

Financial stability in low-inflation environments¹

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Abstract

Price stability does not seem to have reduced the possibility of boom-bust cycles in asset markets and banking crises. This paper identifies common underlying patterns for financial crises over the period 1970-2002. Crises tend to be correlated with one another and concentrated in specific subperiods.

1. Introduction

There has been increased attention in the recent literature to the factors underlying financial crises. A common feature of many of these studies is the finding that weak economic fundamentals contribute to crises by allowing imbalances to accumulate (eg Mishkin (2000)). However, although the probability of crises may well be reduced in countries where the fundamentals appear to be sound, it does not fall to zero (Bordo et al (2000)). This study therefore analyses the characteristics of crises that occur in periods of (apparent) macroeconomic stability. How real, at present, is the possibility of crises developing in advanced countries, and are there patterns that are typical of these crises? In order to retain the relevance for the industrialised world, we do not include other countries in our assessment as crises in these countries may be due to factors that do not apply in industrialised economies (Mehrez and Kaufmann (1999)).

We focus on banking crises and on bust periods in asset markets. Both of these can have significant macroeconomic impacts - and may feed on each other. Another potential source of crises, exchange rate movements, has become less important. Most of the countries we consider have abandoned fixed exchange rate regimes, thereby removing a potential source of macroeconomic tension. Instead, they have joined a currency union or have chosen freely floating exchange rates.

The paper continues in Section 2 with a discussion of how crises can develop. Section 3 contains an empirical analysis of crisis episodes and patterns of key variables around these crises. Conclusions are drawn in Section 4.

2. Anatomy of crises

Two main types of financial crises in industrialised economies are problems at individual financial institutions (banking crises) and asset price busts. Banking crises are particularly devastating when a problem in one or a few institutions spreads unchecked across the financial system. This systemic risk results from institutions having various exposures with one another.

Banking and asset price crises can be interrelated. Asset market busts are likely to cause financial sector troubles if balance sheets of both financial and non-financial firms are weak. This is particularly

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the case for financial firms, as an asset price crash can seriously compromise their financial health. Non-financial sector balance sheets also matter, since declining net worth in combination with asymmetric information problems may amplify financial crises (Bernanke and Gertler (1989)). Expectations play an important role in the triggering and spread of banking and asset price crises, due to the lack of full information on underlying values of investment projects.

2.1 Price stability and crises

In an environment with price stability, inflation and inflationary expectations are low and stable. In the countries covered in this paper, inflation has been mostly below or close to 3% since the mid-1980s. In theory, threats to financial stability are less likely to emerge in an environment with price stability (eg Schwartz (1995), Mishkin (2000)). First, price stability tends to reduce uncertainty regarding future economic conditions. This fosters balanced risk-return decision-making and reduces financial risks. Second, in such an environment, volatility in nominal interest rates is less likely. Mishkin (1991) shows that in the US most financial crises began with a sharp monetary policy contraction. Third, with price stability, debt contracts tend to be of a long duration and denominated in domestic currency. This makes an economy less vulnerable to sentiments of both domestic and foreign creditors.

However, price stability is no guarantee of financial stability. It can be argued that the credibility of the central bank's commitment to price stability, by anchoring inflationary expectations at low and stable levels, can make prices and wages stickier. This will reduce the inflationary pressures usually associated with unsustainably strong demand, but it can also allow financial imbalances to build up (Borio and Lowe (2002)). If temporary favourable supply side developments in times of strong economic performance and price stability are incorrectly perceived as permanent, excessive optimism about economic prospects and asset prices may emerge. This can lead to overinvestment and excessive credit growth. In this context, asset price inflation and credit growth may reinforce each other: higher collateral values allow for higher credit expansion, resulting in further asset purchases at higher prices. Accordingly, an unsustainable asset inflation-credit spiral may develop.

2.2 Liberalisation and crises

Financial market reform³ and capital account liberalisation have also been associated with crises, as discussed in, for example, Demirgüç-Kunt and Detragiache (1998) or Bakker and Chapple (2002). Prior to reform, lending levels and interest rates have typically been kept artificially low by direct government controls. In such a situation, credit rationing is common practice, with lending decisions based on close relationships between banks and customers. Reform and liberalisation are likely to boost competition, forcing financial institutions to change their behaviour in order to remain competitive. The removal of credit rationing promotes an increase in the supply of credit, while banks may also be keen to expand lending in order to gain market share. However, risk and credit assessment skills do not necessarily keep pace with the changing market environment. The increased availability of credit, combined with a view that reforms have increased the potential economic growth rate, is likely to result in asset price rises. As noted in Section 2.1, such increases in asset prices can become self-sustaining for a certain period of time.

2.3 After the crisis

A severe financial crisis will disrupt financial intermediation as adverse selection and moral hazard problems increase, causing a sharp drop in lending. Because of the central role of the financial sector in industrial countries, this will damage the macroeconomy. In response to lower lending, the private sector will cut spending, resulting in a contraction of the real economy. In addition, monetary policy will be hampered by a banking crisis, as financial institutions are a pivotal link in the chain of monetary transmission. Distortions or poor corporate governance in the financial sector may amplify monetary

³ "Reform" refers to reform of the domestic financial markets while "liberalisation" is taken to refer to capital account liberalisation. Often the two proceed in parallel.

policy errors, since they can lead to insufficient risk assessment in an environment with strong credit and asset price increases.

