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Counter-cyclical Economic Policy

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COUNTER-CYCLICAL ECONOMIC POLICY

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by Douglas Sutherland, Peter Hoeller, Balázs Égert and Oliver Röhn

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ABSTRACT / RÉSUMÉ**Counter-cyclical economic policy**

What changes are needed to make counter-cyclical economic policy more effective in the aftermath of the recent crisis? An important lesson from the severity of the recent recession is that policy in various areas will have to be more prudent during upswings and to build in greater safety margins to be able to react to large adverse shocks. In the period leading up to the crisis, cycles became more synchronised, while asset prices became more volatile. Recent events also underline the difficulties encountered in detecting and reacting to asset price misalignments. The confluence of the turn in asset prices, financial market crisis and slump in trade challenged the ability of counter-cyclical policies to cope with the severe downturn, although experience reveals that countries where the fiscal position was sound and inflation under control were better able to cushion the shocks. Furthermore, robust micro-prudential regulation can help the financial sector withstand shocks. In this light, existing policies should be strengthened to ensure that there is room for manoeuvre going into a downturn. In order to deal with similar shocks in the future, macroeconomic and financial sector policies should consider precautionary policy settings and macro-prudential regulation to address systemic threats to stability.

JEL Codes: E61, G28

Keywords: Macroeconomic policy; financial sector regulation

Politique économique contracyclique

Quels changements sont nécessaires pour que la politique économique contracyclique soit plus efficace à l'issue de la crise ? On peut tirer une leçon essentielle de la récession récente : il faudra que, dans plusieurs domaines, la politique économique soit plus prudente en période d'expansion et comporte plus de marges de sécurité pour pouvoir réagir à un choc de grande ampleur. Avant la crise, on a pu observer une plus grande synchronisation des cycles et une plus forte volatilité des prix des actifs. Les événements récents mettent également en lumière les difficultés rencontrées pour détecter les déphasages des prix des actifs et pour y réagir. La conjonction d'un retournement des prix des actifs, d'une crise financière et d'un effondrement des échanges fait que les mesures contracycliques n'ont plus été à même de contrecarrer une profonde récession. Cela étant, l'expérience montre que les pays dont les finances publiques étaient saines et l'inflation maîtrisée ont pu mieux amortir les chocs. De plus, une solide réglementation microprudentielle peut aider le secteur financier à résister en cas de choc. C'est pourquoi il faudrait renforcer les politiques actuelles pour conserver une marge de manœuvre face à une récession. Pour parer à des chocs similaires à l'avenir, les mesures macroéconomiques et celles applicables au secteur financier devraient s'appuyer sur un cadre d'action guidé par la précaution et sur une réglementation macroprudentielle afin d'écarter les menaces pour la stabilité qui ont un caractère systémique.

Codes JEL : E61, G28

Mots-clés : politique macroéconomique ; réglementation du secteur financier

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COUNTER-CYCLICAL ECONOMIC POLICY

Douglas Sutherland, Peter Hoeller, Balázs Égert and Oliver Röhn¹

1. Introduction and main findings

1.1 The recent economic and financial crisis has challenged some presumptions about the forces shaping economic cycles and the effectiveness of policy that had developed during the great moderation era. This crisis *inter alia* casts doubt over the understanding of the impact of financial markets on the cycle and the cycle on financial markets. Recent events also underline the importance of asset price developments and the difficulties encountered in detecting and reacting to asset price misalignments. An important lesson from the severity of the recent recession is that policy in various areas will have to be more prudent during upswings and to build in greater safety margins to be able to react to large adverse shocks. Moreover, policy settings need to be reconfigured to damp unnecessary volatility, while they should facilitate necessary adjustment. Such a reconfiguration needs to take a broad view as macro and microeconomic policy settings both react to and influence the cycle and they are often inter-related.

1.2 In considering these issues, the paper will review the most important aspects without attempting to be comprehensive. The next section examines the nature of the cycle and highlights how business and asset price cycles have been changing over time. This is followed by an examination of fiscal policy, assessing how counter-cyclical it has been and what factors affect its effectiveness. The fourth section looks at monetary policy, reviewing how policy has stabilised inflation and output and factors that have affected transmission mechanisms. The fifth section assesses the interrelationship of the cycle with financial markets and reviews recent policy initiatives in this area. The sixth section considers how structural policies affect the cycle. The final section, drawing on the preceding analysis, considers the scope for improving policy, to what extent different types of shocks require different responses and how uncertainty influences policy making.

1. The authors are members of the Economics Department of the OECD. The paper is a revised version of a document prepared for a meeting of Working Party No. 1 of the OECD Economic Policy Committee held in March 2010. The OECD's project on counter-cyclical economic policy was partly funded by a grant from Nomura Research Institute. The authors would like to thank the participants of the meeting, and also Jørgen Elmeskov, Jean-Luc Schneider and other members of the Economics Department for valuable comments and suggestions and Susan Gascard for excellent editorial support. This paper draws on a number of other papers prepared as part of the project on counter-cyclical economic policy (Adam, 2010; Davis, 2010; Égert, 2010a, 2010b; Röhn, 2010; Sutherland, 2010).

Main findings

1.3 The main findings can be divided into those that concern the understanding of the factors shaping cycles and the developments leading into the recent crisis, changes that have shaped room for manoeuvre and the effectiveness of policy and, finally what is required to avoid and to cope with large adverse shocks.

Changes to the cycle

- The business cycle has tended to become less volatile and longer during the expansionary phase with fewer recessions. Asset price cycles have tended to become longer as well.
- The synchronisation of cycles has been particularly strong in the lead up to the recent crisis and the transmission of the crisis across countries was rapid. The degree of synchronisation of economic activity and real share and house prices in the run-up to the crisis was unprecedented both across and within countries.
- Monetary and structural policies appear to have contributed to the reduction of macroeconomic volatility during the great moderation era, though this was accompanied by greater asset price volatility.
- The flip-side of the great moderation was greater risk taking, which fuelled a considerable build-up in private-sector debt, which finally turned around sharply.
- The pro-cyclicality of the banking sector, as measured by the co-movement of key banking indicators with the cycle, has increased since the late 1970s. This was accompanied by a rising number of banking crises.

The room for manoeuvre and effectiveness of policy

- The room for fiscal policy to react to the cycle is constrained by budget deficits going into a downturn. Generally, the poorer the fiscal position the less reactive governments have been and can be in their response to adverse shocks. Market completeness reduces the effectiveness of counter-cyclical fiscal policy with private saving offsets stronger when financial markets are more developed.
- Monetary policy effectiveness has been influenced by financial market deepening and completeness. More developed markets allow a more rapid pass through of policy rates, while making consumption and investment more sensitive to interest rates.
- Developments in the conduct of monetary policy have helped anchor inflation expectations, helping to stabilise economies more effectively. On the other hand, financial market developments and greater international linkages have made monetary policy transmission more capricious, creating challenges in determining the strength and speed of monetary policy impulses.
- The mismatch between savings and investment opportunities at the global level have helped keep long-term interest rates low in countries with a low saving rate, while pushing up asset prices, so that financial conditions remained loose for some time, despite the monetary policy tightening before the economic crisis.

- Housing and stock market valuations influence economic activity, boosting consumption and investment when asset prices rise. The interaction of asset markets with the financial sector can foster the build-up of misalignments and debt, with vulnerabilities emerging, even when inflationary pressures are benign.
- The greater openness of economies leads to a lower effectiveness of national policies, thus strengthening the potential role for cross-country co-ordination in the face of large common shocks.
- Finally, there will be less need for macroeconomic policy to react to the cycle in the countries that show a strong resilience to shocks or have large automatic fiscal stabilisers.

What policy changes are needed?

- The severity of the recent shock highlights the importance of building up sufficient safety margins during good times. Some countries where fiscal policy was already in a bad shape were forced into a pro-cyclical tightening during the crisis, while countries with a comfortable budget surplus could implement twice the fiscal stimulus as compared to countries with a relatively high deficit. Countries where inflation was relatively high found it harder to cut rates to support output stabilisation. And capital buffers of banks were too small in many countries to withstand the losses stemming from the crisis. With interest rates hitting the zero bound during the crisis in many countries, there is also a case for re-examining the costs and benefits of raising inflation targets.
- Policy-making should be informed by a more accurate assessment of cyclical developments. For example, for fiscal policy, better measures of the cyclically-adjusted balance as well as accounting for the impact of asset prices on revenues would help ensure that windfall gains during an upswing are not used for permanent tax cuts or spending increases. Concerning monetary policy, the measurement of consumer price inflation can be improved in many countries.
- There are several ways to reduce the pro-cyclicality of the financial system. These include raising its shock-absorption capacity by aiming at higher, counter-cyclical and possibly contingent capital buffers and implementing a system of provisioning for bad loans that provides sufficient buffers during a downturn. It will also be important to deal with incentive problems embedded in the structure of financial institutions and remuneration systems and to deal with moral hazard problems for systemically important financial institutions that are deemed too important to fail. Adding an overarching layer of macro-prudential oversight to micro-prudential supervision of the financial system would provide a comprehensive view of the building-up of vulnerabilities.
- Policy should attempt to match the policy response to the shock. In normal times, allowing the automatic stabilisers to operate and a monetary policy response are likely to be the most effective ways to deal with demand shocks. When the shock is common across a number of countries a co-ordinated response may also be desirable. Supply shocks are more difficult to address as they will often also induce a change in demand and the relative weight of the supply and demand components can alter the appropriate response. With temporary supply shocks, where the supply shock element predominates, a monetary policy response is often appropriate. With a more permanent supply shock, however, macroeconomic policy should at most attempt to smooth the necessary adjustment.

- Shocks originating in financial and housing markets can be particularly costly and macroeconomic policy addressing the shock will need to be aggressive, with an important role for fiscal policy, if interest rates hit the zero bound and the functioning of financial markets is impaired.
- There are several ways to deal with the build up of asset and credit booms that could ultimately threaten financial stability. Interest rates are probably not the best instrument to lean against the wind, when asset prices grow much faster than the fundamentals. Furthermore, the methods to detect asset price misalignments are still insufficiently robust and early warning systems need to be developed further to be a reliable guide for policy. In this light, sound financial market regulation and supervision should be the first line of defence. More targeted interventions may be warranted when there is concern that an asset price misalignment is emerging. For instance, maximum loan-to-value ratios could be adjusted. There is also room to adjust tax policy in many countries. It tends to favour debt over equity financing, which provides incentives to boost leverage, while tax incentives for housing should be phased out, because they can push up the indebtedness of households. However, in the absence of sufficiently robust financial market oversight, monetary policy will need to be vigilant. In particular, when an asset price boom is associated with strong credit growth, monetary policy can have a strong influence through altering the price of leverage. In this case, balancing the costs of getting the timing of policy changes wrong or acting too aggressively against the potentially avoidable costs of severe corrections can tip the balance in favour for monetary policy to lean against the wind.
- Finally, policy makers face a host of uncertainties. In this context, policy should take into account the possible costs of basing decisions on erroneous information about the functioning of the economy, the nature of shocks or the effects of policy. A precautionary stance that takes into account these factors may be warranted. Moreover, risk assessment tools, such as early warning systems, need to be developed further.

2. Cycles and the great moderation

Summary

While their amplitude has come down, output cycles have tended to become longer and more asymmetric with expansionary phases lasting longer, while the length of slowdown or contraction phases has remained approximately the same. House price cycles and to a lesser extent stock market cycles have become longer and larger in amplitude.

Though the evidence is not conclusive, the synchronisation of business cycles appears to have become stronger, especially among some country groupings. The degree of synchronisation of GDP, real share and house price growth during the economic and financial crisis is unprecedented both across countries and within countries.

There are many explanations for the great moderation era that preceded the economic and financial crisis. They focus on good luck, better policy and structural changes in the economy. Panel estimates suggest that better monetary and structural policies have reduced output volatility, though this effect was partly off-set by greater stock and house price volatility.

The flip-side of the great moderation was greater risk taking, which in combination with financial market innovations fuelled a considerable build-up in asset prices as well as debt by households, businesses and among financial institutions, which finally turned around sharply.

