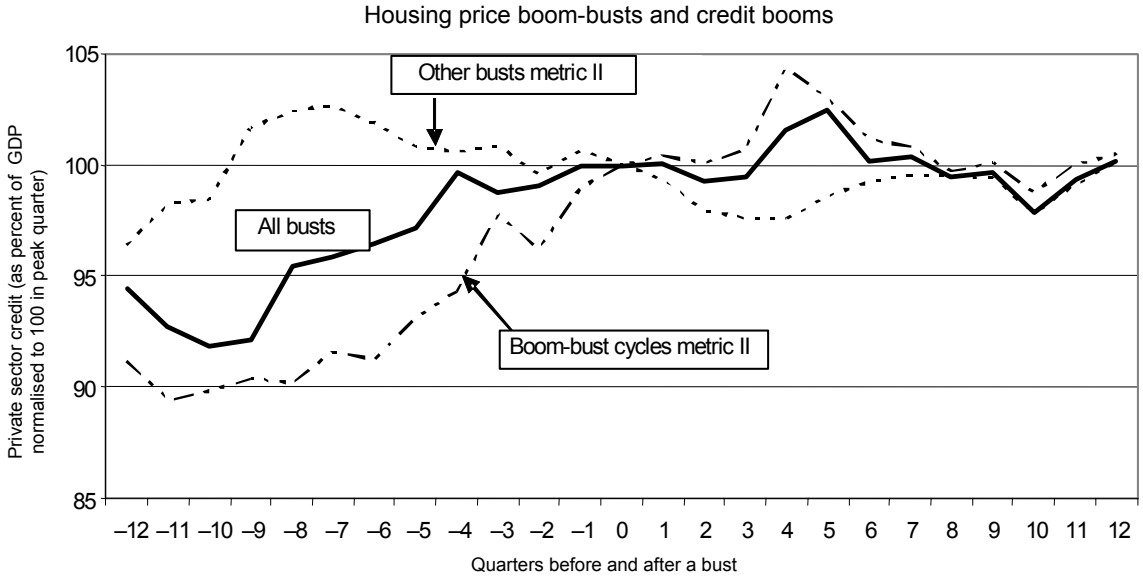
Source: Author's calculations.

Figure 5

Housing price busts, monetary policy and the financial system

Medians over all events in categories





Source: Author's calculations.

References

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

The asset price bubble in Japan in the 1980s: lessons for financial and macroeconomic stability[1]

Shigenori Shiratsuka

Abstract

This paper reviews the implications of asset price fluctuations for financial and macroeconomic stability, based on Japan's experience of the asset price bubble. That experience was characterised by euphoria, that is, excessively optimistic expectations with respect to future economic fundamentals, which lasted for several years before dissipating. Policymakers are unlikely to make an appropriate policy response without full knowledge of the nature of asset price hikes or an accurate forecast of potential growth rates. In any policy response, it is deemed important to assess the sustainability of financial and macroeconomic stability.

Keywords: Asset price bubble; Financial stability; Macroeconomic stability, Sustainability. JEL Classification Codes: E31, E44, E58, E63, G18.

I. Introduction

In this paper I discuss the implications of asset price fluctuations for financial and macroeconomic stability, based on Japan's experience in the late 1980s.

A look back over Japan's experience since the late 1980s shows that the emergence and bursting of the bubble played an important role in economic fluctuations in this period. This experience clearly indicates that both financial and macroeconomic instability are closely related to large fluctuations in asset prices, and raises the question of what is the appropriate way to treat asset prices in macroeconomic policymaking.

What should be noted regarding Japan's experience is that the enthusiasm of market participants, together with the inconsistent projection of fundamentals, contributed to a large degree to maintaining temporarily high asset prices at that time. Such enthusiasm is often called euphoria,[2] excessively optimistic but unfounded expectations for the long-term economic performance, lasting for several years before dissipating.[3]

In this context, it is crucial to accurately analyse what asset price fluctuations imply and to accurately evaluate how expectations illustrated in such fluctuations are sustainable. In retrospect, the prevailing expectations in Japan in the late 1980s were that the country was entering a new era of economic development, reflecting optimistic expectations for potential growth. It was thus excessive optimism rather than consistent projection of fundamentals that mainly supported temporarily high asset prices. As a result, the increase in asset prices during this period failed to provide sufficient evidence with

---

[1] This paper was prepared for the IMF-BIS conference on Real Estate Indicators and Financial Stability, held at the IMF in Washington DC on 27-28 October 2003. The paper is based on my past research with many co-authors, including Kunio Okina, Makoto Saito, Tokiko Shimizu and Masaaki Shirakawa. I would like to thank the staff of the Institute for Monetary and Economic Studies of the Bank of Japan for their helpful comments. The views expressed here are mine and do not necessarily reflect the official views of either the Bank of Japan or the Institute for Monetary and Economic Studies.

[2] Kindleberger (1996) employs the concept of euphoria to describe the financial history of major asset price bubbles. Shiller (2000) uses the term "irrational exuberance" to describe a similar phenomenon. Garber (2000), however, argues against the explanation of bubbles from the viewpoint of mass psychology.

[3] It is important to note that euphoria is completely different from a rational bubble as modelled in Blanchard and Watson (1982). The rational bubble is expressed as a divergence from economic fundamentals and the probability of its bursting is recognised among economic agents and thus incorporated into asset price formation.

which to assess whether this rise was the consequence of the advent of a new economy or just euphoria.

This paper is organised as follows. Section II summarises the characteristics of the asset price bubble in the late 1980s by reviewing Japan's experience of asset price booms in the postwar period. Section III verifies the lessons of asset price bubbles regarding financial and macroeconomic stability. Section IV discusses policy implications regarding how to deal with major fluctuations in asset prices in macroeconomic policymaking. Section V examines policy implications in a more practical manner by conducting a case study exercise based on Japan's macroeconomic conditions in the late 1980s. Section VI concludes.

II. Japan's asset price bubble in the late 1980s

In this section I summarise the characteristics of the asset price bubble in the late 1980s, based on Japan's historical experience of asset price inflation in the postwar period.

A. Japan's asset price fluctuations in the post-WW II period

Figure 1 plots major financial and economic indicators, including asset prices such as stock and land prices in the postwar period. The figure plots stock prices and land prices as indicators for asset prices (first panel), the consumer price index, the domestic wholesale price index, and the GDP deflator as indicators of the general price level (second panel), the growth rate of real GDP, and the unemployment rate as indicators for demand-supply conditions (third panel), and M2+CDs and nominal GDP (last panel).

The figure shows Japan experienced three major boom-bust cycles in asset prices in the postwar period: (1) the *Iwato* boom in the second half of the 1950s; (2) the boom of Prime Minister Tanaka's "remodelling the Japanese archipelago" project; and (3) the *Heisei* boom in the late 1980s to early 1990s.

First, at the time of the *Iwato* boom, when Japan's economy entered the so-called "high economic growth period", asset prices increased rapidly, reflecting an improvement in fundamentals due to technological innovations. The real economic growth rate exceeded 10% per annum, driven mainly by investment demand due to technological innovations that replaced the post World War II reconstruction demand. On the price front, consumer prices rose while wholesale prices remained generally stable, thus leading to the so-called "productivity difference inflation".

Second, during the period from the "remodelling the Japanese archipelago"[4] boom to the first oil crisis, asset prices increased and then the general price level sharply rose due to the excessively high growth of the money stock and oil price hikes stemming from the first oil crisis. In the meantime, real economic growth rapidly declined, marking an end to the high economic growth period.

Third, in the *Heisei* boom, asset prices increased dramatically under long-lasting economic growth and stable inflation. Okina et al (2001) define the "bubble period" as the period from 1987 to 1990, from the viewpoint of the coexistence of three factors indicative of a bubble economy, that is, a marked increase in asset prices, an expansion in monetary aggregates and credit, and an overheating economy. The phenomena particular to this period were stable CPI inflation in parallel with the expansion of asset prices and a long adjustment period after the peaking of asset prices.

The decline in asset prices was initially regarded as the bursting of the asset price bubble, and an amplifying factor of the business cycle. Although the importance of cyclical aspects cannot be denied,

[4] Kakuei Tanaka, who became Prime Minister in 1972, effected extremely aggressive public investment based on his belief (remodelling the Japanese archipelago) that it was necessary to resolve overpopulation and depopulation problems by constructing a nationwide shinkansen railway network, which led to an overheated economy.

further declines in asset prices after the mid-1990s seem to reflect the downward shift in the trend growth rate beyond the boom-bust cycle of the asset price bubble (Figure 2).[5]

B. Mechanism behind the emergence and expansion of the bubble

Focusing on the third episode above, the bubble was generated by the complex interaction of various factors as a process of "intensified bullish expectations" (Figure 3).

The intensified bullish expectations are clearly observed in the increased equity yield spread during the period from the late 1980s to the early 1990s (Figure 4). As reported by Okina et al (2001), the expected growth rate of nominal GDP computed from the equity yield spread in 1990 is as high as 8% with the standard assumption based on the discount factor. However, in view of the low inflation at the time, it was unlikely that the potential growth rate of nominal GDP was close to 8%. Hence, it would be more natural to infer that the high level of the yield spread in 1990 reflected the intensification of bullish expectations, which were not sustainable in the long run.