3. Empirical analysis

We analyse quarterly data over the period 1970 Q1-2002 Q2 for a group of 20 industrial countries: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Italy, Japan, Korea, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom and the United States. We first examine the incidence of crisis episodes over time to see whether these can be related to each other and to more general macroeconomic developments. We subsequently analyse the average pattern of key macroeconomic variables before and after financial crises.⁴ Potential leading indicators have been selected on the basis of theoretical considerations and data availability.

3.1 Data and definitions

We consider two types of financial crises: banking crises and asset market busts, where the latter are further split into housing market and stock market crises. These crisis episodes are determined as follows:

- **Banking crises** are characterised by financial distress resulting in the erosion of most or all aggregate banking system capital. For the identification of these crises, we rely on existing studies. An episode is considered a banking crisis if it qualifies as such according to either Bordo et al (2001) or Mehrez and Kaufmann (1999).
- Our definition of an **asset market crisis**, both for stock and property, is based on the methodology of Bordo and Jeanne (2002). Asset price crises are determined on the basis of moving averages of the growth rate in asset prices in comparison to their long-run historical average. More specifically, a bust is defined as a period in which average growth over a 12-quarter window is smaller than a threshold. This threshold is the average growth rate in the asset price in all countries over the entire sample (\bar{g}), minus x times its standard deviation v :

$$\sum_{l=1}^{12} \frac{g_{i,t-l}}{12} \leq \bar{g} - xv$$

Similarly, boom periods occur when:

$$\sum_{l=1}^{12} \frac{g_{i,t-l}}{12} \geq \bar{g} + xv$$

The three-year window is also chosen by Bordo and Jeanne (2002), and is sufficient to filter out short-term volatility. The parameter x is calibrated such that the main boom and bust periods in the stock market and the housing market are selected, without including too many observations.⁵ Although this methodology is ad hoc, it is reassuring that most of the boom-bust periods are plausible when compared to other sources. In particular, most boom-bust patterns closely match the results of Bordo and Jeanne (2002), despite some differences between their

⁴ Our analysis builds on recent empirical work on financial crises by Kaminsky and Reinhart (1999) and Borio and Lowe (2002).

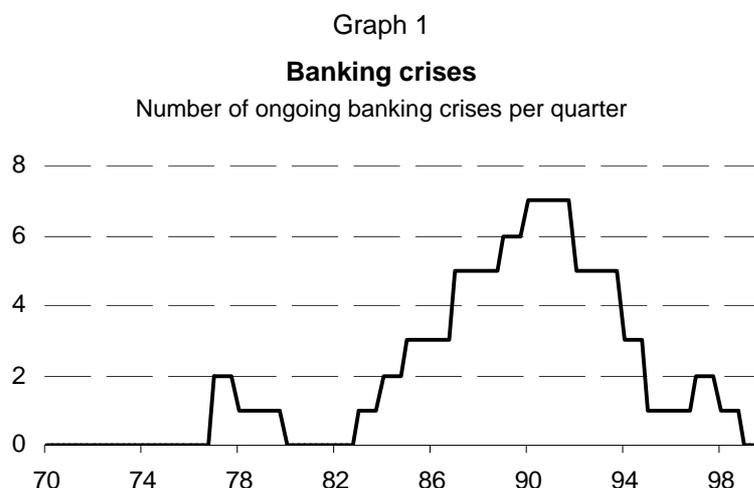
⁵ The average annual growth rates are 1.5 and 3.4%, respectively, for house prices and share prices (both in real terms, deflated by CPI). The corresponding standard deviations are 7.5 and 23.1%. To determine thresholds, we use $x = 1.0$ for house prices and $x = 0.8$ for stocks. Bordo and Jeanne (2002) find for their sample average growth rates of 1.1 and 2.9% and standard deviations of 5.8 and 13.6%, respectively, and take $x = 1.3$ for both categories. According to our calculations, stock market busts cover 18.6% of all observations, while housing market busts take place 17.9% of the time.

data set and ours.⁶ Following our procedure, 25 major stock market crashes and 23 residential property crises have occurred since 1970 in the 20 industrialised countries concerned.

The macroeconomic variables we consider around crisis periods are: short-term and long-term interest rates, inflation, industrial production, the ratio between credit outstanding and nominal GDP, money and credit growth, and asset prices (shares and residential property).⁷

3.2 The incidence of crises

Graphs 1-3 summarise the crisis periods for all countries in our sample. For asset prices, we include both the boom and bust episodes, the latter presented with a negative sign. Some striking differences can be seen across subperiods. During the 1970s there were only two banking crises, but quite a few asset market busts. The practical absence of banking crises must be seen against the background of highly regulated financial markets in those years. Stock market crises were heavily concentrated in the high-inflation years 1973-77, when real economic prospects were bleak. Presumably, there was a flight into property, the traditional safeguard against high inflation, which partly explains the high frequency of property booms in the mid-1970s. These house price increases turned out to be excessive, since in the late 1970s many property markets collapsed.