Economic cycles: some stylised facts

2.1 Economies are subject to fairly regular cyclical movements, but a decline in the amplitude of the cycle prior to the economic and financial crisis meant that economies were being tipped into recession less frequently. This contributed to longer expansions in the level of output, punctuated by growth slowdowns rather than outright recessions. As the last expansion was atypical in terms of length and low volatility of output and inflation, the factors underpinning these developments as well as their implications are reviewed.

2.2 The apparent cyclical features of an economy can vary depending on how the cycle is measured (Box 2.1). The length and amplitude in growth and deviation cycles are broadly similar for both rising and falling phases. This is not surprising for deviation cycles as this arises by construction, while for growth cycles it implies that their regularity has not changed much. On the other hand, output (classical or level) cycles exhibit considerable length asymmetries between upswings and contractions (Table 2.1). GDP downturns often last only a handful of quarters, while expansions typically persist for 4 to 5 years. Furthermore, the amplitude of the expansion is typically much larger than the contraction.

Table 2.1. **Output cycle asymmetries between expansions and downturns over the long run**

2.3 In comparison with GDP, expansions of consumption are longer and shorter for investment (Table 2.2). Also the size asymmetry is more pronounced for consumption and less pronounced for investment, indicating less trend increase for the latter and perhaps more volatility. Share and house price cycles over the long run tend to be more symmetric. Long and large expansions of GDP are often accompanied by long and large expansions of private consumption and real house prices (Égert, 2010a).

Table 2.2. **Cycle asymmetries**

2.4 The nature of the cycle has changed over time, with the changes most pronounced for level cycles. For most OECD countries, output cycles have tended to become longer and more asymmetric with expansionary phases lasting longer, while the length of slowdown or contraction phases has remained approximately the same. This is widespread among different variables, with larger and longer expansions occurring for consumption, investment (including stockbuilding), as well as share and house prices. In comparison with the average of previous expansions, the length of the latest expansion phase is about double for output, consumption and stock prices (10 years versus 5 years), while it nearly quadrupled for house prices (almost 10 years versus 2-3 years). The asymmetry of the size of the expansion in comparison with the contraction has also become more pronounced for level and deviation cycles but not for growth rate cycles (Égert, 2010a). Another important feature for deviation and growth cycles has been the fall in the amplitude over time.

Box 2.1. Defining and measuring cycles

Several alternatives for defining and measuring cycles exist. These include the choice of cycle type and the method for determining the frequency and dating of peaks and troughs of the cycle. Cycle types include:

- Level, classical or business cycles that are fluctuations in the level of an economic variable.
- Deviation cycles that are differences between the level and an estimated permanent component of an economic variable.
- Growth rate cycles that are measured by the growth rates of level variables.

For empirical work, the cycle is often determined by applying a standardised procedure to identify expansions or contractions. In all three cases an algorithm identifies the turning points. Due to the stochastic nature of economic time series, the approach often needs filtering rules to ensure that turning points are not too frequent, which is a feature of the Bry Boschan Quarterly (BBQ) algorithm (Harding and Pagan, 2006). No single measure gives a complete characterization of the cyclical nature of an economy. For example the output cycle can change while the deviation and growth rate cycles remain broadly unchanged.

1. The data sets used include one with annual data stretching back to the 1790s for some countries and one with quarterly data from the 1950s.

Cycle synchronisation within a country

2.5 Synchronisation, measured by the overlap of expansions and downturns of different variables with expansions and downturns of output within a country, shows marked differences across countries and sometimes there is only little synchronisation (Table 2.3). For instance, private consumption is highly synchronised with output in Canada, Japan, the United Kingdom and the United States, but not in France and Germany, while with the exception of Japan, the United Kingdom and the United States, house prices appear unsynchronised with GDP cycles. Rolling window correlations show that the synchronisation of GDP, real share and house prices became unprecedentedly strong during the last downturn compared with the previous 40 years (Figure 2.1).

Table 2.3. **Cycle concordance within countries**Figure 2.1. **10-quarter rolling-window correlations of macroeconomic variables**

Cycle synchronisation across countries

2.6 A number of factors can increase business cycle synchronisation. These factors diminish the risk of asymmetric shocks or allow an economy to cushion the effects of such a shock more effectively. For example, similar economic structures, trade openness and greater intra-industry trade and factor mobility can all play a role in increasing synchronisation. On the other hand, greater financial market integration provides better opportunities for countries to diversify idiosyncratic risks, which should weaken cross-country correlations of consumption and possibly also output. But strong financial linkages can also hasten the transmission of regional shocks, turning them into global shocks, as was the case with the economic and financial crisis. A high degree of synchronisation can imply both limits on policymakers' ability to undertake stabilisation at the domestic level and the need for more international policy co-ordination.

2.7 Examining cross-country synchronisation, output cycles have overlapped to a significant extent (Table 2.4).² In particular, cycle synchronisation appears strong for some country groups (for instance, among Germany, Austria and the Netherlands or the United States, the United Kingdom and Canada). Furthermore, synchronisation has been higher in recent decades. The data also suggest that stock markets in OECD countries were highly synchronised over the last 40 years but that the cross-country correlation for real house prices was less pronounced and was limited to a subgroup of countries (United States, United Kingdom, Spain, France, Netherlands, Norway and Sweden) (Égert, 2010a). Previous research – Duval *et al.* (2007), using a regression-based decomposition of output gap measures into common and idiosyncratic components – provide some evidence that synchronisation across OECD countries may not have been strong, with the possible exception of euro area countries.³ Kose *et al.* (2008) on the other hand found for a large sample of developed and developing countries that business cycles became more synchronised within groups of countries, and that global factors – though not group factors – declined in importance since the early 1980s for developed countries.

Table 2.4. **Concordance of GDP cycles across countries**

2.8 However, looking at time variations in cross-country co-movements based on rolling window correlations, GDP and real house price growth became extremely strongly correlated by historical standards during the recent crisis. A similarly very strong synchronisation of real share prices could be observed after the burst of the dot-com bubble (Figure 2.1). Also correlations between GDP growth, real house and share prices within countries were high in the run-up and during the crisis.⁴

2.9 The shocks originating from the United States in 2007 and 2008 were transmitted remarkably quickly to the rest of the world. Financial market integration and trade openness were key elements of the rapid and strong transmission, magnified by intra-industry trade within subgroups of countries. Small open economies, in particular, are vulnerable to such shocks, as their trade openness is often a multiple of that of the large countries, while their financial markets lack depth.

-
2. Measures of synchronisation based on regression analysis tend to find that declines in the amplitude of cycles narrows cross-country divergences of cyclical positions (Dalsgaard *et al.*, 2002).
 3. Artis *et al.* (2003), Böwer and Guillemineau (2006) and Giannone and Reichlin (2006) report similar findings for the euro area. Others report stronger idiosyncratic components (Nadal-De Simin, 2006; Camacho *et al.*, 2006). With the formation of the euro area, the co-movement of consumption and output became stronger after the mid-1990s (Darvas and Szapáry, 2008).
 4. Previous studies argue that synchronisation is strong during recessions (Canova *et al.*, 2004) and during periods of above average growth (MacAdam, 2007).

2.10 Recent empirical studies show that trade and financial market integration (FDI and portfolio flows) fosters co-movements among OECD economies (Jansen and Stockman, 2004; Böwer and Guillemineau, 2006; Artis *et al.*, 2008). Garcia-Herrero and Ruiz (2008) find for Spain and its trading partners that higher trade intensity and more similar economic structures have a positive effect on bilateral business cycle correlations, but that stronger financial integration results in lower business cycle correlations because of larger capital flows across countries. Labour market rigidities measured by the OECD's labour market regulations indicator tend to lead to less synchronised business cycles (Artis *et al.*, 2008).

2.11 A high degree of intra-industry trade is important for business cycle synchronisation because a contraction or expansion in a sector will equally affect both countries (Frankel and Rose, 1998). Burstein *et al.* (2008) document that trade related to vertically integrated production chains increase business cycle co-movements between the United States, Canada and Mexico. More generally, intra-industry trade is found to increase synchronisation among OECD economies (Artis *et al.*, 2008).

The great moderation

2.12 As noted above, the latest expansion was atypical. The literature provides a number of explanations for this episode, the so-called great moderation. In the United States, the standard deviation of output growth and inflation declined considerably with a break occurring around the middle of the 1980s (Blanchard and Simon 2001; Dalsgaard *et al.*, 2002; Davis and Kahn, 2008). Other OECD economies experienced similar declines in output and inflation volatility (Figure 2.2). On the other hand, not all countries enjoyed a great moderation, with output growth volatility even increasing in Iceland, while in some others (like France) output volatility was never pronounced.

Figure 2.2. **The great moderation**

2.13 Three broad sets of explanations for the great moderation are advanced in the empirical literature: better macroeconomic policy, good luck and structural changes in the economy.

Better policy and good luck

2.14 A number of findings suggest that better macroeconomic policy, particularly monetary policy, may have contributed to the great moderation. Output volatility is often correlated with the volatility of inflation, which is consistent with a story of better monetary policy (Blanchard and Simon, 2001). Dalsgaard *et al.* (2002) argue that monetary policy gained credibility because of institutional changes including greater central bank independence, the introduction of inflation targeting frameworks and a strong track record in fighting inflation. This led to a better anchoring of inflation expectations. Similarly, Clarida *et al.* (2000) identify a shift in monetary policy contributing to greater macroeconomic stability. The change may be related to the higher weight assigned to inflation in the monetary policymaker's objective function (Taylor, 1998). Even relatively small changes in policy rules and changes in the volatility of shocks can imply relatively large changes in the volatility of output and inflation (Canova, 2009). Cecchetti *et al.* (2005) argue that improved monetary policy played an important role in 21 OECD countries out of 25 in lowering the volatility of inflation, but was less instrumental in damping output volatility. However, improved monetary policy may have helped damp the impact of shocks.

2.15 A second explanation, not necessarily incompatible with better monetary policy, is good luck – in particular fewer large adverse shocks – contributing to reduced volatility.⁵ Stock and Watson (2002) argue that the decline in volatility was too large to be explained by changes in monetary policy alone. Indeed,

5. Empirically, it can be difficult to distinguish the two factors (Benati and Surico, 2009).

sharp changes in the price of oil often accompany synchronised turning points across the OECD (Figure 2.3).⁶

Figure 2.3. **Oil price volatility and the synchronisation of recessions**

Changes in economies

2.16 A large number of other changes in the functioning of economies may have contributed to the great moderation. These include:

- *Financial innovation* – Financial market deepening and innovation have allowed greater consumption and investment smoothing, by allowing better risk diversification and inter-temporal smoothing (Blanchard and Simon, 2001; Catte *et al.*, 2004; Dynan *et al.*, 2006a; de Blas, 2009).⁷ Cecchetti *et al.* (2006) show that higher proportions of credit granted to the private sector are correlated with lower volatility. Benk *et al.* (2009) argue that credit market liberalisation helped the absorption of shocks, which may otherwise have shown up in higher inflation and growth volatility. Nevertheless, these findings need re-examination in the wake of the crisis.
- *Globalisation* – The impact of globalisation could either reduce or increase volatility. The rapid development of emerging economies has underpinned growth in the developed world. At the same time, cheap imported goods from China and other emerging economies have created a terms of trade gain for the advanced economies and thus a beneficial tailwind, which only turned into a headwind when rapid global growth led to sharp rise in oil and other commodity prices (Pain *et al.*, 2006). On the other hand, greater trade and financial integration can make a country more exposed to external shocks.
- *Inventories* – Better inventory management may have contributed to the decline in aggregate volatility (Dalsgaard *et al.*, 2002). Kahn *et al.* (2002) show that in the United States, inventory levels declined in the mid-1980s and Cecchetti *et al.* (2006) show that the contribution of inventory changes to GDP growth declined for the major economies. However, this dynamic may only reflect smaller shocks hitting economies and other research finds that the great moderation has little to do with changes in inventory behaviour (Barrell and Gottschalk, 2004).
- *Output composition* – The shift in the composition of output from manufacturing to services may have affected volatility. This has been advanced by Black and Dowd (2009) using state level data for the United States. However, McConnell and Perez-Quiros (2000) and Stock and Watson (2003) demonstrate that the decline in volatility is common across sectors in the G7 countries.
- *Firm level dynamics* – Firm dynamics can exhibit distinct differences from aggregate developments. For example, Comin and Philippon (2005) show that firm-level output volatility increased, whereas aggregate volatility fell. This could be related to developments in financial markets allowing riskier firms access to external finance (Buch *et al.*, 2009) and the consequences of regulatory reform and technical progress leading to idiosyncratic or sector-specific shocks becoming more important and less correlated across firms and sectors (Stiroh, 2009).
- *Household income* – Dynan *et al.* (2006b) find that individual households have faced increased economic uncertainty during the great moderation in the United States, but the covariance across

6. See also Bakus and Crucini (2000) and Kose *et al.* (2008).

7. Evidence points to a decline in the “home bias” in OECD countries (Lane and Milesi-Ferreti, 2007; Sorenson *et al.*, 2007).

households has decreased, leading to smoother aggregate income developments. They also find that the response of consumption to income shocks fell, which is consistent with changes in financial markets allowing greater consumption smoothing. Edmond and Veldkamp (2008) argue that changes in the United States' earnings distribution helped reduce GDP volatility, as income was concentrated among groups that were not credit constrained.