The intensified bullish expectations were certainly grounded in several interconnected factors. The factors below are often pointed out as being behind the emergence and expansion of the bubble:

- aggressive behaviour of financial institutions
- progress of financial deregulation
- inadequate risk management on the part of financial institutions
- introduction of the Capital Accord
- protracted monetary easing
- taxation and regulations biased towards accelerating the rise in land prices
- overconfidence and euphoria
- overconcentration of economic functions in Tokyo, and Tokyo becoming an international financial centre

Focusing on monetary factors, it is important to note the widespread market expectations that the then low interest rates would continue for an extended period, in spite of clear signs of economic expansion. The movement of implied forward rates from 1987 to 1989 (Figure 5) shows that the yield curve flattened while the official discount rate was maintained at a low level.[6]

III. Adverse effects on financial and macroeconomic stability

In this section, I selectively examine the lessons of Japan's asset price bubble in terms of financial and monetary stability. I take up three points below: (i) the build-up of risks during the period of bubble expansion; (ii) the vulnerability of the bank-based financial system; and (iii) the weakened effects of monetary easing.

---

[5] The bursting of the asset price bubble not only triggered the materialisation of adverse effects but also amplified them as time passed, thereby making structural adjustment more difficult. This incomplete economic adjustment to major changes in a relative price system resulted in the downward shift in growth trend in the 1990s, thereby amplifying the asset price decline beyond the boom-bust cycle.

[6] The implied forward rate is the future interest rate estimated from market rates with a different time to maturity. For example, the implied forward rate for three years ahead gradually increased from June 1987. As the BOJ conducted a slightly tighter monetary operation from September 1987, it rose to a level over 6% in the autumn. However, expectations of higher interest rates receded after the worldwide plunge of stock prices in October of the same year, and the implied forward rate decreased to around 5%. After the spring of 1988, the stock market gradually recovered and the economy once again showed clear signs of expansion. Nevertheless, the rate basically remained flat at around 5% towards the spring of 1989.

A. Build-up of risks during the period of bubble expansion

The first lesson is that risks of financial and macroeconomic instability build up during asset price booms and materialise as an aftermath of asset price declines and recessions.[7] In the light of Japan's experience, it seems to be a characteristic that the effects of a bubble are asymmetrically larger in the bursting period than in the expansion period.

A rise and fall in asset prices, which contain an element of a bubble, influence real economic activity mainly through two routes: (i) consumption through the wealth effect, and (ii) investment through a change in the external finance premium due to changes in collateral and net asset values.[8] As long as asset prices are rising, they influence the economy in a favourable way and the adverse effects are not thoroughly recognised.

However, once the economy enters a downturn, the above favourable cycle reverses, thereby leading to a severe reaction. The harmful effects of a bubble will emerge, exerting stress on the real side of the economy and the financial system due to an unexpected correction of asset prices. If intensified bullish expectations which previously supported the bubble are left unchecked, the expansion and subsequent bursting of the bubble will become more intense, affecting the real economy directly or, by damaging the financial system, indirectly.

Looking at the land price problem from the viewpoint of the stability of the financial system, it was the risk brought about by the sharp rise in land prices and the concentration of credit in the real estate and related industries that were insufficiently perceived. During the bubble period, real estate was generally accepted as collateral. However, if the profitability of businesses financed by secured loans is closely related to collateral value, such loans become practically unsecured since profits and collateral value move in the same direction.

In fact, Shimizu and Shiratsuka (2000) show a simple numerical exercise, which is based on an analytical framework of value-at-risk (VaR) and enables us to sufficiently predict the magnitude of non-performing loans held by Japanese banks in the 1990s ("stress testing"). The exercise estimates the aggregate credit risk inherent in the loan portfolio of Japanese banks during the bubble period by assuming sufficiently prudent scenarios for the probability of bankruptcy, the concentration of credit and the future fluctuation of collateral prices (see Figure 6 for the scenario for land price fluctuation, and Table 1 for the estimation results).[9]

It should be noted, in this context, that the interaction of risks takes various forms, and such aggregate risks are not merely the simple sum of risks recognised by individual economic agents. It might well be the case that insufficient recognition of the interaction of various risks in the economy leads to an excessive concentration of risk. It is thus deemed important to recognise the risk profile of the economy as a whole, which might adversely affect sound financial and economic conditions from the medium- to long-term viewpoint.

Moreover, the effect of asset price fluctuations is asymmetric, with a stronger effect in the case of an asset price decline, because the collapse in asset prices has adverse effects on the stability of the financial system. Changes in cash flow and asset prices arising from cyclical movements in firms' net worth tend to affect agency costs and credit conditions, thereby influencing firms' investment behaviour. It is important to note that the capital base functions as a buffer against future risks and losses. Although this function is not clearly recognised as long as the economy is expanding smoothly, the adverse effects of having an insufficient capital base will materialise once the outlook for economic expansion changes.

---

[7] See Borio et al (2001) for further discussion on this point.

[8] Bernanke et al (1996) refer to the amplification mechanism of initial shocks through changes in credit market conditions as the "financial accelerator".

[9] It should be noted that the analytical framework of Shimizu and Shiratsuka (2000) focuses on the changes in collateral values of bank loans, among various risk factors for bank loan portfolios. This approach is thus effective in the case of late 1980s Japan, whose financial system heavily depended on bank lending secured by real estate. Financial systems vary between countries in terms of the relative weights of bank lending and other features.

B. Vulnerability of a bank-based financial system

The second lesson is that the vulnerability of Japan's banking system to very large and unexpected shocks increased significantly in the late 1980s.[10]

In a financial system, banks play a buffer role against short-term shocks by accumulating internal reserves when the economy is sound and absorbing losses stemming from firms' poor business performance or bankruptcy during recession. Even though some risks cannot be diversified only at a particular point in time, such risks can nevertheless be diversified over time. In order to achieve a more efficient allocation of risks in the economy, it is deemed important to have not only markets for cross-sectional risk-sharing but also sufficiently accumulated reserves as a buffer for intertemporal risk-smoothing.

Such a risk-smoothing function of the banking sector, however, is difficult to maintain under financial liberalisation and more intense competition from financial markets. Intertemporal smoothing requires that investors accept lower returns than the market offers in some periods in order to obtain higher returns in others. Investors, however, would opt out of the banking system and invest in the financial markets, thereby deteriorating banks' internal reserves. As a result, a risk-smoothing function is lost easily and suddenly once the economy encounters a shock that erodes banks' net capital to the extent that it threatens their soundness.

In fact, during the bubble era, gradual financial deregulation led to a reduction in the profitability of the banking sector in Japan (Figure 7), thereby deteriorating the risk-smoothing function in the banking sector. Against the background of financial liberalisation, fund-raising by major firms had been rapidly liberalised since around 1980, while banks were only allowed to enter the securities business gradually. Thus banks were very concerned that major firms would become less dependent on them for funding. In the meantime, since interest rates on deposits had gradually been liberalised, banks forwent the rent as they accepted deposits with regulated interest rates. Moreover, banks aggressively extended loans to small and medium-sized enterprises against real estate collateral as well as real estate related loans at low interest rates (Figure 8). In retrospect, such aggressive lending at low interest rates seemed to have caused financial institutions to take excessive risks compared with their profit outlook.

In this connection, two points should also be noted. First, a bank-based financial system, like Japan has, absorbs more risks from households than a market-based financial system does. Risk allocation in the economy thus would have been very different if the economy had had a market-based financial system even under a similar course of financial and economic development. Second, a bank-based financial system tends to magnify the adverse effects of the bursting of bubbles on real economic activity due to the longer time lag before their materialisation.

C. Weakened effects of monetary easing

The third lesson is that the effectiveness of the central bank's monetary easing is substantially counteracted when the financial system carries problems stemming from the bursting of a bubble.

Although it is difficult to give a direct answer to the above question, the quantitative growth of financial indicators suggests that the current monetary easing phase is different and unusual compared with past experiences. First, from a quantitative aspect, Figure 9 shows that the monetary base (which represents the liabilities of the BOJ) has been recording marked growth, while the money supply (M2+CDs) has been growing at a low rate and bank loans have been declining. Second, on the fund allocation front, Figure 10 indicates that while loans to manufacturing industries, which are believed to carry relatively high profitability, had declined throughout the 1990s, loans to the real estate industry followed an increasing trend until 1998.

The above observation suggests the possibility of two mechanisms. First, an increase in non-performing loans erodes the net capital of financial institutions, resulting in a decline in risk-taking ability (credit crunch). Second, even though firms become unprofitable, financial institutions continue

[10] Baba and Hisada (2002) discuss the characteristics of Japan's financial system in detail.

lending to them to prevent losses from materialising (forbearance lending).[11] Under such circumstances, loans to unprofitable firms become fixed and funds are not channelled to growing firms, holding down economic activity.

Moreover, monetary easing alone was unable to offset amplified shocks beyond the boom-bust cycle of asset price fluctuations. Nagahata and Sekine (2002) showed that the positive impacts of lowering interest rates worked, although such easing impacts were offset by the negative impacts of deteriorated balance sheet conditions at the firms as well as banks.

As a related issue, it should be stressed that, once a financial system tumbles into a critical situation, the boundary between monetary and prudential policies becomes extremely ambiguous.[12] Money market operations under financial crises have a larger burden of liquidity management in various markets, in addition to a standard role as a starting point of monetary policy transmission.