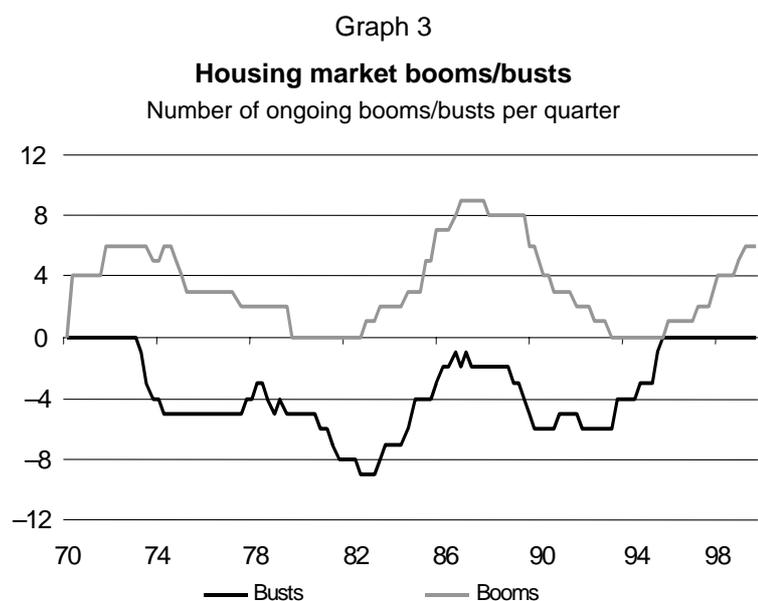
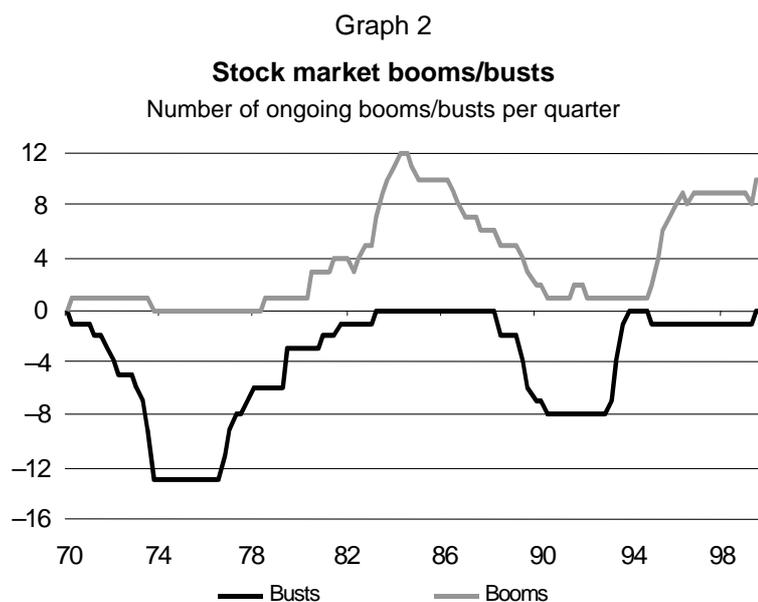


In the early 1980s, there was a boom in stock markets, but a bust in property prices. The decline in inflation and high real interest rates were important factors behind the poor performance of property markets. These factors, together with an improvement in economic prospects, made stocks more attractive to investors.

Most banking crises in our sample are concentrated in the period 1984-93. One of the explanations for this may be that there were high and increasing real interest rates undermining the profitability of the banking sector. In the early 1980s, US real interest rates reached their highest level in the postwar period. In addition, the high frequency of banking crises in the 1980s and early 1990s can be partly attributed to financial market reform and capital market liberalisation, which often took place in the years preceding these crises. Interestingly, these crises developed despite a high degree of price stability in the years concerned. They occurred after a boom in stock prices in the early 1980s, and more or less coincided with stock market crises (1987, early 1990s) and bad performance on property markets (early 1990s). These factors are in line with our theoretical considerations in Section 2, and is discussed in greater detail below.

⁶ Bordo and Jeanne (2002) analyse annual rather than quarterly data and also include Ireland, but not Austria, Belgium, Korea, New Zealand, Portugal and Switzerland.

⁷ Our data come from various sources (national statistics, IFS, BIS, etc) and are available upon request.



In the 1990s, stock and property markets moved much more in tandem than in the 1970s. This is not surprising, given reduced inflation and liberalised capital markets in these years. Interestingly, stock markets seem to lead property markets. In both markets, boom-bust cycles have occurred since 1985 despite price stability and free capital markets in most countries during this subperiod. Hence, these factors are no guarantee of financial stability.

Over the whole period, it is striking that both banking and asset price crises seem to occur in bunches. This is most clearly visible for stock markets, which is no surprise as these are strongly intertwined internationally. Although property markets and banking are more nationally oriented, crises in these markets also tend to be particularly concentrated in specific subperiods. Especially in the early 1990s, the three types of crisis coincided. While these patterns suggest that crises have common roots, the concentration of financial crises may also signal contagion.

3.3 Behaviour of variables around crises

In this section, we consider average patterns of some key macroeconomic variables 12 quarters before and after crisis periods. Graph 4 shows the extent to which these variables deviate from their levels at the start of a crisis during the run-up phase (periods –12 to 0) and how much they depart from their levels in the aftermath of these episodes (periods 0 to 12). The crisis period itself is not considered here.⁸ The data shown are averages, which may of course mask important differences across episodes. In the Appendix, we present the same graph plus a range determined by adding and subtracting one standard deviation, as a rough measure of dispersion, to check the robustness of average patterns. One should be cautious, however, of interpreting this range as a confidence interval, as the distributions of individual cases tend to be non-symmetric while the standard deviations are sometimes increased substantially by one or two outliers.⁹