2.17 Many of these explanations are not mutually exclusive and their relative importance is unclear. In order to assess the possible influence of the competing factors panel regressions were estimated (Table 2.5). Consumption volatility is found to be positively related with aggregate output volatility. As consumption volatility itself was generally declining, it contributed to the decline in aggregate volatility, though causality could run both ways. The results also imply that consistent with the better policy story the impact of inflation volatility on output volatility drops out, possibly a result of better anchored inflation expectations. Structural policies may also have begun to have an effect with unemployment volatility no longer appearing to exert a strong influence on overall volatility in the latter part of the sample. The volatility of the measure for openness also seems to have become less important in explaining overall volatility. On the other hand, the volatility of asset prices, notably stock returns and house prices, appear to have had an increasing influence on aggregate volatility during the great moderation period. Finally, stockbuilding was insignificant and the estimated coefficient suggests that the quantitative effect is trivial.

Table 2.5. **Factors contributing to the great moderation**

The flip side of the great moderation

2.18 The great moderation lasted for a long time and it is likely to have shaped the behaviour of market participants. Benign market conditions may have raised the willingness to take on risk. This could be because less volatility for a long stretch of time was extrapolated into the future, because it was thought to be due to structural changes or the faith in policy makers to maintain steady growth and low inflation had risen. Also the aggressive easing in monetary policy in the wake of the dot.com bubble may have put a floor under expected asset prices. Clearly spreads of high-risk bonds had become very low, bank lending standards became lax and leverage reached record levels.

2.19 Risks were underestimated in other ways. It was often assumed that adverse shocks were not closely related with each other. Banks that relied on securitisation thought that they would be able to find other sources of funding for their loans, which turned out to be wrong. And investors thought that they could insure against default by the monolines or credit default contracts. But given the many defaults during the economic crisis, insurance was not available.

2.20 Greater risk taking is at the heart of the credit boom that preceded the crises, with non-financial corporation debt to GDP ratios rising sharply in many countries both in the late 1990s and mid 2000s (Figure 2.4). Household debt to GDP ratios also rose in a number of countries, becoming comparatively large in both the United Kingdom and the United States. Apart from greater risk taking, the build up in debt was fuelled by financial innovation, which rendered financial intermediation much more complex. While asset prices, in particular house prices, and credit rose steeply in a number of countries, this did not spark strong pressures on capacity, but commodity prices surged. There was thus no clear signal from the main economic indicators, such as very rapid growth, high output gaps or rising inflation that dangers were around the corner and it was especially heartening for policy makers that low and/or falling unemployment did not spark wage inflation. At the same time, rising asset prices helped flatter fiscal balances. But rapid asset price increases and the sharp rise in credit turned out to be unsustainable.

Figure 2.4. **Household, government and non-financial corporation liabilities**

2.21 Monetary policy is also seen by some to have fuelled the asset price and credit boom. Indeed, judged by a Taylor rule, monetary policy was loose in the United States between 2001 and 2005 and deviations from Taylor rates have been shown to have underpinned credit and real house price growth (Ahrend *et al.*, 2008). However, the policy rate for the euro area and the United Kingdom was not much out of line with the rule, but credit growth was rapid nonetheless and asset prices also rose strongly in a number of these countries. In some of the smaller euro area countries (Spain, Greece and Ireland), real interest rates were negative, but the ECB sets monetary policy for the area as a whole. The recent sharp slump has raised the issue whether central banks should “lean against the wind”, an important issue that will be investigated below. The meltdown in financial markets has demonstrated problems with financial market supervision that concentrated on micro-prudential aspects and ignored systemic risks (section 5). Regulators and supervisors did not spot the risks posed by the emergence of the secondary banking system and that risk, rather than being well diversified, was being concentrated in financial market institutions. There was also little action to counter ever laxer lending standards.

2.22 High saving relative to investment in a number of rapidly growing emerging market economies and associated global imbalances may also have played a role. The building up of reserves in a number of emerging economies and especially China and their investment in assets of the advanced economies are likely to have resulted in lower long-term interest rates.⁸ Though emerging market capital inflows were heavily skewed towards US assets, interest rates were also low in non-reserve currency countries. Low interest rates, in turn, encouraged investors to move into riskier, higher-return assets. Furthermore, capital inflows putting downward pressure on long-term interest rates complicated the task of monetary policy in stabilising their economies, particularly as asset price misalignments began to emerge (section 4). Blanchard and Milesi-Ferretti (2010) argue that as asset price booms developed in a number of OECD countries from the mid-2000s pushing down saving rates even further. The pattern of imbalances that emerged was particularly difficult to address by unilateral action, despite disorderly adjustments being a chronic concern for policymakers during the 2000s.

8. Obstfeld and Rogoff (2009) point to a confluence of a number of factors which allowed the United States (and other countries) to finance macroeconomic imbalances at low interest rates and China to delay rebalancing its economy. These factors included the rebuilding of international reserve positions in Asian economies following the crisis in 1998 and a reliance on export-led growth in the region (See also Bini Smaghi, 2007).

3. Fiscal policy

Summary

Fiscal policy reaction functions suggest that cyclically-unadjusted balances have moved in a counter-cyclical way. On the other hand, estimates of discretionary fiscal policy show pronounced counter-cyclical only in some countries. The use of discretionary fiscal policy appears to have been constrained in countries with large deficits.

Deficits are not only affected by economic activity, but also house and stock price cycles. This means that conventional measures of cyclically-adjusted balances that do not take into account asset price cycles have painted too rosy a picture of underlying budget balances during the upswing prior to the economic and financial crisis.

Fiscal policy can influence cyclical developments through the operation of the automatic stabilisers, discretionary policy and institutional settings. The size of the automatic stabilisers depends on a number of features of the tax and transfer system and is positively related to the size of government.

Fiscal rules can help avoid the building up of debt and may lead to swifter consolidation of fiscal positions following a downturn. By assisting fiscal policy being counter-cyclical during the expansion phase of the cycle, they will also allow a stronger response to cope with large adverse shocks. But inappropriate fiscal rules can be destabilising and fiscal rules may also lead to behavior aimed at respecting the letter but not the spirit of the rule.

The ability of discretionary fiscal policy to affect economic activity following shocks depends on how private agents react. New work suggests that the private saving offset is around 40% on average across countries, which is somewhat lower than found in prior research. Changes in current revenue are almost fully offset, whereas offsets to current spending are on average around one third to one half depending on the sample. There is no offset for public investment, making it the most potent policy tool. Saving offsets are stronger the higher the level of government debt consistent with the expectation that subsequent consolidation will lead to higher taxation. They are also stronger, the better developed financial markets are, pointing to the importance of liquidity constraints for the effectiveness of policy.

How counter-cyclical has fiscal policy been?

3.1 OECD-wide fiscal policy, as measured by cyclically-adjusted fiscal balances (balances purged of the effect of the automatic stabilisers), has shown larger counter-cyclical variations since the mid-1990s than before (Figure 3.1). In part, the break with the past reflects consolidation in the United States during the 1990s as well as in Europe in the run up to the qualification date for joining the euro area. Fiscal balances in Japan, on the other hand, generally deteriorated throughout the 1990s, with a nascent consolidation only beginning in 2005. After 2000, both the United States and the United Kingdom experienced a marked counter-cyclical loosening of policy in the wake of the dot.com bubble, which was only partially corrected in the following upswing (Figure 3.2). In the euro area, the counter-cyclical loosening was much smaller and on aggregate largely corrected. In countries where fiscal positions appeared to strengthen, the improvements may have been flattered by the revenue buoyancy related to the asset price booms (Box 3.1).

Figure 3.1. **Fiscal policy over the cycle**

Figure 3.2. **Fiscal positions on the eve of downturns**

Box 3.1. Revenue buoyancy and fiscal balances

Measures of cyclically-adjusted budget balances play an important role in assessing the fiscal stance. While cyclically-adjusted balances are adjusted for the influence of the real cycle, several revenue components are affected by asset price cycles. Failure to account for asset price movements may thus lead to a distorted picture of the fiscal stance. An overly rosy picture can lead to pressure for tax cuts or spending increases that can permanently weaken budget positions (Journard and André, 2008). Relatively little attention has been paid to how revenues are affected by asset price cycles. This is partly due to conceptual problems. For example, there is no consensus on how to identify “equilibrium” asset prices in order to disentangle a temporary from a permanent asset price movement. Girouard and Price (2004) found that accounting for the influence of asset prices in OECD countries could have a marked influence on balances accounting for 0.5% of GDP on average between 1995 and 2000. Morris and Schuknecht (2007) estimated that the overall euro area budget balance could be boosted by about 0.5% of GDP during asset price upswings. For the United Kingdom, Farrington *et al.* (2008) found similar results though also noted that differences in the phase of asset price cycles could have largely offsetting effects such that the aggregate adjustment to fiscal balances was small. Work by the Secretariat is underway to explore ways to take the effects of asset price cycles on revenue developments into account in a systematic way. In the empirical work, reported below, the effect of asset price developments on fiscal policy reactions to the cycle is controlled for by the inclusion of asset price variables.

3.2 In order to assess the extent to which fiscal policy has acted in a counter-cyclical manner and gauge the influence of different institutional factors fiscal policy reaction functions were estimated (full results are reported in Égert, 2010*b*). The main results of these regressions are:

- Cyclically-unadjusted balances⁹ are positively correlated with the development of the output gap or GDP growth, implying that budget balances (including automatic stabilisers and discretionary actions) moved in a pro-cyclical way, *i.e.* overall fiscal policy was counter-cyclical. Unadjusted balances were more pro-cyclical during downturns than during expansions (Égert, 2010*b*).
- Cyclically-adjusted balances, which are adjusted for the impact of the automatic stabilisers, are less well correlated with the output gap or GDP growth (Table 3.1). They generally suggest that discretionary fiscal policy was neutral or at best weakly counter-cyclical. Nevertheless, at the individual country level, discretionary fiscal policy was strongly counter-cyclical in Australia, Canada, Denmark and the United States and strongly pro-cyclical in Austria, Belgium, Hungary, the Netherlands, Poland, Portugal and the United Kingdom.
- The scope for using discretionary fiscal policy depends on the size of the deficit (Table 3.2). Discretionary fiscal policy in countries running larger deficits tends to be pro-cyclical. Indeed, countries where the fiscal balances were favourable appeared better able to respond to contractions in output (see below). There is less evidence that fiscal policy is affected by high debt levels or the size of the government sector.
- There is also evidence that fiscal policy has reacted more strongly to large swings in the cycle (Égert, 2010*b*).
- Cyclically-unadjusted government revenues show pronounced pro-cyclicality, while government spending overall is acyclical. On the revenue side, corporate taxes are found to react most strongly to GDP growth, while taxes on individuals, goods and services and social security

9. While it would be better to use underlying balances that also correct for one-off items, the Secretariat's time series for the underlying balances are considerably shorter. They usually start in the 1980s, whereas cyclically-adjusted balances are typically available from the 1970s. The two measures are almost perfectly correlated for most OECD countries.

contributions react less strongly. On the expenditure side, investment spending and government wages are the most pro-cyclical components, while government subsidies tend to be counter-cyclical. Social security transfers do not react to the cycle probably because they include large components, such as health and pension payments that are acyclical and that dominate the cyclical component, which includes unemployment benefits (Égert, 2010b).