More precisely, during financial crises, financially stressed banks tend to have serious difficulties not only with lending, but also arbitraging and dealing. This hampers the transmission mechanism from the policy-targeted rate to longer-term rates, resulting in segmentation among various financial markets. Thus, it could be extremely important for a central bank to intervene in various financial markets to fix segmented markets, thereby restoring market liquidity and the proper transmission mechanism.

IV. Risk management perspectives

In this section, I turn to the policy implications of how to deal with major fluctuations in asset prices in macroeconomic policymaking. I would emphasise the importance of risk management perspectives in order to deal with the possibility of a bubble in a pre-emptive manner.[13]

A. Risk assessment of the economy

A starting point of the risk management of the economy is how to accurately assess risks with a view to the future risk of financial and macroeconomic instability. The critical point in the risk assessment is the judgment on the possibility of structural changes in the economy or entering a “new economy”. As evidenced by the experience of Japan’s bubble period, it is difficult to deny such a possibility with the contemporaneously available information under euphoric expectations. This makes it crucially difficult to identify whether the increases in asset prices being observed are really a bubble or not in the very process of the expansion of a bubble.

Policymakers in the above situation are faced with two different kinds of risk. When productivity rises, driven by changes in economic structure, strong monetary tightening based on the assumption that the economic structure has not changed would constrain economic growth potential. On the other hand, a continuation of monetary easing would allow asset price bubbles to expand if the perception of structural changes in the economy was mistaken.

This issue can be regarded as similar to a problem of statistical errors in the test procedure of statistical inference. A type I error (the erroneous rejection of a hypothesis when it is true) corresponds to a case where (though a “new economy” theory may be correct) rejecting the theory means the central bank erroneously tightens monetary conditions and suppresses economic growth potential. A type II error (failure to reject a hypothesis when it is false) corresponds to a case in which a bubble is mistaken as a transitional process to a “new economy”, and the central bank allows inflation to ignite.

Given that one cannot accurately tell in advance which of the two statistical errors policymakers are more likely to make, it is deemed important to consider not only the probability of making an error but

---

[11] Sekine et al (2003) provide empirical evidence on the possibility of forbearance lending in Japan in the 1990s.

[12] See Saito and Shiratsuka (2001) for details on this point.

[13] Greenspan (2003) points out that monetary policymaking under uncertainty involves a crucial element of risk management.

also the relative cost of each error. In this regard, Japan's experience suggests that making a type II error is fatal compared with a type I error when faced with a bubble-like phenomenon. For monetary policymaking at that time, it seemed pragmatic to flexibly adjust the degree of tightening while paying due attention to not only a type II error but also a type I error.

B. Sustainability of sound financial and economic environments

In assessing the risks in the economy, I should stress the importance of the viewpoint of the sustainability of sound financial and economic environments.

Taking monetary policy as an example, the relevant question in practice is how to define price stability so that it supports a sound financial and economic environment as a basis for sustainable economic growth. There seems to be a consensus that the best thing monetary policy can do to foster sustainable economic growth is to deliver predictably stable prices in the long term. However, a consensus has yet to be reached as to how to transform such a conceptual definition into a practice of monetary policy as regards the practical interpretation of price stability.

In this context, Shiratsuka (2001) classifies views regarding price stability into two: "measured price stability" and "sustainable price stability". The first definition of "measured price stability" emphasises the importance of maintaining a specific rate of inflation measured by a specific price index at a particular point in time. This enables one to specify price stability numerically so as to set a tolerable target range for the inflation rate, such that price stability corresponds to a rate of inflation from 0 to 2%.

The second definition of "sustainable price stability" considers price stability to be important as a necessary condition for maximising economic stability and efficiency.[14] In this case, price stability pursued by a central bank is not necessarily equivalent to maintaining a specific rate of inflation measured by a specific price index at a particular point in time. This is because such indicators are influenced by various temporary shocks and measurement errors.[15] An important yardstick for price stability is whether the stabilisation of public expectations regarding inflation is attained.[16]

It seems most practically feasible for a central bank to deal with asset price bubbles from the viewpoint of contributing to the sound development of the economy through the pursuit of price stability. However, it might be the case that achieving low measured inflation in the short term does not necessarily ensure sustainable stability of the economy.

V. Assessment of intensified bullish expectations

In this section, I examine policy implications, discussed in the previous section, in a more practical manner by conducting a case study exercise about Japan's macroeconomic conditions in the late 1980s.

---

[14] Mieno (1994), the former Governor of the BOJ, stated during his lecture at the Kisaragi-kai in May 1994 that "price stability does not mean the stability of price indices. Real price stability can be achieved when such stability is backed by medium- to long-term, well-balanced, and sustainable economic growth."

[15] For example, it might be the case that statistically measured inflation is highly volatile at a glance, while most of the effects are just temporary. Conversely, it might also be the case that measured inflation remains stable, even though the changed underlying inflation trend is offset by temporary shocks. To deal with this problem, Shiratsuka (1997) and Mio and Higo (1999) empirically show that the trimmed mean estimator, which excludes the impacts of items located on both the tails of cross-sectional distribution of inflation, adequately adjusts for the impact of temporary shocks, and could well be a quite useful and powerful indicator with which to gauge the changes in underlying inflation fluctuations.

[16] In this context, FRB Chairman Greenspan refers to price stability as being a state of the economy in which "economic agents no longer take account of the prospective change in the general price level in their economic decision making" (Greenspan (1996)).

A. Taylor rule

I first take up the Taylor rule as a possible guidepost for a central bank to deal with asset price fluctuations in a pre-emptive manner.

In the most basic formulation, the Taylor rule considers that the operational target level of the interest rate should be determined according to the divergence of the inflation rate and output gap from their equilibrium level (Taylor (1993)). The standard interpretation of the Taylor rule is that a central bank has two objectives on the level of economic activity, inflation and output gap, whose relative importance is evaluated by the coefficients of each objective variable. However, if we regard the output gap as a proxy of future inflationary pressure, the Taylor rule can be interpreted as a rule that responds to current and future price developments.[17]

Within the framework of the Taylor rule, Bernanke and Gertler (1999) argue that it is possible for a central bank to deal with potential inflationary pressure in a pre-emptive manner. This is because effects of asset price fluctuations are included in changes in the current output gap.[18] They present simulation results that the BOJ should have been able to achieve better performance if it had pursued a Taylor-type rule that discards asset price fluctuations (Figure 11). In fact, their policy rule points to the need for rapid tightening by raising the interest rate from 4% to 8% in 1988, despite focusing only on the inflation and output gap.

Okina and Shiratsuka (2002, 2003) point out, however, that Bernanke and Gertler's (1999) conclusion depends crucially on their treatment of the consumption tax in compiling a core inflation rate (Figure 12). They show that the spike of the policy rate in 1998, observed in Bernanke and Gertler (1999), disappears when they adjust for the introduction of the consumption tax (3%) in April 1989. They conclude that it was difficult for the BOJ to pursue rapid monetary tightening in 1988 as Bernanke and Gertler pointed out, if one considers that one-time price increases induced by an introduction of the consumption tax should not be offset by monetary tightening.

B. Output gap and trend growth

Given the above argument on the Taylor rule, I next examine two components of the Taylor rule, output gap and inflation, in turn.

The assessment of potential GDP differed according to whether one adopted the optimistic expectations at the time or accepted the potential growth rate based on the benefit of hindsight that such expectations were nothing more than euphoria. In the case of euphoria, the perceived potential output path shifts upwards as economic expansion prolongs, resulting in the underestimation of inflationary pressure in view of the output gap. Conversely, in the case of a rational bubble, an output gap is assessed based on recognition that the potential output path remains unchanged. Thus, market participants correctly recognise fundamental values of asset prices as well as the sustainability of currently overvalued asset prices, which leads to the same judgment reached with the benefit of hindsight, that the asset price increase was entirely the result of euphoria.[19]

What typically bears out this point is, as illustrated in Figure 13, the evaluation of the real GDP growth path on a real-time basis. 1987 Q1 marks the bottom of the yen appreciation recession prior to the bubble period. At this point, when one plots a linear trend line from 1977 Q4 to 1987 Q1, it

---

[17] For example, Meyer (2000) states that the Taylor rule depends on two central bank objectives, inflation and output gap, as well as being pre-emptive in nature in the sense that the output gap is a leading indicator of inflation. In addition, interpreting the inflation rate and output gap as variables in the Taylor rule, Goodhart (1999) states that these two variables are core variables in forecasting future inflation.

[18] Bernanke and Gertler (1999) argue that "[by] focusing on the inflationary or deflationary pressures generated by asset price movements, a central bank can effectively respond to the toxic side effects of asset booms and busts without getting into the business of deciding what is a fundamental and what is not".

[19] In this context, Meyer (2000) states that a major challenge for US monetary policy at that time (as of March 2000) was determining how "to allow the economy to realise the full benefits of the new possibilities while avoiding an overheated economy". He also emphasises the importance of possible changes in aggregate supply and trend growth in the evaluation of inflationary pressure.

approximately corresponds to a trend of 3.5% growth. However, from 1987 Q1 to mid-1991, real GDP expanded following a trend line of 5% growth.