- Short- and long-term **interest rates** rise significantly during the quarters preceding both housing market and stock market busts, whereas they remain more or less constant prior to banking crises. Short-term interest rates rise particularly rapidly prior to stock market busts - almost 4 percentage points in two years. This suggests that interest hikes are one of the proximate causes of such crises.
- In this context, it is also interesting to observe that **inflation** increases prior to bust periods in stock markets - about 2 percentage points, on average - and, albeit not very significantly, before property crises. By contrast, there is no clear pattern for inflation just before banking crises. Presumably, contractionary monetary policy to control inflation is an important trigger for crises in asset markets. After a banking crisis, inflation drops significantly - about 3 percentage points - while stock market busts are initially followed by higher inflation.
- Another, more forward-looking way to examine interest rates and inflation pressures is by considering the **yield curve**, ie the difference between the long- and short-term interest rates presented in the first two panels. About two to three years before a stock market crisis, the yield curve steepens significantly, which correctly signals an acceleration in inflation. One year before the stock market crisis starts, however, the yield curve flattens again, which is largely due to a strong increase in the short-term interest rates. The yield curve also flattens on average prior to a property market crisis, but this pattern is not very robust across different episodes (see the Appendix). In the case of bank crises, the yield curve does not even show any clear pattern, in line with the behaviour of interest rates. Altogether, changes in the yield curve suggest that especially the stock market is forward-looking, implying that expectations play a greater role in triggering a stock market bust than in the case of both other types of crisis.
- Particularly in the run-up phase to a stock market crisis, **industrial production growth** increases, while it does not show a clear pattern before the other two types of crisis. Consistent with the inflation patterns described above, stock market crises typically develop in periods of a booming economy - reflecting a positive perception that the boom will continue - while many banking crises and housing market busts may be the result of an economic slowdown. Note, however, that just before a stock market crisis, the acceleration in industrial production growth slows significantly, probably due to the short-term interest rate increase. Asset crisis episodes are immediately followed by a significant slowdown. Negative wealth effects possibly play a role here, in combination with reduced future prospects, reflected by forward-looking share prices.
- Excessive credit growth is often seen as an important underlying cause of asset bubbles and (to some extent) relatedly, banking crises. In particular, Borio and Lowe (2002) stress the

⁸ In other words, for the observations –12 to 0, the level at the start of the crisis is subtracted, while for the observations 0 to 12 the level in the final quarter of the crisis episode is subtracted. Hence, the crisis period (“period 0”) is excluded, so the observations just before and after period 0 are not connected. Crisis periods have very different lengths, which makes it difficult to include them in our cross-national analysis.

⁹ Patterns of all individual cases are not presented in order to save space, but are available upon request.

importance of the **credit/GDP ratio** as a leading indicator of financial crises.¹⁰ This finding is especially corroborated for property crises and banking crises, which are preceded by a significant increase in this ratio, while after the crisis periods this increase slows somewhat.¹¹ By contrast, prior to a stock market crisis the credit/GDP ratio rises only marginally; our dispersion measure shows that this increase is not robust (see the Appendix). This difference between on the one hand housing and banking crises and on the other hand stock market crises might be due to the fact that the former two categories are more closely related to the domestic economies, while share prices are typically correlated with the major stock markets abroad. This also explains our finding above, in Graph 2, that stock market crises in various countries are more concentrated in particular years than both other crisis categories. Hence, excessive domestic credit growth is more likely to cause financial problems in domestic markets than in internationally oriented stock markets. To some extent, this may be seen as a refinement of Borio and Lowe's results, which are primarily based on an aggregate index including both property and equity prices.

- Given the behaviour of the credit ratio, it may be interesting to look at the patterns of **money** and **credit** growth rates. Before all three types of crisis, money growth (both M1 and M3) slows on average, albeit not very significantly (see the Appendix), while credit growth does not follow a clear pattern. All in all, the credit ratio appears to be a more reliable indicator for financial strains than money and credit growth, which underscores the importance of cumulative processes rather than growth rates.
- Finally, we consider the behaviour of **asset prices**. Typically, the growth rate of both stock and house prices drops significantly prior to a banking crisis, which suggests they may be one of the underlying causes. After a stock market bust, share prices continue their downward path for some time (about four quarters). The growth rate of real house prices drops after all three types of crisis, including a stock market crisis, when the growth rate drops by 15 percentage points in six quarters. This is in line with Graphs 1-3, which indicate that stock markets seem to lead property markets.¹²

By and large, the patterns shown in Graph 4 are in line with the discussion in Section 2 and with previous empirical studies (see, for example, Borio and Lowe (2002)). At the same time, one should be cautious when interpreting our results for two reasons. First of all, we have mainly presented stylised facts; in order to draw stronger conclusions one should formulate stricter hypotheses and carry out more rigorous testing. For instance, it would be interesting to analyse combinations of variables, to correct for country-specific factors, and to look more precisely at different subperiods. Second, our analysis is only of limited use for predicting crises. We focus on the behaviour of some key variables around crisis episodes, which does not imply that these are *always* good leading indicators for financial crises. This would require a further analysis of type one and type two errors. We are planning to address these issues in future work.