- Fiscal balances (both cyclically-adjusted and unadjusted) are positively correlated with the growth rates of asset prices (house prices and the stock market index) (Table 3.1 and Égert, 2010b for the unadjusted balances). Fiscal balances are also positively correlated with openness.¹⁰
- Other controls have been used in the literature and also been tested here. However, additional explanatory variables, such as GDP volatility, debt servicing costs and political economy variables were not found to have an effect.

Table 3.1. **Fiscal policy reaction functions**

Table 3.2. **Non-linearities in fiscal policy reaction functions**

What factors have influenced policy over the cycle?

3.3 Fiscal policy can influence cyclical developments through the operation of the automatic stabilisers, discretionary policy in reaction to the cycle and institutional settings.

Automatic stabilisers

3.4 The fiscal reaction functions reported above suggest that in many countries most of the cyclical sensitivity of fiscal balances comes from the automatic stabilisers. The cyclical sensitivity is related to a number of features (van den Noord, 2000). The tax structure and the progressivity of taxes influence how reactive revenues are to cyclical conditions. As the main automatic stabiliser on the spending side are unemployment benefits, the more generous these benefits are the greater the sensitivity of fiscal balances to the cycle.¹¹ In general, the almost mechanical reaction of the cyclical component of government balances to movements in the output gap is stronger for larger governments (measured by the share of cyclically-adjusted current primary spending) (Figure 3.3). The size of the automatic stabilisers can vary substantially across countries.

Figure 3.3. **Government size and cyclical sensitivity**

Discretionary fiscal policy

3.5 Counter-cyclical discretionary fiscal policy has been out of favour for some time (Auerbach and Gale, 2009). The scepticism partly arose due to a succession of negative supply shocks in the 1970s and 1980s, which limited the effectiveness of fiscal action, and a perception that monetary policy had become more potent. The timeliness of discretionary fiscal policy was also a concern, with lags in decision making and implementation risking the stimulus ending up being pro-cyclical. Furthermore, economic agents could anticipate government interventions, which could exacerbate the cycle. For example, the possibility that investment credits or subsidies for new car purchases may be offered as part of a stimulus package may be sufficient to induce firms to delay investment and individuals to delay the purchase of a car until the

10. However, the gap coefficient of the country-specific discretionary fiscal policy reactions is not related to the openness indicator, suggesting no effect of openness on the fiscal policy response to the cycle.

11. Girouard and André (2005).

stimulus package is implemented. The effect of discretionary policy on activity is also subject to considerable controversy.¹² Notwithstanding these concerns, the magnitude of the recent slump has seen renewed appetite for discretionary fiscal policy, partly because the shock was large, interest rates hit the zero bound in many countries and monetary policy transmission was impaired.

Influences on discretionary fiscal policy

3.6 The budget position on the eve of a recession influences a government's use of discretionary measures. A more favourable budget position has generally allowed governments more room for fiscal action. In past cycles, the cyclically-adjusted deficit has generally moved relatively little when economies entered a recession, though for countries in a favourable fiscal position a slight fiscal loosening can be seen (Figure 3.4). In the recent sharp slump, when discretionary fiscal policy was widely used, those countries in better fiscal shape provided a large boost to their economy, which is around double the boost by the higher deficit countries after the onset of the recession.

Figure 3.4. **Changes in cyclically-adjusted balances around turning points**

3.7 Fiscal rules help create the necessary room, particularly in good times, for the pursuit of a counter-cyclical discretionary policy and allow the automatic stabilisers to operate unfettered. Fiscal rules can also help avoid the building up of debt and may lead to swifter consolidation of fiscal positions following a downturn. Not only will this assist fiscal policy being counter-cyclical during the expansion phase of the cycle, when appetite for consolidation may be weak, but may allow a stronger response to cope with large adverse shocks. There is some evidence that binding fiscal rules can induce a more counter-cyclical fiscal policy. For instance, Gali and Perotti (2003) argue that discretionary fiscal policy under EMU became more counter-cyclical and that counter-cyclical fiscal policies have become more common during major recessions.

3.8 Spending rules and budget balance rules appear to be particularly important in supporting fiscal consolidation (Guichard *et al.*, 2007). While budget balance targets are widespread, fewer countries also implement spending rules (Table 3.3). For rules to be effective, they need to be tailored to the needs of the economy. Supporting institutions that enhance transparency and accountability will also be important. Together these rules and accountability mechanisms can enhance the predictability of fiscal policy. Giving guidance for expectations provides another reason for using fiscal rules (and possibly independent fiscal institutions). The extent to which rules lend credibility to fiscal consolidation, for example, will enter the information set of the central bank and bond market participants. Monetary policy and bond premia will adjust and be more likely to support consolidation. When fiscal announcements are not credible, central banks will be less willing to move early in the fear that subsequent policy reversals will be destabilising (Ahrend *et al.*, 2006). Many of the fiscal rules reported in Table 3.3 have been put under severe strain or have even been suspended in the aftermath of the recent financial crisis. Suspending fiscal rules in the wake of extreme economic shocks begs the question of how to re-establish credibility. As in the case of monetary policy, establishing a strong track record may help to anchor expectations that fiscal policy will return to a sustainable path. Alternatively, defining the conditions under which the fiscal rule can be suspended temporarily and setting out the path for returning to the rule may also underpin credibility (section 7).

12. In the empirical literature, there is no consensus on the size or even the sign of the effects. Partly this is a consequence of the difficulty in identifying a discretionary change in fiscal policy (Leeper *et al.*, 2009 for the econometric issues). Perotti (2005) using SVAR techniques for quarterly data in five OECD countries finds that the estimated effects have become smaller over time (with a break occurring around 1980). This break, Perotti argues, is related to less persistence of fiscal shocks, credit constraints being less prevalent, and there is a stronger real interest rate response.

Table 3.3. **Main fiscal rules currently applied in OECD countries**

3.9 When a government fails to address fiscal sustainability in good times, certain types of fiscal rules can induce pro-cyclical fiscal policy and creative accounting (Koen and van den Noord, 2005). Close to balance or in surplus rules and deficit thresholds, for example, could induce governments to tighten the belt in bad times, thereby exacerbating downturns. Pro-cyclicality of fiscal policy as a result of balanced-budget rules can be a particular issue for sub-central governments, who can have only a limited ability to smooth their spending. Recent experience in the United States demonstrates that these types of rules can partly offset a stimulus at the central government level. This issue is recognised in a number of countries, where transfer mechanisms are in place to assist sub-central governments to smooth their income and therefore spending (Sutherland *et al.*, 2005). Alternative ways to mitigate, though not eliminate, the adverse effects of fiscal rules is by lengthening the time horizon of the rule or establishing a rule that explicitly takes into account the cycle. Another approach is to rely more on spending rules, which are less likely to give rise to significant pro-cyclicality. However, they also have drawbacks in constraining policy reactions to sudden cyclical developments.

3.10 There are also a number of political economy features that can influence discretionary fiscal policy (Price, 2010). Election cycles can generate boom-bust cycles. Politicians may be tempted to loosen fiscal policy before elections by increasing public spending that is financed by debt rather than by tax increases if the electorate favours spending and underestimates the future cost of servicing debt. In addition, governments that are likely to lose elections may opt to accumulate debt in order to reduce the fiscal room for manoeuvre of the next government. Governments may proceed with fiscal consolidation right after the elections given that the benefits of consolidation may take time to materialise.

3.11 Institutional aspects of fiscal policy are also important drivers of fiscal deficits. Fiscal policy in countries with dispersed political power is less influenced by the electoral cycle but tends to be more pro-cyclical over the business cycle because political fragmentation can lead to poorer fiscal policy decisions (Hallerberg *et al.*, 2002).¹³ In addition, political dispersion and a lack of political consensus may act as a break for fiscal consolidation after elections.

Fiscal policy effectiveness

3.12 A traditional way of gauging the effectiveness of fiscal policies is by looking at fiscal multipliers. Multipliers provide an overall quantitative summary of the effect of fiscal measures on aggregate activity including first and second round effects. Recent OECD (2009a) work has surveyed multiplier estimates based on simulation results from various macro models in OECD countries. The general findings are that short-run multipliers from government spending exceed those of revenue measures, with the former slightly above 1 and the latter around 0.2 – 0.8 depending on the specific form of tax cuts. Furthermore, multipliers tend to increase from the first to the second year and evidence from multi-country models suggest that multipliers are smaller for more open economies reflecting import leakage effects.

3.13 An alternative way to assess fiscal policy effectiveness is to focus on private reactions to fiscal policy. As rational forward-looking individuals should not react to changes in fiscal policy stemming from automatic stabilisers, the focus is on discretionary fiscal policy. Various channels can lead to an offsetting private behaviour to fiscal actions. First, private saving will rise in response to deficit financed tax reductions as the marginal propensity to consume out of disposable income is less than one. Second,

13. Drazen and Eslava (2010) argue that prior to election years politicians may be tempted to change the composition of public expenditure without increasing deficits by spending on items that are favoured by voters, while reducing others.

private savings are indirectly affected by increasing budget deficits through higher interest rates and/or inflation which cause crowding-out effects. Finally, forward looking agents may anticipate that given a constant government spending path, current increases in budget deficits will have to be financed through higher taxes in the future (Ricardian equivalence).¹⁴ In earlier work assessing the importance of Ricardian behaviour, de Mello *et al.* (2004) found evidence of partial, but substantial, offsetting movements in private and public saving of about 30-50% in the short term and about 75% in the long term while controlling among other things for the real interest rate, inflation and asset price effects.¹⁵ New work finds that the saving offset is around 40% (Table 3.4) both in the long and in the short term, which is also consistent with, albeit at the lower end, of other empirical research.¹⁶ However, there is considerable heterogeneity across countries (full results are reported in Röhn, 2010).

- The composition of changes in public saving is important in determining the size of the offset. Changes in current revenue are almost fully offset in the long term, whereas offsets to current spending are on average around one third to one half depending on the sample (Table 3.4). The revenue offset appears high. It is, however, broadly consistent with the estimate of de Mello *et al.* (2004) of about 80%.¹⁷ Additional evidence suggests that the long-term revenue offset has been increasing over time (Röhn, 2010). There is no offset for public investment, perhaps reflecting the expectation of a return on the investment. While the revenue offset is similar in the long and short term, differences exist for spending. The short term offset for spending is estimated to be between one fourth and one third depending on the sample. This suggests that temporary deficit-financed public spending could boost aggregate demand, while tax cuts would have a much smaller effect.
- Offsets may also react in a non-linear way (Table 3.5). Private saving reactions to fiscal policy appear to depend on debt levels. Saving offsets are stronger the higher the level of government debt consistent with the expectation of an increased likelihood of subsequent consolidation or higher interest payments.¹⁸ Both will lead to higher taxation or cutbacks in spending.
- The private saving offsets are stronger when a country is more financially developed. This is consistent with the implication that when borrowing constraints are binding Ricardian equivalence may not hold. Credit constrained households will consume from a deficit-financed stimulus, which makes fiscal policy more potent. In this context, Boskin (2008) notes that secular declines in saving rates may raise the effectiveness of temporary fiscal policy.¹⁹ In the current crisis the higher effectiveness of fiscal policy due to dysfunctional financial markets may be counteracted by the need for households to repair their balance sheets.

14. Full Ricardian behaviour implies no effect on national savings and thus no impact on the real interest rate.

15. Other controls include: the old age dependency ratio; the ratio of M2 to GDP; changes in the terms of trade; and the growth rate of per capita GDP.