Given the above argument, it is deemed crucial that the risk of committing a type II error increases as economic expansion prolongs. This is because continued economic expansion gradually makes it difficult to recover the cyclical and trend components from the data.

C. Inflation

In the bubble period, the CPI was extremely stable until around 1987, but started to rise gradually in 1988 (Figure 14). The year-on-year increase in the CPI, adjusted for the impact of consumption tax, continued to rise after April 1989, and it reached 2% in April 1990 and 3% in November 1990.

From the viewpoint of "measured price stability", two evaluations are possible: (1) prices eventually rose substantially towards the end of the bubble period, compared with the recent level of inflation; and (2) price stability had not been undermined in comparison with the figure before the bubble period. The difference between the two evaluations, so to speak, boils down to the question of what can be regarded as a tolerable rate of inflation. There can be a variety of answers to this question.

From the viewpoint of "sustainable price stability", however, it can be seen that Japan's economy experienced deflation as a result of the emergence of the bubble economy in the second half of the 1980s. Thus, as Okina et al (2001) point out, it could be safely claimed that Japan's economy did not succeed in maintaining price stability after the bubble period. In other words, the experience of the bubble period seems to suggest the importance of "the sustainability of price stability over a fairly long period".

D. Money supply and credit

Finally, I examine the development of monetary aggregates. During the bubble period, the large increase in money supply and credit also signalled the need for an early increase in interest rates.

In fact, while the BOJ expressed concern over the increase in money supply from a relatively early stage,[20] such concern was ultimately not taken seriously. The major reason for this was lack of a common understanding, including on the part of the BOJ, as to what kind of problems might be occasioned by the massive expansion of money supply and credit.

At that time, concern over the large increase in money supply was mainly based on the view that such an increase would eventually result in inflation. However, prices did not rise even though money supply increased. As a result, it was widely argued that the statistical relationship between money supply and prices had become unstable and this argument gradually prevailed. In addition, the ongoing deregulation of deposit interest rates was often mentioned as a reason for the statistical instability.

Based on Japan's experience, when money supply and credit show a very large upswing, we should pay close attention to such movements in the conduct of monetary policy on the presumption that such large fluctuations may indicate the possibility of undesirable developments in economic activity.

VI. Concluding remarks

This paper has reviewed the implications of asset price fluctuations for financial and macroeconomic stability, based on Japan's experience of the asset price bubble in the late 1980s.

[20] As pointed out in Okina et al (2001), the BOJ had already voiced concern over the massive increase in money supply and the rapid rise in asset prices in the summer of 1986. The concern of senior BOJ officials is expressed in the term "dry wood" (easily ignitable inflation) which was often heard at the time.

A critical point is that Japan's asset price bubble was based on excessively optimistic expectations with respect to the future, which might be described as euphoria with the benefit of hindsight, rather than a rational bubble. Under continued price stability, the perceived potential output path shifted upwards as economic expansion prolonged, resulting in the emergence of euphoria and underestimation of inflationary pressure in view of the output gap. However, the increase in asset prices during this period also failed to provide sufficient evidence with which to assess whether this rise was the consequence of the advent of a new economy or just euphoria.

After all, policymakers are unlikely to make an appropriate policy response without full knowledge of the nature of asset price hikes or a correct forecast of potential growth rates. In any policy response, it is deemed important to assess financial and macroeconomic stability from the viewpoint of sustainability. It should be noted, however, that no rules exist regarding how to accurately recognise the risk profiles in the economy. In fact, Kindleberger (1995) points out that there are no cookbook rules for policy judgment, and it is inevitable that policymakers are required to make a discretional judgment.[21]

Table 1

The credit risk of the loan portfolio of city banks (end-March 1990)

In trillions of yen

	Bankruptcy probability (observation period)	**Assumption about portfolio diversification**	**Scenario for the future fluctuation of collateral prices**	**Amount of credit risk**	
					Of which: Concentration risk[1]
1	Bankruptcy probability (1985-89)	Average diversification	Constant	2.7	1.6
2	Default probability (1985-89)	Average diversification	Constant	5.0	2.7
3	Default probability[2] (1990-94) assuming deterioration of the credit situation of the construction, real estate and finance-related industries	Average diversification	Constant	14.9	6.0
4	Same as above	Average diversification	Deviation from the theoretical value is eliminated in five years	17.5	6.9
5	Same as above	Credit concentration in the real estate and finance-related industries is assumed (α: 0.1 → 0.3)	Same as above	22.8	10.5

Source: Table 2 in Shimizu and Shiratsuka (2000).

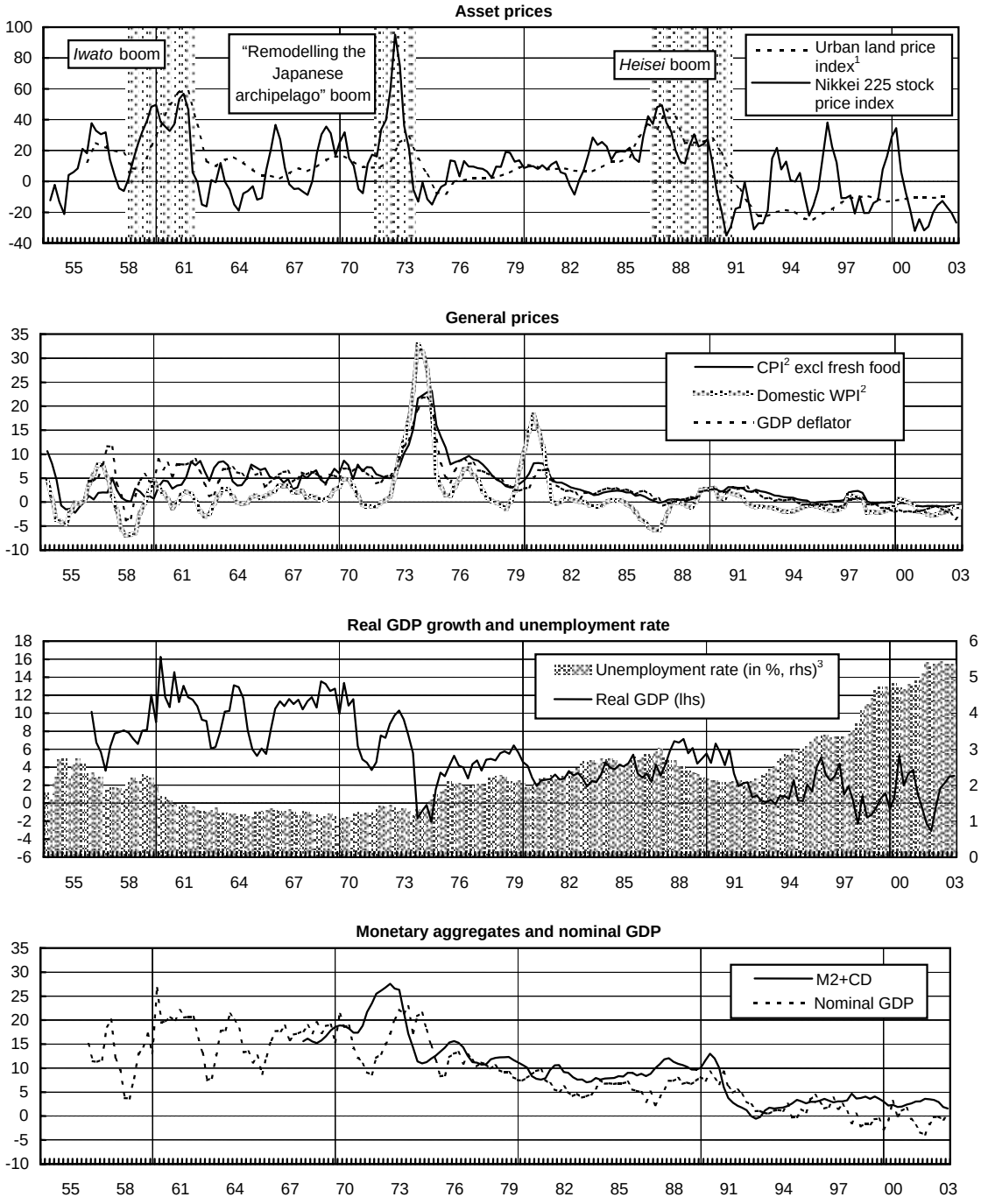
[1] The amount of risk when dynamic risk is assumed to be zero. [2] The following increases for the default probability are assumed: for the construction industry, from 0.0% to 0.40; for the real estate industry, from 0.0% to 0.59%; and for the finance-related industry, from 0.0% to 7.49%.

[21] Kindleberger (1995) on this point: "When speculation threatens substantial rises in asset prices, with a possible collapse in asset markets later, and harm to the financial system, or if domestic conditions call for one sort of policy, and international goals another, monetary authorities confront a dilemma calling for judgment, not cookbook rules of the game."