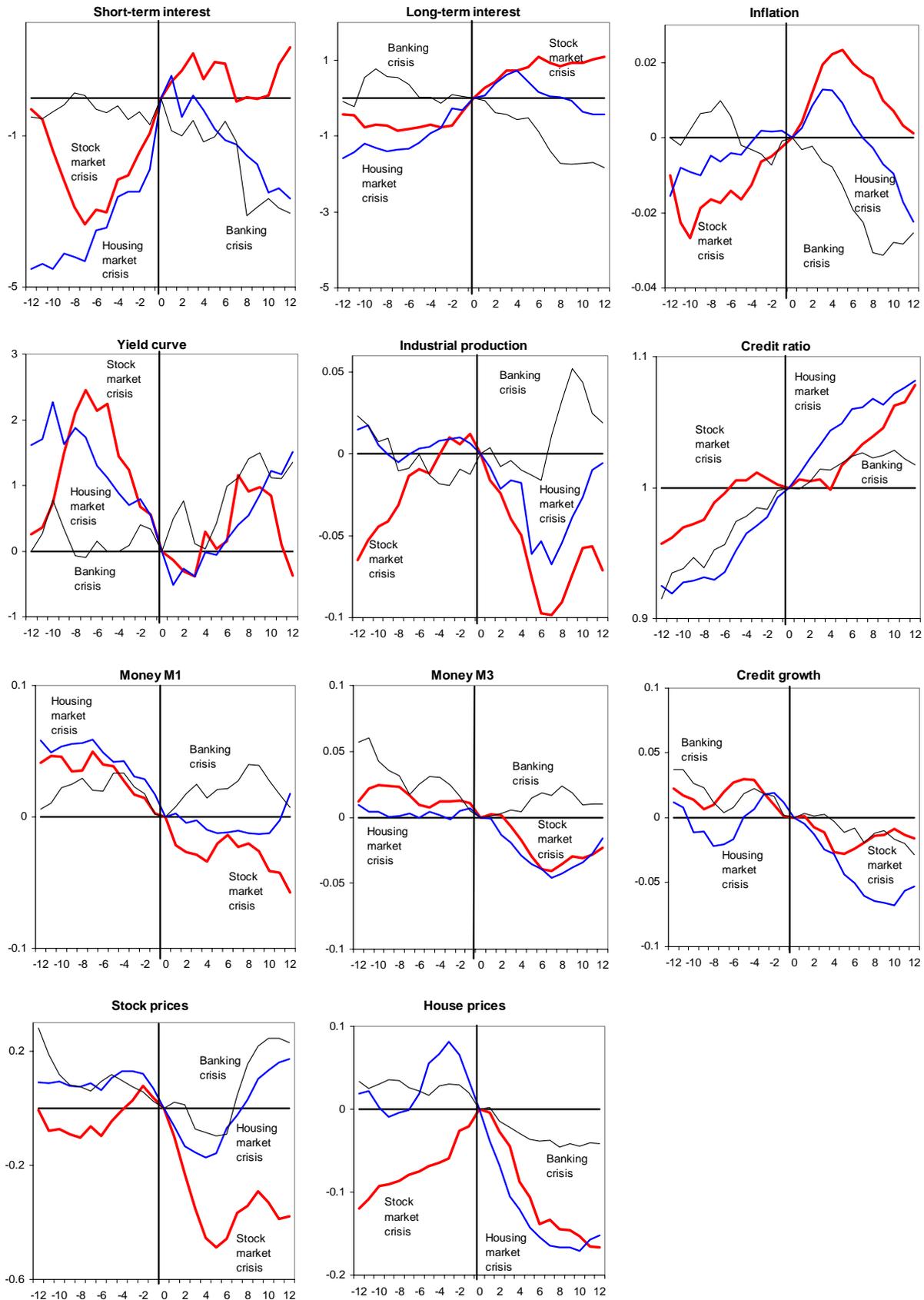
¹⁰ We present this variable in a slightly different way. Instead of *subtracting* the first observation of a crisis from observations -1 to -12 and the last observation of a crisis from +1 to +12, we now *divide* by these first and last observations of crisis periods, respectively. This is because we consider a level now, rather than a growth rate, which makes it less useful to take simple averages because countries with a high credit ratio - eg reflecting a well developed financial sector - will dominate the results. In addition, for some countries we only have indices, which makes it even more difficult to interpret the results. By dividing instead of subtracting, all data in the graphs are normalised at their level at time 0.

¹¹ On average, the ratio does not decrease after a crisis, which one might have expected. To some extent, this reflects the gradual increase in the ratio in most countries over time, as a result of financial development.

¹² An interesting question is to what extent there exists a causal relationship running from the stock market to the housing market. Some indirect evidence of this relationship for the Netherlands is presented in Netherlands Bank (2002). This study shows that house prices not only follow share prices with a lag, but that this correlation is also higher for more expensive categories than for the cheaper segments of the housing market. As households in the higher segment are more sensitive to the stock market - they own more shares - this pattern is consistent with a causal link between share prices and house prices. In addition, Sutton (2002) finds that stock prices explain a substantial part of house price changes for a group of industrial countries, also taking into account other explanatory factors (economic growth, interest rates).