16. Recent studies for Spain (de Castro and Fernandez, 2009) and Australia (Brittle, 2010) also find partially offsetting movements between private and public savings. In the case of Australia the offset is estimated to be one half in the long term and one quarter to one half in the short term.

17. The estimated revenue offset of above 100% in the entire sample compared to 86% for the six large countries may also reflect the poorer data quality of the quarterly revenue series in smaller OECD countries.

18. This finding is consistent with earlier work by Nicoletti (1988, 1992).

19. In a DSGE model of the EU Roeger and in't Veld (2009) find that the introduction of credit constrained households can have a marked effect on government spending multipliers, almost doubling them in some scenarios.

Table 3.4. **Saving offsets**Table 3.5. **Non-linearities in saving offsets**

3.14 Other mechanisms can also limit the effectiveness of fiscal action. Government debt levels have begun to rise sharply across the OECD since early 2008. Gross debt levels are projected to rise to 100% of GDP on average for the OECD in 2010. This accumulation may increase the cost of borrowing. For example, Laubach (2003) estimates for the United States that a one percentage point increase in the projected deficit raises interest rates by 25 basis points, while a one percentage point increase in the debt to GDP ratio is associated with interest rates rising 3 to 4 basis points. Recent estimates by Haugh *et al.* (2009) find that interest rate spreads in the euro area are influenced by changes in the debt service ratio, which are larger when the country has a poor record of fiscal discipline. Also consistent with an interest rate crowding out effect a negative relationship between asset prices (house and stock prices) and private savings exists in some countries (Röhn, 2010). Larger government deficits can put upward pressure on bond rates and thus borrowing costs so that an indirect offset may occur through asset prices.

3.15 Also the openness of an economy will affect the effectiveness of fiscal policy's impact on economic activity. For small, open countries part of the effect of a discretionary fiscal stimulus and of the automatic stabilisers on damping the cycle is lost due to import leakage. In addition, if a fiscal expansion drives up the domestic interest rate, the fiscal stimulus can increase capital inflows which will lead to an appreciation of the exchange rate. A fiscal stimulus will have international spillover effects both through the trade and interest rate channels. For instance, simulations with the OECD global model (Hervé *et al.*, 2007) suggest that the largest spillovers from the current fiscal stimulus packages result from the US stimulus amounting to ¼ per cent of OECD GDP in 2010 (OECD, 2009a). The existence of spillover effects raises questions about the benefits of international policy co-ordination. In principle policy co-ordination could improve fiscal responses by internalising spillover effects. In practice, however, co-ordination may be difficult to achieve since the magnitude of spillover effects are difficult to measure and differences in the scope for fiscal policy to react across individual countries exist.

4. Monetary policy

Summary

During the great moderation era, monetary policy has been very successful in bringing down inflation rates as well as their volatility. But the economic crisis raises questions as to whether monetary policy played a role in fuelling asset price inflation and indebtedness.

Monetary policy has been reactive to the cycle and countries with better inflation control can generally react more forcefully to cyclical developments. While monetary policy has largely responded to inflation and output developments as the Taylor Rule would predict, there have been some large and persistent deviations. Estimated monetary policy reaction functions suggest that the weight assigned to inflation and the output gap can differ significantly across countries. In almost all cases, the Taylor principle holds with interest rates reacting more than proportionally to changes in the inflation rate.

Differences in the size and completeness of financial markets can imply a different pass through from policy rates to market rates and will also lead to differences in consumption and investment smoothing. However, better developed financial markets may also mean that it is harder to rein in economic activity that is strongly influenced by asset price developments. Furthermore, greater financial integration and cross-border capital flows can influence long-term interest rates and imply different weights to transmission via the exchange rate as opposed to other transmission channels. When policy rates change, the determinants of financial market conditions such as long-term interest rates, credit conditions, exchange rate movements and asset price-related wealth effects can offset or amplify the intended policy impulse.

Asset price developments provide a particular challenge for policymakers. Asset prices played an important role in the build up to the crisis, but containing them with monetary policy could entail large collateral damage to activity and inflation. Besides the precautionary approach of avoiding an unnecessarily lax monetary policy stance that can stoke misalignments and considering a longer horizon for the inflation target, the incorporation of asset prices into the central bank's mandate faces many problems. While detecting the emergence of large asset price misalignments may be feasible, it remains difficult to identify them early and to predict turning points. Reacting to false alarms about turning points can imply large welfare costs, although there may be a case for leaning against the wind, if an asset price bubble is driven by a credit boom and prudential regulation is not judged to be sufficiently robust.

4.1 Since the early 1980s, monetary policy has been successful in bringing inflation down and to keep it low and stable. This accompanied the sizeable reduction in output volatility with the success of monetary policy identified as one of the factors contributing to the great moderation (section 2). Monetary policy's contribution to improved macroeconomic outcomes arose in a number of different ways. Monetary policy changed from a stance that accommodated inflation to a stance that responded strongly to inflation pressures and thereby stabilised expectations (Clarida, Gali and Gertler, 2000; Taylor, 1998). Indeed, anchoring inflation expectations at low and stable rates counts as a major success of monetary policy. The spread of central bank mandates that constrained policy to focus at low levels of inflation arguably was a major factor contributing to the stabilisation of inflation expectations. The spread of mandates has also implied that monetary policy attempts to stabilise economic activity are implemented only to the extent that they do not jeopardise inflation control (Orphanides, 2004). Anchoring expectations remains important given the many uncertainties monetary policymakers face. Understanding the current state of the economy is difficult and projecting variables such as the output gap at longer horizons is subject to large margins of error (Koske and Pain, 2008). The great moderation era ended abruptly, raising the question whether monetary policy contributed to the severity of the crisis by stoking asset price

inflation. This section examines how monetary policy has responded to cyclical developments, including asset price cycles, and assesses factors influencing the effectiveness of monetary policy.

How has monetary policy reacted to the cycle?

4.2 Monetary policy responds vigorously to the cycle. For example, a simple metric shows that short-term interest rates fall on average by around 3 percentage points in the 4 to 5 quarters following the start of a recession (Figure 4.1). However, at higher inflation and interest rates the observed response suggests that the scope for policy to act is muted. This holds both over time and across countries during the last downturn.

Figure 4.1. **Short-term interest rates around turning points**

4.3 The Taylor rule is an often used gauge to assess the stance of monetary policy with respect to the cycle. It provides a normative benchmark for assessing short-term interest rates with respect to deviations of the actual inflation rate from targeted inflation and the output gap.²⁰ The interest rate implied by a Taylor rate which puts equal weight on both inflation and output stabilisation provides a reasonable approximation of actual interest rate developments (Figure 4.2).²¹ However, there are periods when actual rates differed markedly from the rate implied by a Taylor rule, such as the relatively tight stance in Australia and Norway in the early 1990s and the relatively loose stance in Canada and the United States in the early to mid 2000s. Altering the weight given to the output gap in the Taylor rule can help explain some of the deviations, but not all. However, Taylor rules fail to take into account headwinds or fluctuations in risk premia, which occurred in the United States in the early 2000s in the wake of a succession of accounting frauds and corporate governance scandals.

Figure 4.2. **Taylor rules and actual short-term interest rates**

4.4 While the Taylor rule provides a useful benchmark, it fails to assess the forward looking nature of monetary policy explicitly. Monetary policy bases policy rates on expected developments in inflation and, in some cases, output.²² Even monetary authorities with only an explicit inflation target may attempt to respond to output volatility or at least aim to meet their medium-term inflation target without creating excessive volatility in output. To examine the forward-looking element of monetary policy more formally, monetary policy reaction functions were estimated (detailed result are provided in Sutherland, 2010). Previous studies have identified *inter alia* changes in the weights assigned to inflation and output stabilisation as coinciding with the great moderation (Clarida *et al.*, 1998). Following one strand of the literature, the estimations use actual outturns for the projected values, thus assuming perfect foresight.²³ In this context, the exercise does not address whether monetary policy could have been better, but seeks to identify how the implied reaction to inflation and the output gap differs over time and across countries. The estimations (Table 4.1), which also control for other possible monetary policy objectives, suggest:

- In a number of countries since 1980, monetary policy appears to move only in relation to developments in future inflation, the expected output gap being insignificant (Australia, Czech

20. There are also drawbacks in using Taylor rules. They are, for instance, based on neutral interest rates and output gaps, both of which are unobservable.

21. The target inflation rates and neutral interest rates are taken from Ahrend *et al.* (2008).

22. Note, however, if monetary policy is only based on forecasts, particularly on inflation, this may lead to inflation indeterminacy (Woodford, 2003).

23. A theoretical possibility in this case is that a central bank that perfectly controls inflation would appear not to react to inflation.

Republic, Hungary, Poland, Sweden and the United Kingdom). This may reflect difficulties in forecasting the output gap in these countries.

- In a second group of countries, monetary policy appears to move in relation with future changes in the output gap as well as inflation (Canada, Iceland, New Zealand, Switzerland and the United States). Positive coefficients for the expected output gap indicate that policy is counter-cyclical. The reaction to the contemporaneous output gap is less marked. This should not be surprising, if monetary policy is forward looking. The contemporaneous output gap influences future inflation, which is already taken into account in the inflation forecast and central banks pursuing output stabilisation are more likely to respond to projected output developments given the lags with which policy affects the economy.
- In most cases the Taylor principle is satisfied with the short-term interest rates moving more than proportionally to changes in inflation.²⁴
- Asset prices do not appear to influence monetary policy.

Table 4.1. **Monetary policy reaction functions**

Monetary policy effectiveness

4.5 Monetary policy decision making is shaped by the central bank's mandate, economic fundamentals and monetary policy effectiveness. The effectiveness of monetary policy in controlling inflation and thereby in smoothing the cycle is largely shaped by the credibility of monetary policy and the strength and speed of the transmission mechanism. Other things being equal, the faster and more powerful the transmission the smaller and less persistent output and inflation responses to demand shocks will be. Several factors have influenced the effectiveness of monetary policy, but the net effect has neither been a constant strengthening nor weakening of the transmission mechanism (Box 4.1). The following factors influence monetary policy effectiveness:

- By making monetary policy reactions more predictable, innovations in the practice of monetary policy have made expectations an important channel for monetary policy (Woodford, 2003). Monetary authorities have increasingly been given specific mandates often with a reference to targeting inflation rates for which they are held accountable. The explicit mandates for price stability and often greater independence has helped enhance the credibility of policy and greater transparency of monetary policy has provided a better guide for expectations, which has helped to anchor inflation expectations (Minegishi and Cournède, 2009). So-called price-level targeting (see also section 7) would also operate by guiding expectations. The central bank's commitment to reach a particular price level would induce a change in inflation expectations in the case of a deviation from the price-level target, helping to stabilise the economy.
- Asset prices can affect the real economy by providing wealth and collateral that supports consumption as well as by influencing investment activity (Davis, 2010; Catte *et al.*, 2004). Price changes of financial and housing assets can lead to wealth effects, with estimates of the marginal propensity to consume out of net total wealth of between 2 and 8%. They are typically higher in the English-speaking countries. Investment is also responsive to asset price developments. This occurs through changes in debt-to-equity ratios, by altering the valuation of firms relative to the replacement cost of capital (Tobin's Q) and the financial accelerator. To the extent that asset

24. If the coefficient for the inflation variable divided by the coefficient of the lagged interest rate is lower than -1 the Taylor principle is satisfied.

prices can be influenced, monetary policy gains greater traction through the wealth, collateral, balance sheet and the credit channel.²⁵ At the same time, however, if consumption or investment is strongly influenced by asset prices, idiosyncratic asset price developments can make stabilisation more difficult.