Figure 1

Asset prices, general prices and economic environment

Year-on-year changes, in per cent



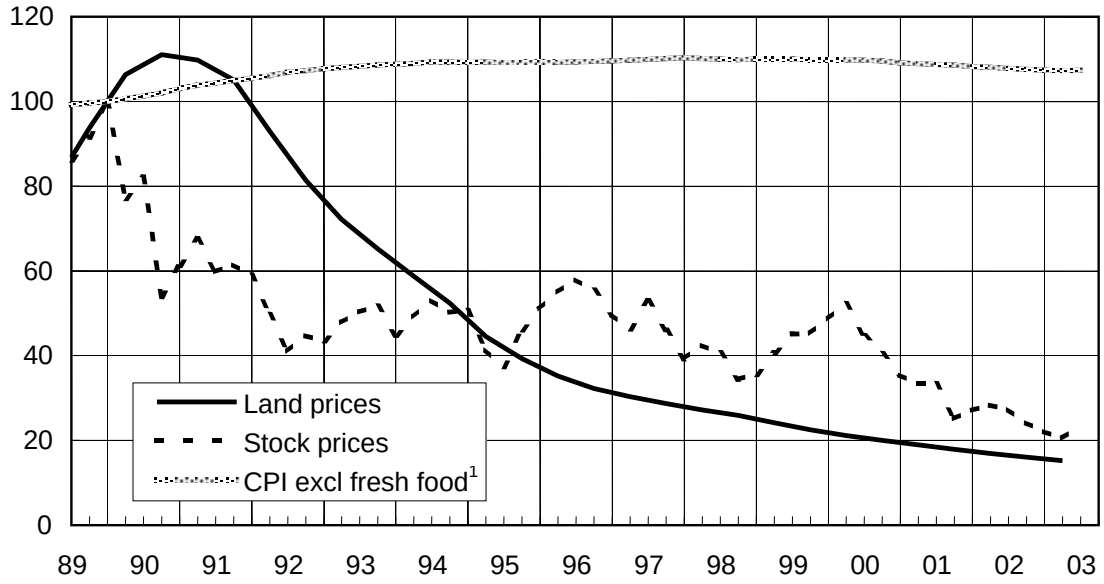
[1] Based on commercial land prices in six major cities. [2] Regarding CPI before 1970 and domestic WPI before 1960, the pre-war base series are connected with the current series. [3] Seasonally adjusted.

Source: Bank of Japan, *Financial and Economic Statistics Monthly*.

Figure 2

Asset price deflation

1989 Q4 = 100

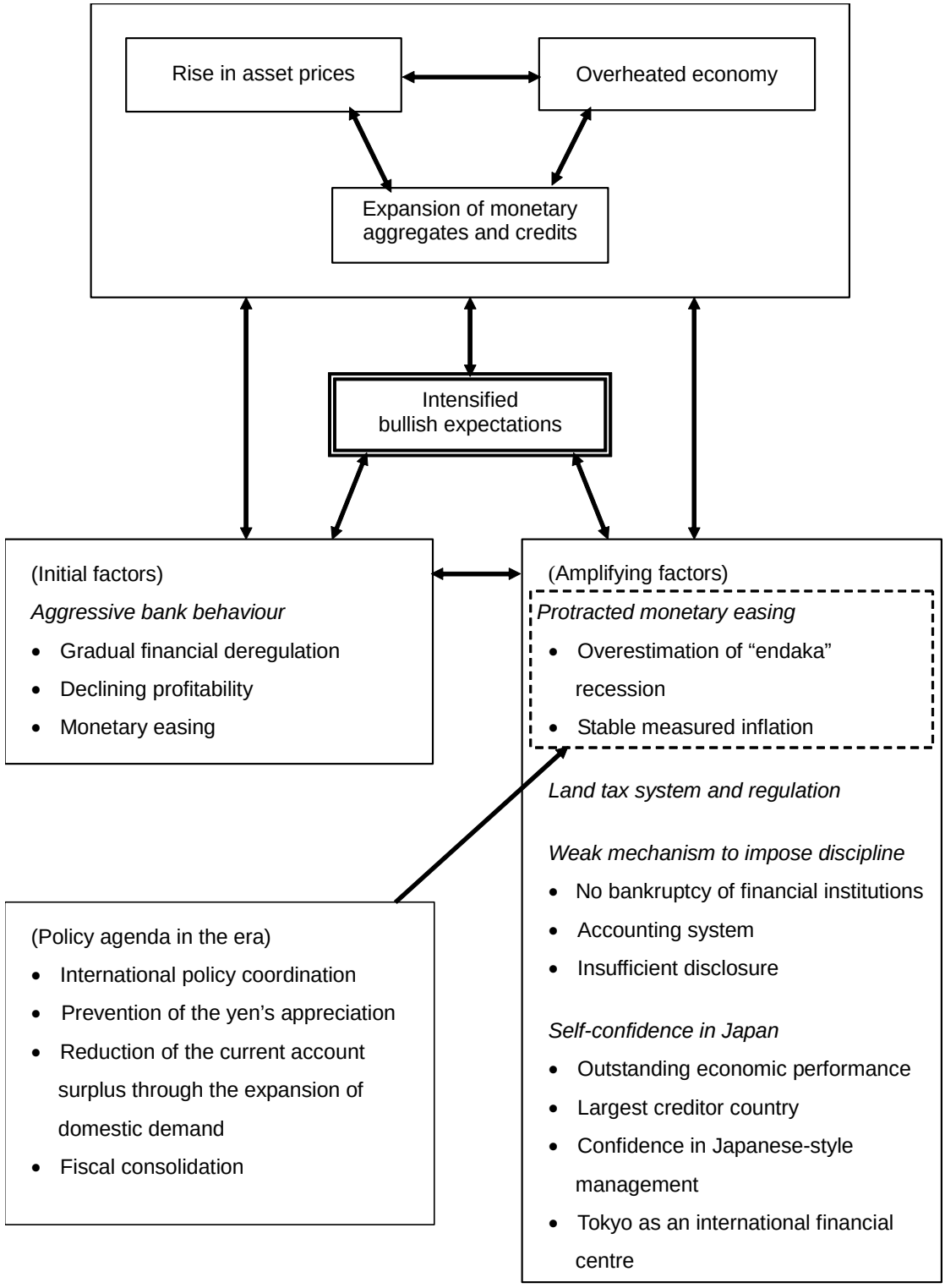


[1] Seasonally adjusted using X-12-ARIMA with options of (0 1 2) (0 1 1) ARIMA model and level shifts in April 1989 and April 1997 when the consumption tax was respectively introduced and subsequently hiked.

Sources: Bank of Japan, *Financial and Economic Statistics Monthly*; Ministry of Public Management, Home Affairs, Posts and Telecommunications, *Consumer Price Index*; Japan Real Estate Institute, *Urban Land Price Index*.

Figure 3

Illustration of bubble economy in Japan

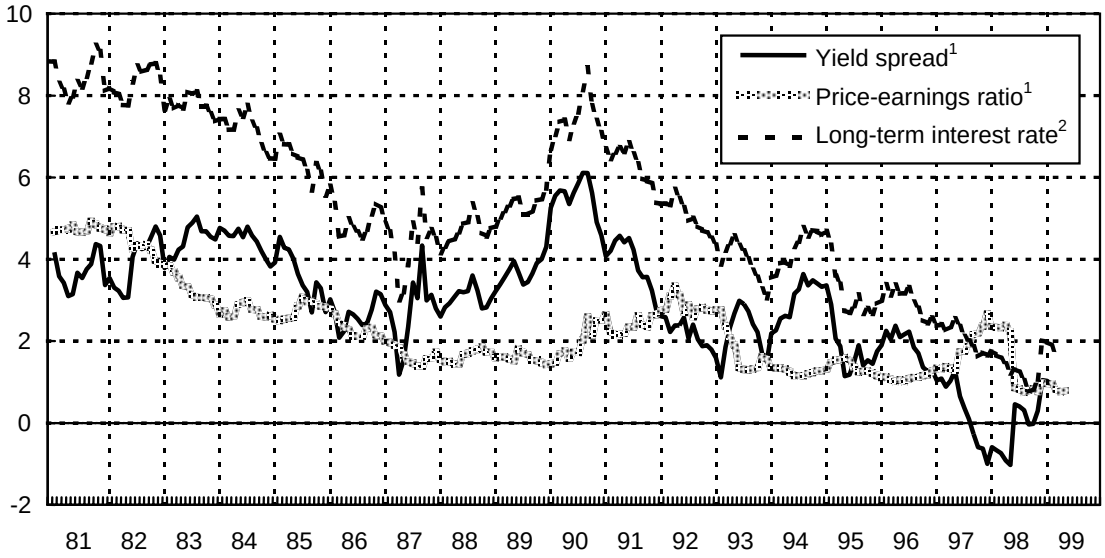


Source: Figure 13 in Okina et al (2001).