Graph 4

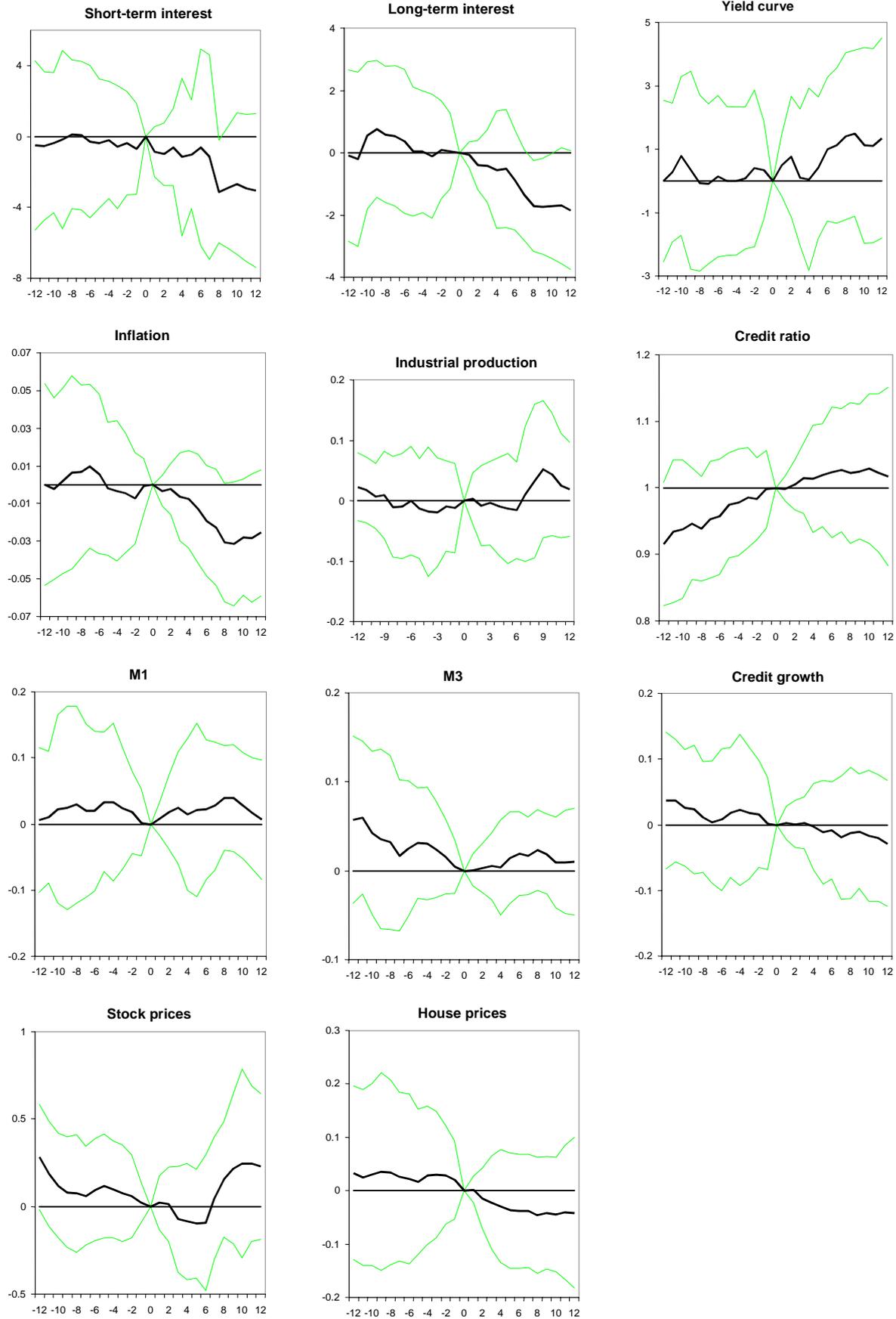
Patterns of variables around crises



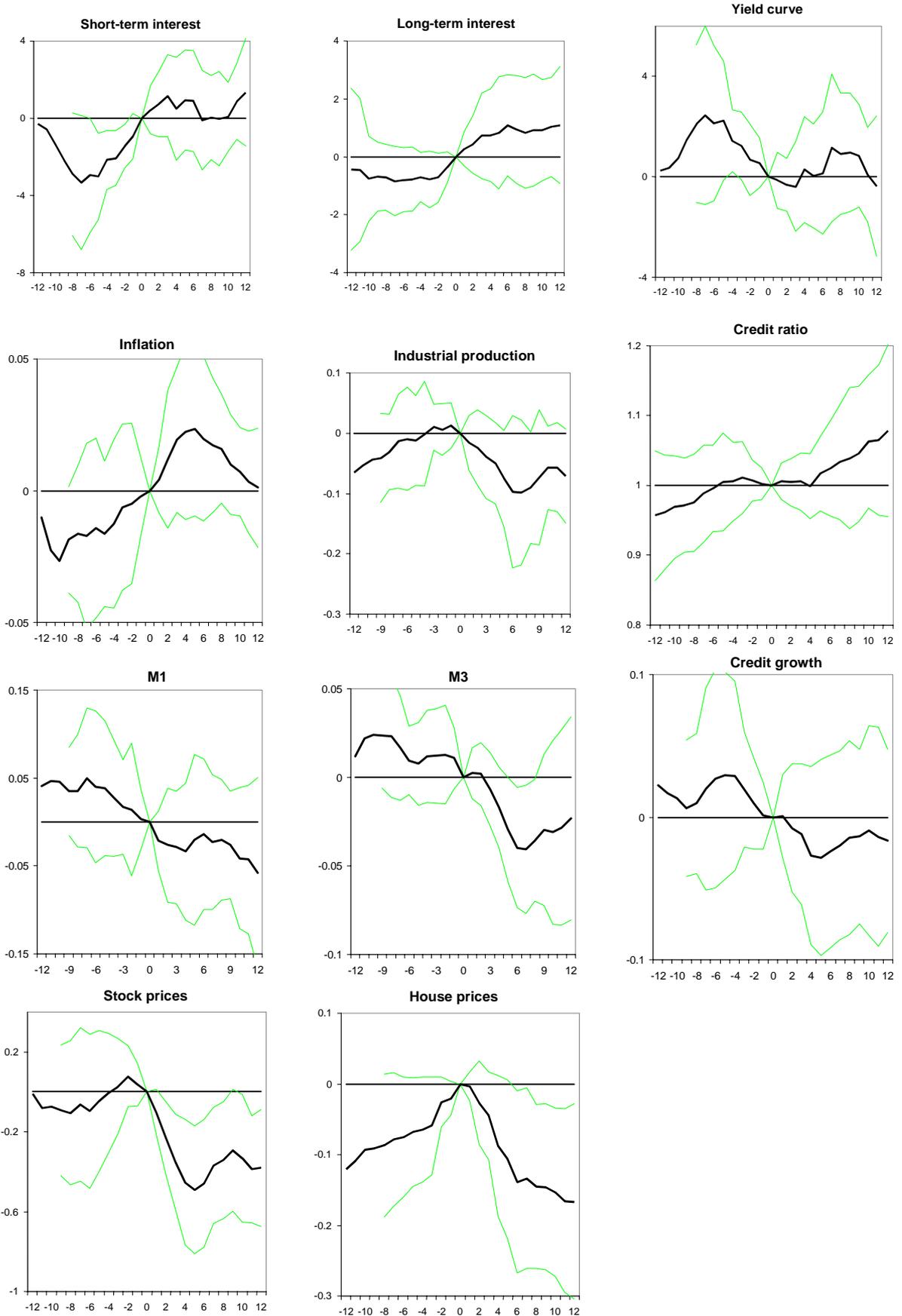
4. Concluding remarks

For more than a decade now, the industrialised world has experienced overall macroeconomic stability. This is an important change from the 1970s and early 1980s, which were characterised by both high and volatile inflation, as well as heavily regulated domestic and international capital markets. With price stability and liberalised capital markets more or less in place in the western world, prospects for long-run economic performance are favourable. However, as our paper illustrates, banking and asset market crises can occur in spite of macroeconomic stability. A key lesson of recent decades is that monetary policy needs to be forward-looking to address risks to price stability. Theory suggests that in doing so, monetary policy contributes to financial stability, since price stability makes financial crises less likely to emerge. Monetary policy must also be forward-looking to address financial stability risks if we are to avoid the damage to the real economy caused by downward corrections that threaten the banking system and financial stability. However, it is very difficult to identify financial imbalances in advance, particularly in the current environment of price stability. A central bank with a high degree of credibility runs the risk that inflationary pressures first manifest themselves in asset markets rather than goods markets. We have presented some evidence that an increase in the credit/GDP ratio indicates a build-up in financial strains, especially during the run-up to housing market busts and banking crises. This result is in line with Borio and Lowe (2002). We have also investigated several other indicators. An important conclusion is that interest rate hikes - although they are less likely in an environment of price stability - seem to have remained an important trigger for asset price crises. This is particularly so for short-term interest rates. Another finding is that banking crises and property crises are more nationally oriented. This arises from the fact that they are less correlated internationally, and seem to have a stronger relationship with domestic credit growth. Finally, a result that warrants further research is that bust periods in the housing market systematically follow stock market crises. Although this may simply be due to the fact that stock prices are more forward-looking, there might also be a causal relationship.