- The degree of liberalisation of financial markets, their depth and completeness also play an important role. Well developed financial markets can enhance the pass-through of policy rates to mortgage and long-term corporate bond rates, boosting monetary policy effectiveness by making consumption and investment more sensitive to interest rates. This will be especially so in countries where there is wide-spread use of adjustable interest rates. Moreover, financial market innovation during the 2000s was particularly fast, with new products and associated markets developing rapidly. This made the relative strength and speed of transmission through the financial markets particularly uncertain.
- The exchange rate channel for monetary policy transmission has become more important with increased capital movements and carry trade. Bini Smaghi (2007) argues that “global excess money” rose precipitously during the 2000s, with growing cross-border capital flows increasingly in liquid instruments and less in direct investments or even equity purchases. Capital flows have become possibly more capricious and abrupt changes in flows could influence both long-term real interest rates and domestic liquidity conditions. Small open economies are potentially quite vulnerable to such changes (see below). To the extent that capital flows influence exchange rates, greater financial integration can give rise to valuation effects from exchange rate shifts, which in turn can affect investment and consumption.²⁶
- Due to globalisation, increasing import penetration raised the sensitivity of prices to foreign economic developments and reduced the sensitivity to domestic economic conditions, contributing to the flattening of the Phillips curve (Pain *et al.*, 2006; Koske and Pain, 2008).²⁷
- Other structural reforms have altered the relative importance of different transmission mechanisms (Ahrend *et al.*, 2008; Cournède *et al.*, 2008). For example, reforms to labour and product market regulations which enhance competitive pressures may weaken price and wage rigidities and thus increase the effectiveness of monetary policy. This is discussed further in section 6.

25. Asset price developments may also complicate the analysis of monetary aggregates. Boone and van den Noord (2008) found that house price growth influenced M3 growth and the velocity of money in the euro area.

26. While exchange rate volatility has declined in most countries relative to the 1980s, in several countries – for example, Canada, Norway and New Zealand – the volatility of exchange rates (USD and effective) has tended to increase during the 2000s.

27. Based on estimates of Phillips curves, Eickmeier and Moll (2009) argue that a common global factor for labour costs and non-commodity import prices have held down inflation while commodity import prices have heightened short-run volatility of inflation. The impact of a common output gap is less clear.

Box 4.1. Transmission channels

There are many potential channels through which monetary policy can affect the economy (Cournède *et al.*, 2008). They include:

- The interest rate channel: changes in the nominal interest rate, in the presence of price stickiness, change the real short-term interest rate and thus can influence real long-term rates. Changes in real long-term interest rates will affect investment and consumption boosting or depressing aggregate demand. The interest rate channel includes the effects of monetary policy on term premia through its communication and on risk premia through feedbacks from asset prices.
- Credit channels refer to ways in which monetary policy decisions may affect the supply of credit. These effects include:
 - The narrow bank lending channel: a change in monetary policy can prompt a change in deposits. This can influence the supply of bank credit if banks are required or wish to hold a fraction of reserves or if other funding sources are imperfect substitutes for deposits.
 - The bank capital channel: monetary policy can influence bank capital (either through profitability or the market valuation of bank assets) and therefore bank lending in the presence of capital adequacy requirements.
 - The balance-sheet channel: the presence of asymmetric information, adverse selection and moral hazard problems can inhibit lending. A rise in asset prices raises the available collateral and lenders will extend credit more easily when the clients have healthier balance sheets.
- Monetary policy can also influence asset prices that in turn influence activity.
 - Tobin's q-theory: a change in the market valuation of a firm relative to its replacement cost of capital will allow the firm to issue new equity to support investment spending. Monetary policy can therefore influence investment through this channel to the extent that interest rates affect equities, for example by encouraging a portfolio adjustment between bonds and equities. This approach is also relevant for housing markets, where rising house prices can stimulate housing investment.
 - The wealth effect: monetary policy, by influencing asset prices can give rise to increased consumption as individuals see price rises as increases in permanent wealth. Thus a policy induced asset price increase should support consumption.
 - The exchange rate channel: with floating exchange rates and greater internationalisation of financial markets, a cut in interest rates can lead to a depreciation of the currency. A depreciation will underpin net exports, thus boosting aggregate output and will also have effects on inflation and balance sheets.

4.6 The overall effect of these developments presented challenges for policymakers to identify and assess in real time the shifting strength of different transmission channels. For example, changes in short-term rates had a varying impact on long-term rates. The relationship among these variables over time shows that there have been distinct periods (Figure 4.3), with changes in the short rate having less of an impact on the long rate during the 2000s than before in several countries (Cournède *et al.*, 2008).²⁸

Figure 4.3. Response of long to short-term interest rates

28. This is related to the so-called interest rate conundrum, which the former chairman of the Federal Reserve, Alan Greenspan, identified as the changing relationship between policy rates and long-term interest rates. Smith and Taylor (2009) argue that this phenomenon may be related to a weaker response of the US monetary authorities to inflation. As this occurred also in other countries, this explanation would imply that the weight of inflation in reaction functions declined around the same time (Cournède *et al.*, 2008).

4.7 The difficulties facing monetary policy formulation during the 2000s were compounded by movements in other determinants of financial conditions, such as asset prices and credit conditions. Thus, when the monetary policy stance was tightened from the mid-2000s, the OECD's measure of financial conditions remained very accommodative (Figure 4.4) (Guichard *et al.*, 2009). In the United States the decomposition of changes in the financial conditions index suggests that wealth effects, easing credit conditions and lower long-term interest rates offset the tightening of the short-term interest rate for some time. Also in the euro area an easing of credit conditions and changes in the corporate bond spread helped keep financial conditions loose, though to a lesser extent. In Japan, changes in the real exchange rate dominated the modest adjustment to short-term interest rates. Finally, in the United Kingdom, wealth effects kept financial conditions relatively loose despite the tightening of interest rates. Thus, even with policy interest rates climbing from the mid-2000s onwards, financial conditions – in part driven by asset prices – remained loose for considerably longer.

Figure 4.4. **Short-term interest rates and financial conditions**

4.8 Arguably the difficulties facing monetary policy formulation were even more severe in small open economies where capital flows can have a large effect on financial conditions. For example, in New Zealand, monetary policy tightening largely due to concerns about asset prices developments, particularly housing, stimulated further the carry trade and capital inflows (OECD, 2009d). As a result, long-term interest rates barely budged, damping the intended effect on domestic demand. In these conditions, the appreciation of the exchange rate hurt principally the tradeable sector, weakening the economy in advance of the financial crisis. An additional concern is that abrupt reversals in capital flows following shifts in sentiment could leave the banking sector exposed, given its reliance on wholesale market funding, and lead to disorderly exchange rate adjustment.

Monetary policy and asset prices

4.9 Asset price developments can create particular difficulties for monetary policy. Monetary policy needs to guard against stoking a developing asset price bubble. For example, Ahrend *et al.* (2008) demonstrated that the cumulated effect of interest rates remaining below the rate implied by the Taylor rule for a prolonged period is correlated with increases in house prices as well as housing investment (Figure 4.5).²⁹ Asset price booms can also develop while monetary policy is consistent with a Taylor rule and as argued above can at times counteract or even offset a tightening of the monetary policy stance. The interaction of monetary policy and asset prices raises at least two issues. The first is whether inflation-targeting regimes should take more account of asset price developments than they currently do. The second is whether in view of the damage financial instability can cause central bank policy should have an explicit mandate to react to asset price bubbles in addition to the price stability mandate. These two issues are taken up in turn.

Figure 4.5. **Deviations from the Taylor rule and housing activity**

Asset prices and the appropriate inflation target

4.10 Asset prices can contain information about future developments of inflation and output. For example, movements in asset prices have some information content related to turning points (Figure 4.6). In a comprehensive study, Stock and Watson (2003) found that assets prices can be useful predictors of inflation and/or output. However, no single asset price performed well for all countries and across time within countries, while out-of-sample performance was generally unstable. Subsequent work has tended to

29. Gambacorta (2009) argues that “low” interest rates affect risk-taking, which will lead to rising defaults, when the cycle turns.

replicate and reinforce these findings.³⁰ In this context, asset prices can usefully augment, but not replace, other information already available to monetary policymakers.

Figure 4.6. **Asset prices around turning points**

4.11 One approach to take greater account of asset prices would be lengthening the time horizon over which inflation targets are to be achieved. In this case, asset price misalignments could affect inflation and output at horizons longer than are typically considered by policymakers. This would fit in the framework of flexible inflation targeting (Bean, 2003).³¹ Alternatively, a statistical approach proposed by Cecchetti *et al.* (2000) aiming to assess the impact of asset prices on inflation over a longer horizon extracts so-called common unobservable trends from movements in different prices. To examine the possible difference made by incorporating asset prices in a price index, a Kalman filter is used to extract the common component of inflationary forces. It is, however, difficult to identify robust empirical relationships:

- In some cases, the statistical approach may reveal only a marginal role for asset prices and thus “underlying” inflation would not be very different from an existing measure of core inflation. At a high level of aggregation (using core inflation, energy prices, food prices and an asset price series) and over a long time period, the common unobserved component is very small due to the highly idiosyncratic movement of asset prices.
- The importance of asset prices can depend on the estimation period. Over some horizons there is a greater degree of co-movement in the series and thus the contribution of asset prices to the “underlying” inflation process is larger. When core inflation is adjusted over different calibration periods, the implied target inflation rate can be appreciably different (Figure 4.7).
- The estimated importance of asset prices to the underlying inflation process can also depend on how disaggregated the data are. If more disaggregated inflation data are used, the contribution of asset price series becomes smaller (Cecchetti *et al.*, 2000). This may reflect sub-components of core inflation capturing some of the movement of asset prices.

Figure 4.7. **Core inflation and core inflation adjusted for house price movements**

4.12 The statistical approach formalises the inclusion of information about asset prices central bankers already consider in decision-making (Bean, 2003). Given that the predictive content of asset prices for future inflation is unstable, including asset prices in an inflation target in a mechanical way may provide misleading signals. However, the simpler approach of systematically considering the possible impact of asset price developments on inflation and output at longer horizons may be a useful complement for policymaking.

4.13 Even without a reliable signal, there could be a case for including some asset prices in an inflation target. An underlying idea is that long-lived assets provide a means to smooth consumption inter-temporally. Alchian and Klein (1973) suggested that prices of long-lived assets, not just current consumption items, could be included in an “inter-temporal cost of living index”, with the weight

30. For example, Roffia and Zaghini (2007) found some evidence that rapid monetary growth accompanied by asset price growth often leads to inflationary outcomes. In an environment where inflation is low and stable, ample liquidity will show up in credit growth and asset prices (Bordo and Jeanne, 2002). Money aggregates on their own appear to lead to marginal improvements in forecasting inflation (Binner *et al.*, 2009).

31. Visco (2003) has some reservations about the practical implementation of flexible inflation targeting, not least the communication challenge it could create.

determined by their importance for consumption. How this should be done in practice is unclear, as the purchase of long-lived assets can include both an element of asset purchase and the services that ownership of the asset confers. This is a particular issue with housing where there is already a case for re-examining the treatment of the housing component in the CPI (Box 4.2). Furthermore, the asset price should be based on fundamentals. Given the difficulties and a potentially large weight in the index, which would introduce significant volatility, the gains from targeting a wider index are likely to be small as compared to the cost of de-anchoring inflation expectations.

Box 4.2. The treatment of housing in the CPI

At present, most housing indices include rental services but differences exist in the treatment of owner occupation. Given that housing constitutes a large proportion of spending the differences in the measurement can give rise to wedges emerging between consumer price indices and the cost of living. This argues for some countries putting more emphasis on improving the measurement of the housing component in existing inflation indices.

Countries adopt different approaches in accounting for housing in the CPI. Owner-occupancy creates a difficulty for pricing as home ownership also includes an element of long-term asset purchase, which is distinct from the services ownership confers. The approaches adopted include:

Rental equivalence approach. This is used in several countries. For example, in the United States, the BLS uses a rent index for renters and a rental equivalence index based on the hypothetical cost to rent.

User cost approach. The full *ex ante* user cost consists of normal maintenance expenditures, property taxes, depreciation expenses, and anticipated capital gains/losses due to housing market specific inflation. Canada and Iceland use a modified user cost approach.

Acquisitions approach. Australia and New Zealand use this approach. Prices for mainly new dwellings excluding the cost of land are used. Cournède (2005) points out that this approach has less desirable properties since land is a large component of housing costs and can be more volatile than dwelling costs.