Figure 4

Equity yield spreads

In per cent



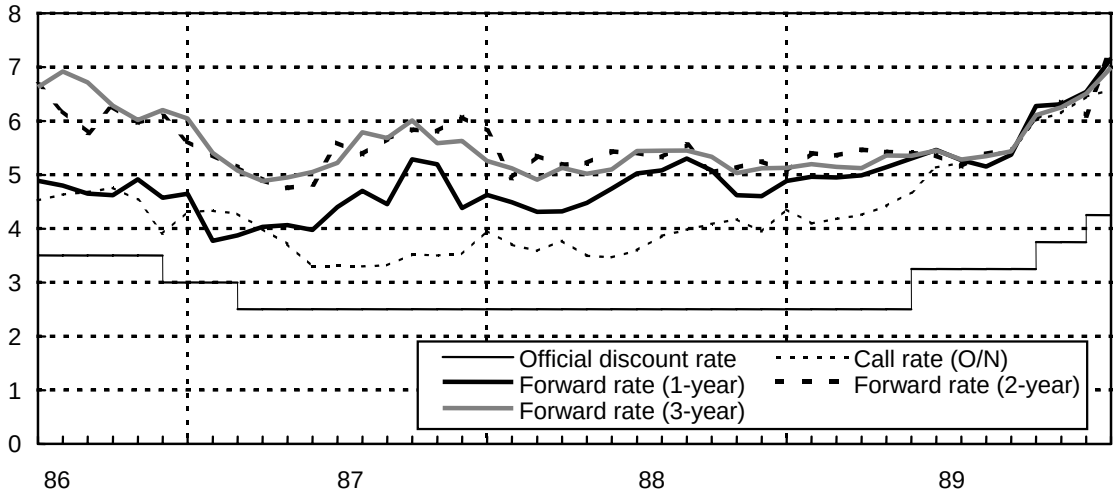
[1] Computed on TOPIX basis. [2] Ten-year JGB rate at end of each month.

Source: Bank of Japan, *Financial and Economic Statistics Monthly*.

Figure 5

Implied forward rates

In per cent

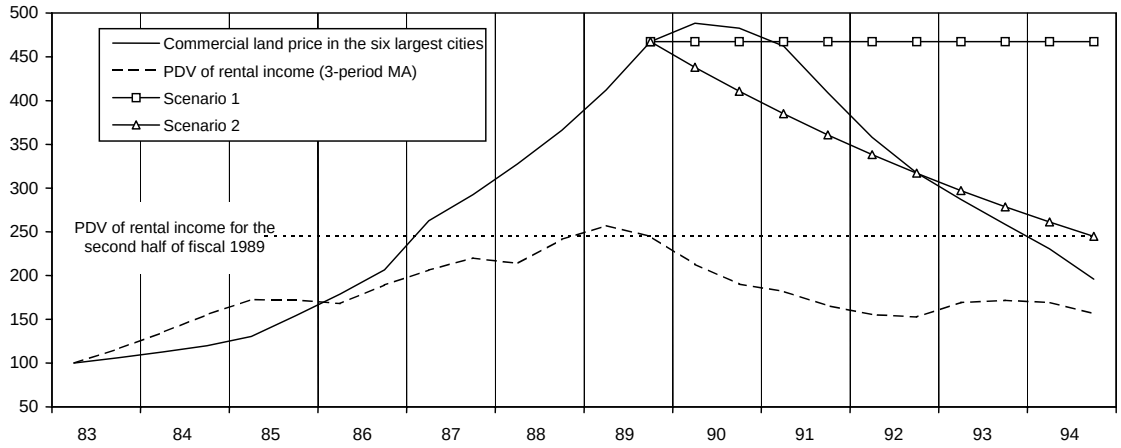


Source: Bank of Japan, *Financial and Economic Statistics Monthly*.

Figure 6

Scenarios for land price fluctuations

First half of fiscal 1983 = 100



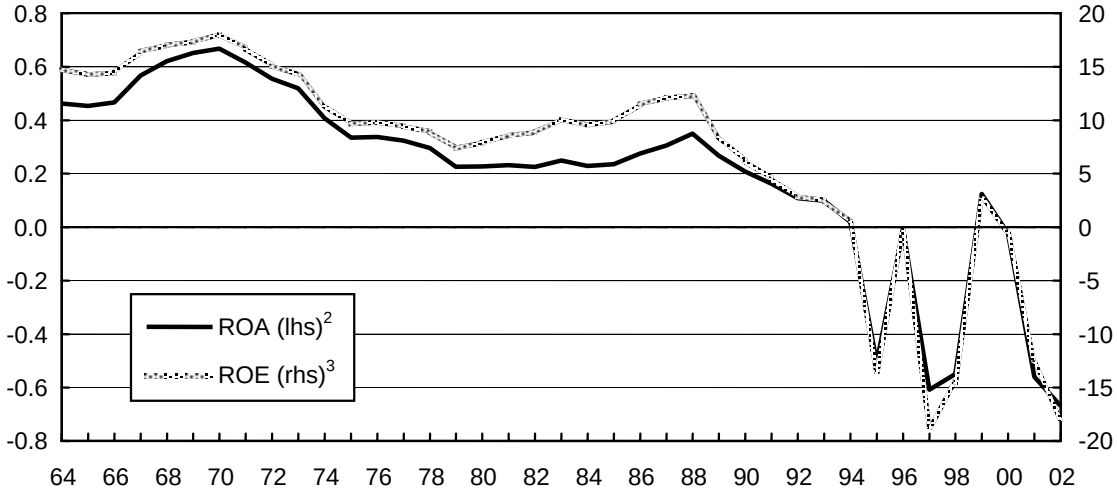
Notes: 1. It is assumed for price fluctuations after the second half of fiscal 1989 that the price will fall at a constant rate so as to eliminate the deviation from the present discounted value in five years. 2. The present discounted value land price is calculated by assuming that (i) total rental income from office space remains constant as a percentage of GDP, (ii) the rate of growth of rental income is equal to the rate of potential economic growth and the expected rate of inflation (with perfect foresight over a one-year horizon), and (iii) the risk premium is 2.3% (given by the difference between the rate of nominal GDP growth for fiscal 1981-9 and the yield spread).

Source: Figure 1 in Shimizu and Shiratsuka (2000).

Figure 7

Profitability of Japanese banks[1]

In per cent



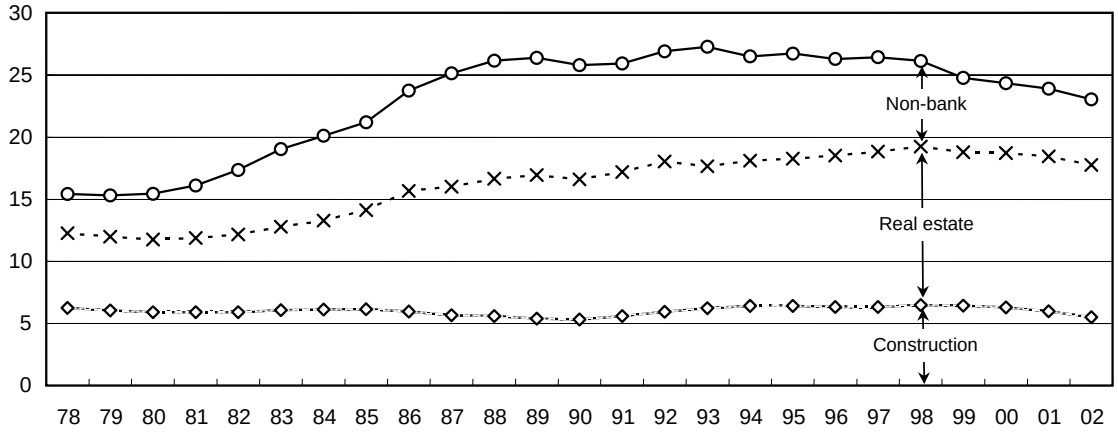
[1] Domestically licensed banks (summation of city banks, regional banks, regional banks II, trust banks, and long-term credit banks). [2] (Profit for the Term) / (Total Assets – Acceptance and Guarantees). [3] (Profit for the Term) / (Total Stockholders' Equity).

Source: Japanese Bankers Association, *Financial Statements of All Banks*.

Figure 8

Bank lending to real estate related industries[1]

In per cent



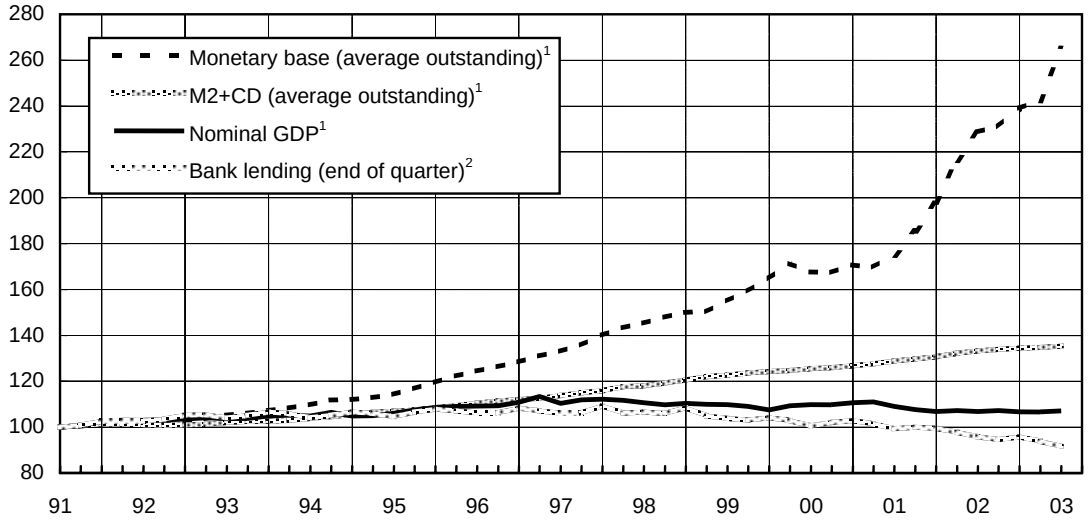
[1] Real estate, construction and non-banks.