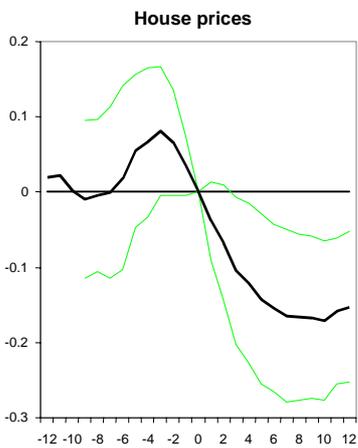
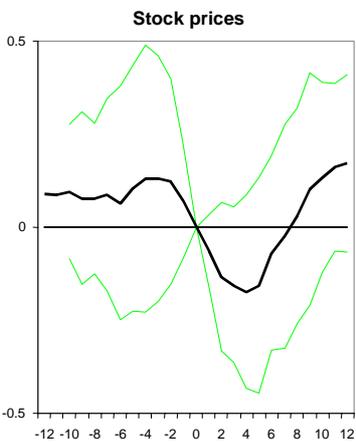
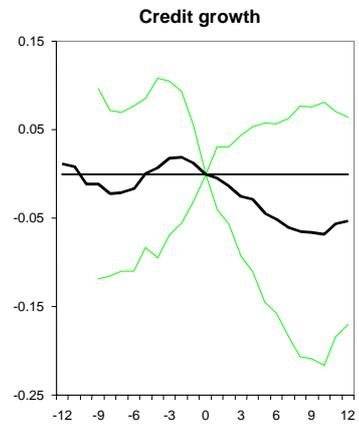
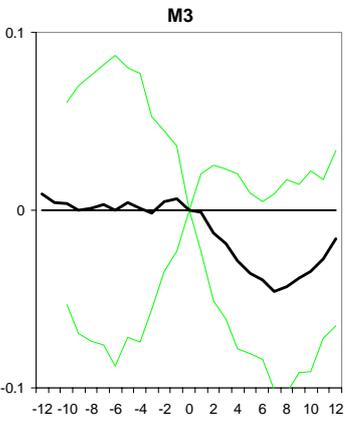
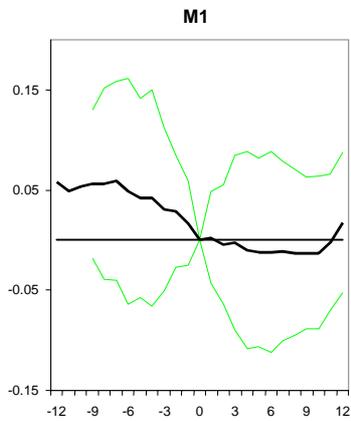
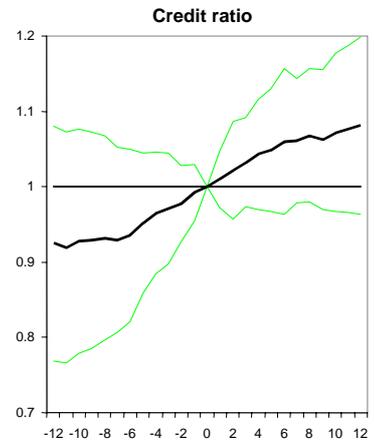
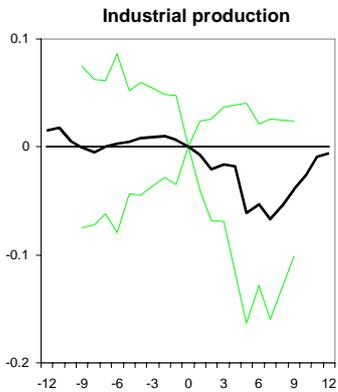
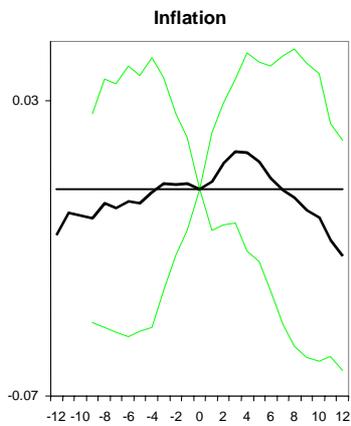
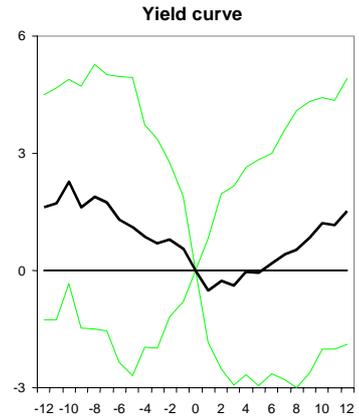
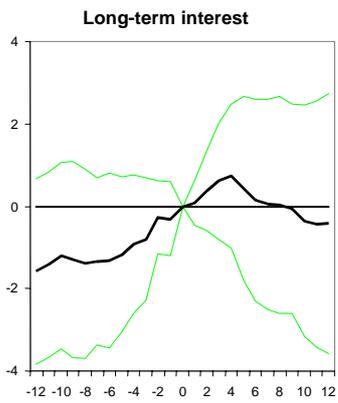
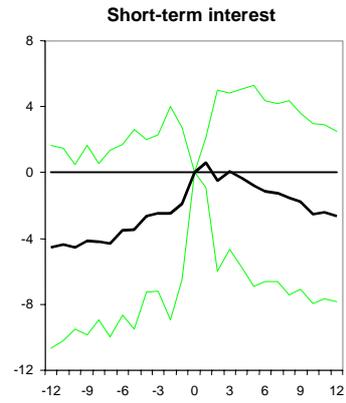
Appendix: Banking crises



Appendix (cont): Stock market crises



Appendix (cont): Housing market crises



References

- Bakker, A F P and B R Chapple (2002): "Advanced country experiences with capital account liberalization", *IMF Occasional Paper*, no 214.
- Bernanke, B S and M Gertler (1989): "Agency costs, collateral, and business fluctuations", *American Economic Review*, vol 79, pp 14-31.
- Bordo, M D, M J Dueker and D C Wheelock (2000): "Aggregate price shocks and financial instability: an historical analysis", *NBER Working Paper*, no 7652.
- Bordo, M, B Eichengreen, D Klingebiel and M S Martinez-peria (2001): "Is the crisis problem growing more severe?", *Economic Policy*, April, pp 53-82.
- Bordo, M D and O Jeanne (2002): "Boom-busts in asset prices, economic instability, and monetary policy", *NBER Working Paper*, no 8966.
- Borio, C and P Lowe (2002): "Asset prices, financial and monetary stability: exploring the nexus", *BIS Working Papers*, no 114.
- Demirgüç-Kunt, A and E Detragiache (1998): "Financial liberalization and financial fragility", *IMF Working Paper*, no 98/83.
- Kaminsky, G L and C M Reinhart (1999): "The twin crises: the causes of banking and balance-of-payments problems", *American Economic Review*, vol 89, no 3, pp 473-500.
- Mehrez, G and D Kaufmann (1999): "Transparency, liberalization and financial crises", *World Bank Policy Research Working Paper*, no 2286.
- Mishkin, F S (1991): "Asymmetric information and financial crises: a historical perspective", in R G Hubbard (ed), *Financial Markets and Financial Crises*, pp 69-108.
- (2000): "Financial stability and the macroeconomy", *Central Bank of Iceland Working Paper*, no 9, May.
- Netherlands Bank (2002): "Impact of stock market strongest in housing market's top segment", *Quarterly Bulletin*, September, pp 33-8.
- Schwartz, A J (1995): "Why financial stability depends on price stability", *Economic Affairs*, Autumn, pp 21-5.
- Sutton, G D (2002): "Explaining changes in house prices", *BIS Quarterly Review*, September, pp 46-55.