Payments approach. This measures cash outflows associated with owner occupancy and has been used in Ireland. This approach can give a misleading picture in periods of moderate to high inflation as mortgage interest payments swell but house price appreciation and consumption of house services are not taken into account (Diewert and Nakamura, 2009).

Alternatively, owner-occupancy is omitted from consumer price indices.

The omission of owner-occupied housing from consumer price indices can create some differences with adjusted indices. For example, Cournède (2005) calculated for the euro area that if a rental equivalence approach were adopted it would raise the inflation rate by around 0.1 percentage points while adopting the user cost approach would lead to an average increase of 0.3 percentage points. However, the variability in the user cost approach is much larger, deviating by as much as 1.7 percentage points from the HICP index (which averaged 2.2 per cent over the period studied).

Asset prices and leaning against the wind

4.14 Even if asset prices are not included in inflation targets, monetary policy may be called on to counter asset price misalignments in order to prevent the negative output and price consequences of large adjustments. A challenging issue for monetary policy is whether it should lean against asset price misalignments or wait: some bubbles correct themselves without disruption, while in the case of disruption, monetary policy has to cope with the fallout of the bubble on economic activity and inflation. The literature is far from settled on this matter. Bernanke and Gertler (2000) make the case that (over) reacting to asset price developments over and above the impact they have on inflation and output is destabilising. On the other hand, Cecchetti *et al.* (2000) and White (2009) argue that by reacting to asset price misalignments – though not necessarily with the intention of suppressing bubbles – inflation targets and low output volatility can be achieved. As the costs of asset price corrections are potentially large, the question arises as to whether monetary policy should explicitly address asset prices and their implications

for financial stability as a complement to their price stability mandate. Central to this issue is whether monetary policy can influence the path of asset price bubbles without inflicting excessive collateral damage.

4.15 Monetary policy innovations can have a pronounced effect on asset prices with the effect felt more rapidly in financial than housing markets. For example, Rigobon and Sack (2004) estimate that an unanticipated 25 basis point tightening could lead to a rapid 2% fall in stock indices. The longer-term effects are less certain. Assernmacher-Wesche and Gerlach (2008) argue on the basis of VAR estimates that the effect is felt quickly in stock prices. A 100 basis point rise would lead to a 2% decline in the index after a quarter and then they recover gradually to their initial level. House prices, on the other hand, would respond more slowly with the peak effect of a 100 basis point tightening of about 2% felt after 18 months. If unanticipated, such tightening would also depress GDP, by around $\frac{3}{4}$ per cent.

4.16 While monetary policy can influence asset prices, the bar for taking action is high. The uncertainty surrounding the information set available to real-time policymaking raises the risk of error both in bursting non-bubbles and aggravating downturns by getting the timing wrong. In the first case, the policymaker reacting to asset price movements that are either transitory or driven by changes in fundamentals would unduly depress activity. In the second case, the policy maker would have to establish whether asset prices will continue to grow rapidly or will have turned over the next one or two years. One trajectory could imply a rise in interest rates, the other one a cut. Raising rates when a bubble is apparent but close to correcting could be particularly costly relative to being prepared to clean up after the bubble has burst (Gruen *et al.*, 2005).

4.17 For monetary policy to target asset prices, tools are needed to identify accurately emerging asset price misalignments and the timing of corrections. Various approaches, such as probit-models, can be used to test whether it is feasible to detect the build-up of asset price misalignments. In these models, a number of factors that have been identified as influencing asset price developments are examined to see whether they can help predict whether an asset price misalignment is developing (more commonly they use the probability of a “bust” occurring). Such models can be useful in identifying large asset price misalignments. For example, OECD (2005) and van den Noord (2006) highlighted possible housing market corrections in a number of countries well before the actual corrections.

4.18 As there is a large number of potential variables and no clear way to distinguish between the competing models, so-called Bayesian model averaging (BMA) can help identify variables that are robust to different model specifications and give information about whether asset price misalignments are developing. Preliminary results of an analysis using BMA techniques (available from the secretariat on request) suggest that a number of variables can help identify an emerging asset price misalignment. These include, 4 quarters before a house price correction occurs, the current account balance, the house price to income ratio and interactions of a measure of misalignments with population growth, as well as long and short-term interest rates. Just before the correction a number of other indicators become significant, but these are likely to come too late for policymaking.³² At a longer horizon of around 2 years very little information is available to suggest that a misalignment is emerging. A number of other recent evaluations of methods to detect asset price misalignments or corrections also identify variables like current account balances, house price growth, population growth, interest rates, credit and money growth and investment rates as useful predictors (Agnello and Schuknecht, 2008 and Gerdesmeier *et al.*, 2009). In general, these methods also do not provide an early warning on a consistent basis. Prior to this crisis, probit models gave an indication of emerging problems in early 2007 for some countries. Other signalling models (Alessi and Detken, 2009 and IMF, 2009), which issue a warning if an indicator exceeds a predetermined threshold,

32. They include the per capita GDP growth rate, long-term interest rates, and interactions of the misalignment measure with the house price to income ratio and credit growth.

appeared to give a number of warnings in the run up to the crisis, but the pattern of warnings did not give a consistent picture.

4.19 When it comes to predicting misalignments the performance depends on the preference of policymakers for missed misalignments relative to false alarms. For example, the out-of-sample performance of the models used above suggest that if the policymaker wanted to identify at least two-thirds of all misalignments then one third of alarms would be false. Reducing the share of false alarms would also reduce the share of correctly predicted misalignments. This is a common result for similar types of models. Even within-sample evaluations identifying two-thirds of busts do not appear to lower the rate of false alarms below one-quarter (Gerdesmeier *et al.*, 2009).³³

4.20 The empirical work on identifying misalignments suggests that such estimates are not robust enough to serve as a basis for policy making, though arguably it should be possible to spot big misalignments. Concentrating on just the biggest misalignments would reduce the risk of false alarms. Furthermore, the costliest asset price misalignments tend to be accompanied by credit booms (Borio and Lowe, 2002). In this light, the costs associated with large asset price corrections are significant enough for policymakers to consider the available defences. These include:

- The first line of defence should be sound micro-prudential regulation and supervision of financial institutions. Indeed, sound financial market regulation appears to have sheltered some countries better than others from the current crisis.³⁴
- A second line of defence should include macro-prudential tools, which would aim to identify systemic threats to financial stability that would likely be missed by micro-prudential regulation on its own. Such macro-prudential tools are being currently developed and their effectiveness remains to be seen. Macro-prudential oversight should lead to a better integration of micro and macro-prudential concerns, but would imply the need for effective co-operation between the central bank, regulators and supervisors (section 5).
- A third line of defence should be to use instruments that affect different credit markets. These could include varying loan-to-value ratios, margin and collateral requirements that directly affect the assets where the bubble is developing.
- In the absence of sufficiently robust (micro and macro) prudential regulation, monetary policy will need to be vigilant, while being prepared to step in promptly if a bubble bursts. In particular, when an asset price bubble is driven by a credit boom, monetary policy can have a considerable influence through altering the price of leverage. In this case, balancing the costs of getting the timing wrong or acting too aggressively against the potentially avoidable costs of severe corrections can tip the balance in favour of leaning against the wind. When the asset price boom is not driven by a credit boom the efficacy of monetary policy in reining it in may be limited. For example, the experience during the dot.com bubble when policy interest rates began to rise in the United States without initially much impact suggests that large movements in policy rates may be required, leading to greater volatility in output and inflation.

33. Direct comparison of these models is difficult. Models differ in their choice of asset prices, the method used to identify booms and busts and whether the evaluation is in sample or out of sample.

34. Canada, which also experienced a long period of loose monetary policy (as defined by the Taylor rule) and a similar ramp up in house prices, did not experience the same kinds of problems in the housing and financial markets as the United States. This suggests that sound financial market regulation can mitigate the potential problems caused by asset price misalignments. Indeed, loan-to-value ratios were lower in Canada, the sub-prime market much less developed and incentives to move business to the shadow banking sector lower (MacGee, 2009).

5. Financial market policy

Summary

A major aim of financial market regulation is to prevent financial instability and banking crises, which can lead to severe downturns. Banks and capital markets influence real activity and pro-cyclicality in financial markets can amplify cycles in the real economy.

Capital, provisioning, liquidity and maturity mismatch in the banking sector can generate pro-cyclical behavior in credit supply for a number of reasons including the regulatory setup, the nature of risk assessment and the prevailing incentives to take risks. In the available empirical work, there is little consensus on the degree of pro-cyclicality of the banking system. However, estimation results based on aggregate and bank-level micro datasets show a pronounced pro-cyclicality of the banking sector for most countries, even without taking into account the shadow banking system.

Recent international initiatives suggest ways to reduce the pro-cyclicality of the financial system by raising its shock absorption capacity, dealing with incentive problems and by adding an overarching macro-prudential layer to the supervision of the financial system.

5.1 Financial market liberalisation and innovation since the early 1970s has led to marked changes in the size and structure of financial markets. The assets and liabilities of households, businesses and financial institutions have risen markedly relative to income and output, and the geographic distribution of assets has become more dispersed. Financial innovations have led to the increasing use of new products and techniques for pricing, diversifying, reallocating and monitoring financial and economic risks. Financial innovations have made markets more complete, lowered transactions costs and increased opportunities for risk sharing. At the same time, they can also increase risk taking, potentially offsetting the benefits from the greater opportunities for risk diversification. While financial markets have evolved in all OECD countries over the last decades, large differences remain (Figure 5.1). The aggregate market size (the total value of stock, bond and bank credit markets) was around 400% of GDP for the United States and 300% for the United Kingdom, but only about 250% for the euro area and Japan. Moreover, bond market capitalisation in the euro area remains well below that in the United States, while the banking sector is larger relative to stock markets and private debt markets and securitisation took off much later than in the United States.

Figure 5.1. **Size of capital markets**

The interrelatedness of the financial sector and the real economy

5.2 The banking and financial sectors are strongly intertwined with the real economy. Bank credit and the access to capital markets can amplify movements in the real economy. At the same time, cycles in the real economy can introduce cyclicity in bank lending. Asea and Blomberg (1998) document that bank lending drives and amplifies the overall real cycle in the United States and that there is also a feedback from the real cycle to bank lending.

5.3 The two main channels through which banks and capital markets can influence real activity are the bank lending channel and the broad lending channel (also called financial accelerator or balance sheet channel) (Box 4.1). The real sector may also influence bank lending. In fact, bank lending can react in a pro-cyclical way to cycles in the real economy. A pro-cyclical banking sector will in turn amplify the real cycle. Therefore, a policy design that reduces the banking sector's pro-cyclicality will help attenuate the real cycle. This section reviews the mechanisms through which the banking sector can become pro-cyclical, provides new empirical evidence on the extent of pro-cyclicality and finally discusses proposals for how to dampen the pro-cyclicality of the banking sector. In line with the literature, pro-cyclicality of banking sector indicators, such as capital or liquidity ratios are defined in terms of a negative relationship: an increase in bank capital in bad times and a decrease in good times is considered as pro-cyclical. Counter-cyclicality implies that bank capital increases in good times and decreases in bad times.

How has the financial sector reacted to the cycle?

5.4 The demand for and the supply of bank loans and thus their cost fluctuate over the cycle because credit demand is related to production, business and residential investment (Ayuso *et al.*, 2002) and because lending standards change over the cycle, being lax during expansions, but tight in downturns. Mortgage equity withdrawal to finance consumption can also boost borrowing by households. This can lead to over-lending in upswings and result in an accumulation of bad loans and credit rationing during downturns (Asea and Blomberg, 1998). Gorton and He (2008) suggest that cycles in lending standards and lending occur because banks do not only compete by compressing margins but also by relaxing lending standards during upswings.³⁵

5.5 Fluctuations in bank assets relative to GDP have become more pronounced since the 1970s.³⁶ Figure 5.2 shows that the deviation of the bank asset-to-GDP ratio from its trend and its percentage point changes exhibit greater volatility since the 1970s. The pronounced pro-cyclicality of the banking sector was initially triggered by the move from credit controls of the post-war period to more liberalised banking and financial sectors during the 1970s, while financial innovations played an important role later on. Goodhart *et al.* (2004) show that financial liberalisation in OECD economies was followed by boom-bust cycles in bank lending, output and asset prices. They compare financial liberalisation to a permanent productivity shock in a credit-constrained economy à la Kiyotaki and Moore (1997) in which a positive productivity shock increases the value of collateral that in turn raises the capacity to borrow, which boosts lending, investment and output until the boom turns into a bust.