Source: Bank of Japan, *Financial and Economic Statistics Monthly*.

Figure 9

Monetary aggregates

1991 Q2 = 100



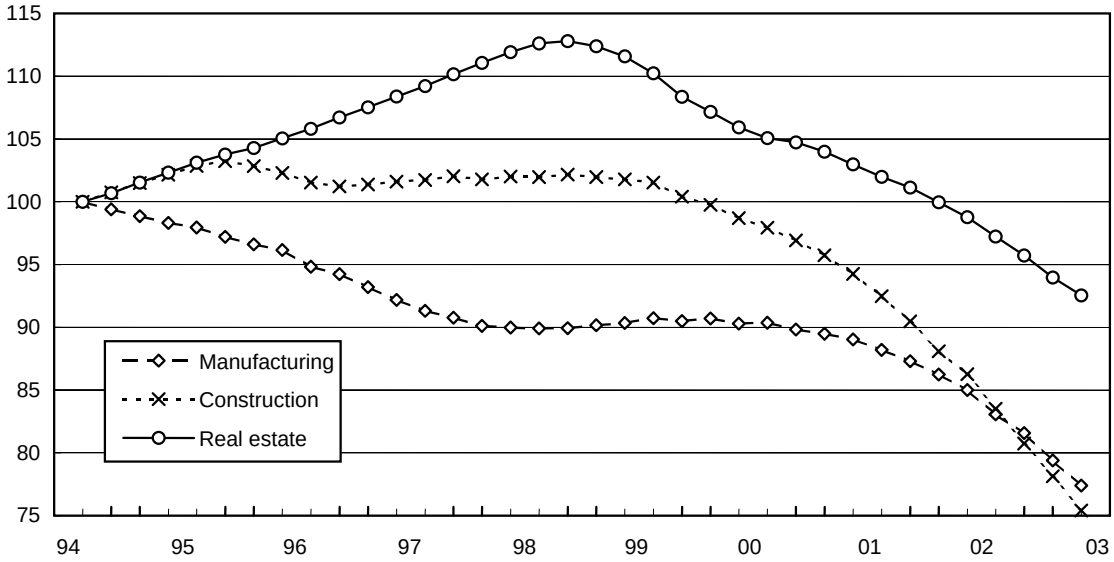
[1] Seasonally adjusted. [2] Seasonally non-adjusted.

Sources: Bank of Japan, *Financial and Economic Statistics Monthly*; Cabinet Office, *Annual Report on National Accounts*.

Figure 10

Loans outstanding by industries (to be updated)

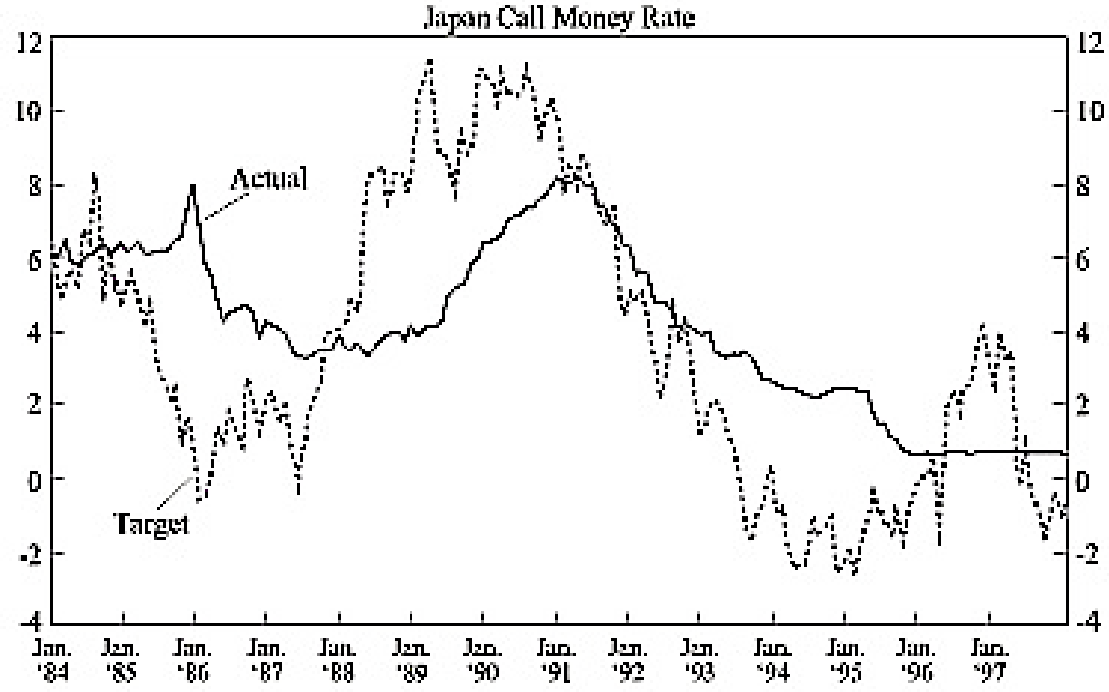
1994 Q3 = 100



Source: Bank of Japan, *Financial and Economic Statistics Monthly*.

Figure 11

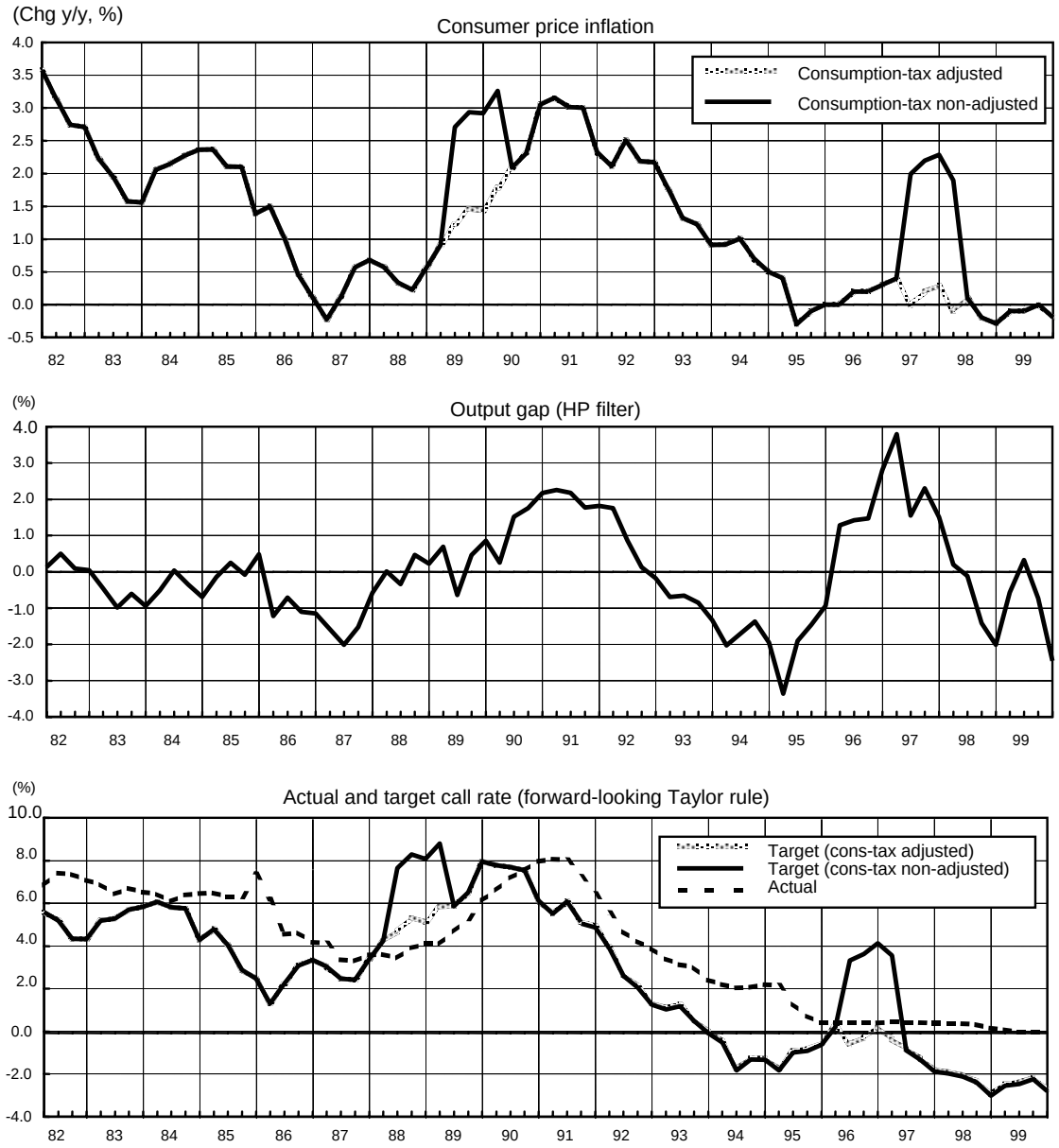
Taylor rule: Bernanke and Gertler's estimation



Source: Bernanke and Gertler (1999).

Figure 12

Taylor rule: Okina and Shiratsuka's estimation



Notes: 1. Output gaps are computed as the difference between actual and HP-filtered series for real GDP. HP-filtered series computed for the sample period from 1955 Q2 to 2000 Q4 with the smoothing parameter $\lambda = 1{,}600$. 2. Taylor rule defined as $R_t = r_t^* + \pi^* + \alpha \times (\pi_{t+4} - \pi^*) + \beta \times (Yt - Y^*)$:

r_t^*: equilibrium real short-term interest rate at period *t*

π^*: targeted rate of inflation

R_t: uncollateralised overnight call rate at period *t*

π_{t+T}: rate of consumer price inflation at period *t*

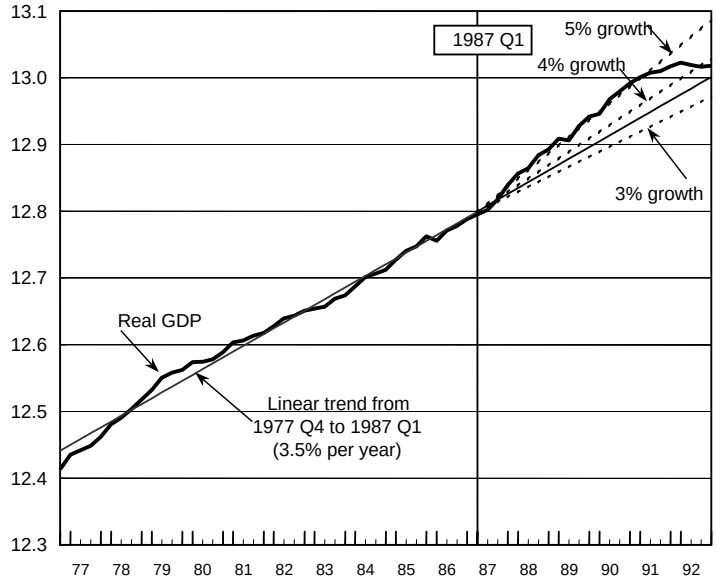
$Y_t - Y^*$: output gap at period *t*

Sources: Okina and Shiratsuka (2002), Charts 6 and 7.

Figure 13

Impact of trend shift in real GDP

Millions of yen in logarithms

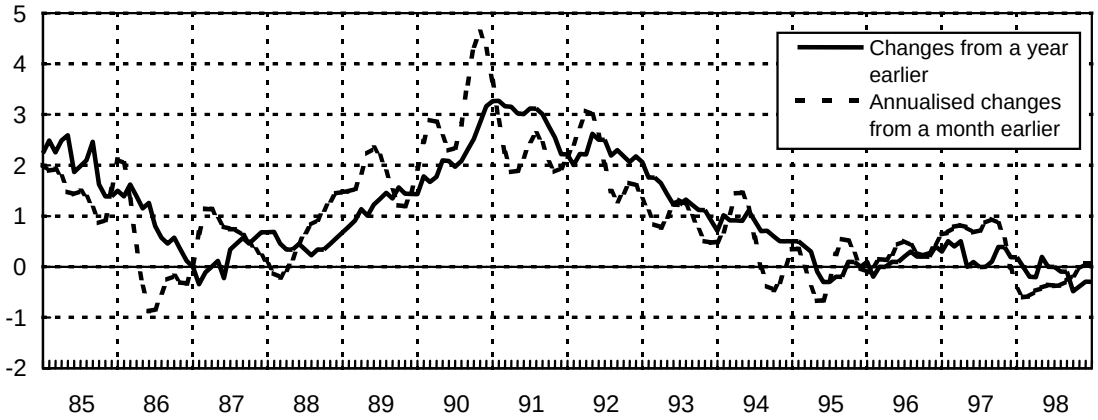


Source: Cabinet Office, *Annual Report on National Accounts*.

Figure 14

Price development

In per cent



Notes: 1. Figures are adjusted for the impact of consumption tax. Regarding the CPI, annualised changes from a month earlier are computed from a seasonally adjusted series applied using X-12-ARIMA with the following options:

Estimation period: from January 1980 to December 1998
ARIMA model: $(0\ 1\ 1)(0\ 1\ 1)_{12}$
Level adjustment: April 1989 (introduction of consumption tax) and April 1997 (consumption tax hike)

Sources: Management and Coordination Agency, *Consumer Price Index*.

References

Baba, Naohiko and Takamasa Hisada (2002): "Japan's financial system: its perspective and the authorities' roles in redesigning and administering the system", *Monetary and Economic Studies*, 20 (2), Institute for Monetary and Economic Studies, Bank of Japan, pp 43-93.

Bernanke, Ben S and Mark Gertler (1999): "Monetary policy and asset price volatility", *Achieving Price Stability*, Federal Reserve Bank of Kansas City, pp 77-128.

Bernanke, Ben S, Mark Gertler and Simon Gilchrist (1996): "The financial accelerator and the flight to quality", *Review of Economics and Statistics*, 78 (1), pp 1-15.

Blanchard, Oliver J and Mark Watson (1982): "Bubbles, rational expectations and financial markets", in P Wachtel (ed), *Crises in the economic and financial structure*, Lexington: Lexington Books, pp 295-315.

Borio, Claudio, Craig Furfine and Philip Lowe (2001): "Procyclicality of the financial system and financial stability: issues and policy options", *BIS Papers*, no 1, pp 1-57.

Garber, Peter M (2000): *Famous first bubbles: the fundamentals of early mania*, Cambridge: The MIT Press.

Goodhart, Charles A E (1999): "Central bankers and uncertainty", *Proceedings of the British Academy*, 101, pp 229-71.

Greenspan, Alan (1996): "Opening remarks: achieving price stability", at a symposium sponsored by the Federal Reserve Bank of Kansas City, Jackson Hole, Wyoming.

———(2003): "Opening remarks: monetary policy under uncertainty", at a symposium sponsored by the Federal Reserve Bank of Kansas City, Jackson Hole, Wyoming.

Kindleberger, Charles P (1995): "Asset inflation and monetary policy", *BNL Quarterly Review,* no 192, pp 17-37.

———(1996): "Manias, panics, and crashes: a history of financial crises*"*, 3rd ed, New York: Wiley.

Meyer, Laurence (2000): *Structural change and monetary policy*, http://www.bog.frb.fed.us/boarddocs/speeches/2000/20000303.htm.

Mieno, Yasushi (1994): "The conduct of monetary policy by the Bank of Japan", *Bank of Japan Quarterly Bulletin*, 2 (3), Bank of Japan, pp 5-12.

Mio, Hitoshi and Masahiro Higo (1999): "Underlying inflation and the distribution of price change: evidence from the Japanese trimmed-mean CPI", *Monetary and Economic Studies*, 17 (1), Institute for Monetary and Economic Studies, Bank of Japan, pp 103-32.

Nagahata, Takashi and Toshitaka Sekine (2002): "The effects of monetary policy on firm investment after the collapse of the asset price bubble: an investigation using Japanese micro data", *Research and Statistics Department Working Paper*, 02-3, Bank of Japan.

Okina, Kunio, Masaaki Shirakawa and Shigenori Shiratsuka (2001): "The asset price bubble and monetary policy: experience of Japan's economy in the late 1980s and its lessons", *Monetary and Economic Studies*, 19 (S-1), Institute for Monetary and Economic Studies, Bank of Japan, pp 395-450.

Okina, Kunio and Shigenori Shiratsuka (2002): "Asset price bubbles, price stability and monetary policy: Japan's experience", *Monetary and Economic Studies*, 20 (3), Institute for Monetary and Economic Studies, Bank of Japan, pp 35-76.

———(2003): "Japan's experience with asset price bubbles: is it a case for inflation targeting?", in William C Hunter, George G Kaufman and Michael Pomerleano (eds), *Asset price bubbles: the implications for monetary, regulatory, and international policies*, The MIT Press, pp 81-99.

Saito, Makoto and Shigenori Shiratsuka (2001): "Financial crises as the failure of arbitrage: implications for monetary policy", *Monetary and Economic Studies*, 19 (S-1), Institute for Monetary and Economic Studies, Bank of Japan, pp 239-70.

Sekine, Toshitaka, Keiichiro Kobayashi and Yumi Saita (2003): "Forbearance lending: the case of Japanese firms", *Monetary and Economic Studies*, 21 (2), Institute for Monetary and Economic Studies, Bank of Japan, pp 69-92.

Shiller, Robert J (2000): *Irrational exuberance*, Princeton: Princeton University Press.

Shimizu, Tokiko and Shigenori Shiratsuka (2000): "The credit risk of Japanese banks during the bubble period: a pilot study of macro stress simulation", *IMES Discussion Paper*, 2000-E-31, Institute for Monetary and Economic Studies, Bank of Japan.

Shiratsuka, Shigenori (1997): "Inflation measures for monetary policy: measuring underlying inflation trend and its implication for monetary policy implementation", *Monetary and Economic Studies*, 15 (2), Institute for Monetary and Economic Studies, Bank of Japan, pp 1-26.

——— (2001): "Is there a desirable rate of inflation? A theoretical and empirical survey", *Monetary and Economic Studies*, 19 (2), Institute for Monetary and Economic Studies, Bank of Japan, pp 49-83.

Taylor, John B (1993): "Discretion versus policy rules in practice", *Carnegie-Rochester Conference Series on Public Policy*, 39, pp 195-214.