Figure 5.2. Cycles in the real economy and the financial sector of OECD countries

5.6 Financial liberalisation gave rise to more risk taking, especially during the great moderation period and resulted in higher leverage ratios.³⁷ Goodhart *et al.* (2004) suggest that this was because banks had to increase leverage if they wanted to maintain the return on equity unchanged while having riskier clients and facing lower profits due to more intense competition. Moreover, the move from relationship banking to arm's length banking and the commodification of financial transactions and securitisation

35. Keys *et al.* (2010) show that lending standards became lax in the US subprime market as securitisation gained in importance.

36. Real credit growth gives a biased picture about the importance of credit cycles. A growth rate of say 20% can be translated into very different figures relative to GDP at different stages of financial deepening: it would imply a 2 percentage point expansion relative to GDP for an initial credit to GDP ratio of 10% and a 16 percentage point increase to GDP for a credit stock of 80% of GDP.

37. The leverage of the banking sector may have become increasingly understated as the shadow banking sector evolved, given its links to banks via contingent credit lines, guarantees and reputational risk.

increased the costs of monitoring and may have contributed to an underestimation of risks (Panetta *et al.*, 2009).

5.7 Examining changes in the relationship between the change of the bank asset-to-GDP ratio and the cycle over time (based on the data underlying Figure 5.2) shows that the banking system was counter-cyclical until the early 1970s and has become pro-cyclical only since the late 1970s (Figure 5.3). It may come as a surprise that the coefficient estimate is not statistically significant for the most recent 12 year period, but it is clear from Figure 5.2 that this is the period when leverage exploded. The rise in pro-cyclicality correlates well with the number of banking crises for this country sample as reported by Reinhart and Rogoff (2008): No banking crisis occurred between 1945 and 1974, three countries experienced banking crises between 1974 and 1977 and 11 banking crises are identified between 1983 and 1995.

Figure 5.3. **Pro-cyclicality of the banking sector: rolling window estimations**

5.8 Capital markets also exhibit a pronounced cyclical pattern. Borio and Zhu (2008) review empirical research that documented the pro-cyclical nature of the equity risk premium, the term premia, corporate credit risk and sovereign debt premia. Figure 5.4 also illustrates that capital markets are pro-cyclical: Corporate credit risk and stock market volatility were moving in tandem with real GDP growth in the US economy: an economic slowdown was accompanied by increased stock market volatility and widening corporate credit risk.

Figure 5.4. **The pro-cyclical nature of stock market volatility and corporate bond spreads**

Regulation of the financial sector, financial instability and cycles

5.9 A major aim of financial sector regulation is to prevent the failure of financial institutions that could destabilise the whole financial system and the economy. Prudential regulatory measures are set to maintain sufficient levels of capital, liquidity and provisions for bad loans of individual institutions to cope with unexpected macroeconomic or more specific (regional or sectoral) shocks and to maintain confidence of the public *vis-à-vis* the system via deposit insurance schemes to avoid bank runs. This section highlights the channels through which regulation affects the pro-cyclicality of the banking sector and provides empirical evidence for banking sector indicators. It then discusses the role of the shadow banking system that circumvented banking sector regulation and played an important role in generating toxic assets that led to heavy losses in the financial crisis.

Bank capital

5.10 The Basel Committee on Banking Supervision has aimed to establish a sufficient capital cushion for banks to absorb unexpected losses. The Basel Capital Accord I of 1988 raised the capital to risk-weighted asset ratio (capital adequacy ratio – CAR) to over 8%. Due to the risk-sensitivity of valuations and the pro-cyclical nature of risk ratings that affected requirements, a side effect of Basel I was the pro-cyclical impact of capital adequacy ratios. It proved to be pro-cyclical because shocks to banks' assets imply a pro-cyclical move in the capital ratio with a corresponding change in bank lending (Panetta *et al.*, 2009). Its introduction is thought to have aggravated the 1991 recession in the United States as banks curtailed lending to meet the 8% CAR target (Goodhart *et al.*, 2004). Moreover, Basel I provided for little bank capital back-up for trading book and off-balance-sheet activities.

5.11 Forward-looking banks would increase capital in good times to secure sufficient room for manoeuvre in bad times to comply with the 8% minimum target. However, short-sighted or backward looking banks would not increase capital during expansions and as a result would be constrained by the 8% limit in slowdowns, a behaviour that is reinforced by competitive pressures and possibly the market for

corporate control. A similar cyclical pattern would apply if banks were to hold capital buffers above the limit of 8% and if they wanted to maintain a comfortable capital buffer over the cycle (Ayuso *et al.*, 2002). Figure 5.5 shows that in 2007 the capital adequacy ratio of OECD countries was higher than the required minimum of 8%. However, capital buffers were small in a number of countries and even where they were large, they were often not sufficient to absorb the large losses during this financial crisis.

Figure 5.5. **Capital buffers in OECD countries**

5.12 The Basel II accord was implemented in 2008 in most OECD countries and strengthens the link between risk exposure and capital. A major difference with Basel I is that the risk weights are no longer specified for broad asset classes and invariant over time, but tailored to individual assets. Capital requirements are computed either by a standardised approach (based on the ratings by rating agencies) or by an internal ratings approach, whereby the weights are computed by the bank itself.

5.13 The way risks are assessed can contribute to the cyclicity of bank capital. Internal credit risk models of banks are more pro-cyclical if default probabilities are estimated using the point-in-time approach. In this approach, risk is linked negatively to the business cycle because the probability of credit default risk increases in a downturn. A through-the-cycle approach smooths risk over the cycle. However, if the time horizon considered does not cover a full cycle, risks will remain negatively correlated with the cycle. The heavy reliance on credit rating agencies in Basel II does not help overcome this problem as credit rating agencies are also prone to pro-cyclical behaviour, as downgrades are more frequent in downturns and upgrades occur more often in upswings. It is not clear yet, whether Basel II will raise or reduce pro-cyclicity. While it strengthens the link between banks' regulatory capital and the risk of assets, it also contains safeguards against pro-cyclicity, for instance, by encouraging the through-the-cycle approach (Panetta *et al.*, 2009).

5.14 There is no consensus in the literature whether actual bank capital is pro- or counter-cyclical. A panel of banking sector-level and individual bank-level data is used to re-assess the pro-cyclicity of bank capital (Table 5.1; Égert, 2010a provides details on the data and estimation issues as well as an overview of the available empirical work). These estimates do not provide policy reaction functions as in the previous sections, but show how banking sector indicators have moved with the credit and output cycle, given the regulatory set-up. Results obtained using both aggregate and individual bank-level datasets suggest that from 1994 to 2007/2008, capital ratios, in particular the tier 1 ratio, the shareholder equity and the total equity/capital ratio have a negative association with loan growth. Country-specific estimations corroborate this result, though there are some exceptions. This pro-cyclical relationship also tends to hold, if first differences of ratios are used. The co-movements are less pronounced for the leverage ratios calculated from national balance sheets and when GDP growth is used to capture cyclical fluctuations. Bank capital ratios do not correlate with real house prices, but there is a negative correlation of leverage ratios and a weak link with the tier 2 capital ratio with real share prices.

Table 5.1. **Panel estimation results for bank capital**

Loan loss provisioning and funding

5.15 Regulators require banks to create provisions to cover expected credit losses. Provisions can be split into two categories: *i)* Specific (*ex-post*) provisions relate to overdue loans where specific rules determine the size and timing of provisions and *ii)* general (*ex-ante*) provisions should cover future loan losses that cannot be linked to specific loans. The general provisions are set by evaluating the risk of the loan portfolio. Another way of looking at provisions is to distinguish between *i)* a non-discretionary (rule-based) component that includes specific provisions and part of general provisions driven by the assessment of future credit default risk and *ii)* a discretionary (non rule-based) component.

5.16 The underestimation of credit default risks over the business cycle is a main source of pro-cyclicality in the non-discretionary rule-based component of loan loss provisioning. The following factors can explain why banks tend to underestimate credit risk during expansions (Bouvatier and Lepetit, 2008; Panetta *et al.*, 2009):

- Risks are underestimated during expansions and overestimated during recessions if provisioning is based on a backward looking rule, for instance, if provisions are built when the risk materialises. There are only few problem loans in good times, but their share increases dramatically in bad times when the riskiness of loans granted at the peak of the cycle (on the basis of lax lending standards) becomes apparent.
- Skewed incentives in pay schemes can lead to herd behaviour and result in an underestimation of long-term risks. Incentive schemes for bank management that are skewed towards short-term horizons increase risk taking. Short-sightedness is being reinforced by performance remuneration linked to annual profits, stock options related to short-term stock market performance and remuneration packages that reward profits, but do not penalise losses.

5.17 As provisions have a direct impact on profits, bank capital and lending, their pro-cyclicality induces pro-cyclicality in bank profits, capital and lending as well. Nevertheless, the discretionary (non-rule based) part of provisioning can counteract the pro-cyclicality of the non-discretionary part if banks use discretionary provisioning for profit smoothing and if banks under-provision in bad times to secure regulatory capital (regulatory capital arbitrage) (Bouvatier and Lepetit, 2008; Lobo and Yang, 2001). This is particularly relevant in countries like the United States where provisions can be included in regulatory capital, whereas regulatory capital arbitrage will not occur, if provisions are not allowed to be part of regulatory capital as in Spain (Pérez *et al.*, 2006).

5.18 Pro-cyclicality can be reinforced if the exposure of banks to negative shocks is substantial. For instance, banks with a large maturity mismatch (large holding of illiquid assets or short-term funding or both) or where wholesale funding instead of more stable funding by customer deposits is important will react more to changes in market conditions. Moreover, less conservative lending practices including high loan to value and high debt servicing to income ratios imply more exposure to asset price fluctuations and to the real cycle, and thus more pro-cyclicality of lending.³⁸

5.19 Estimations carried out with country-level and bank-level panel datasets concerning loan loss reserves, bad loan provisioning, the funding gap, various measures of bank profitability and bank liquidity all exhibit a strong pro-cyclical pattern. In addition, bank equity moves hand in hand with loan growth. This implies that deleveraging does not come about because loans drop while equity remains unchanged but because loans drop more than equity falls. Country-specific estimates broadly confirm the aggregate analysis (Table 5.2).

Table 5.2. Panel estimation results for other bank ratios

38. Also accounting standards that focus on fair value accounting can accentuate the pro-cyclicality of bank balance sheets due to sharp swings in asset prices. There is little agreement in the literature on whether fair value accounting has exacerbated the severity of the financial crisis (Laux, 2009).

Box 5.1. Circumventing regulation: the shadow financial system

The shadow financial system gained importance over the last decade partly because it largely escapes the more stringent regulation of banks. This led to effective leverage of the banking system being much higher than bank leverage indicators suggested and fuelled the financial market boom before 2007 and resulted in large exposures to liquidity, credit and market risks that precipitated the downturn in 2007 and 2008 when the risks materialised.¹

Until recently, US investment banks were not subject to conventional banking regulation, while in other countries, little capital back-up was needed for trading activities and risks associated with off-balance sheet vehicles. Investment banks borrow short-term funds on the money and capital markets and lend to corporations or buy long-term assets. As they are less regulated or capital requirements are low, they are more leveraged. The rise in leverage was exacerbated by the fact that the leverage cap imposed on US investment banks was phased out for the big five US investment banks with capital above USD 5 billion in 2004 (Greene *et al.*, 2006). Relaxing the leverage cap resulted in a strong increase in leverage. Moreover, some big bank conglomerates such as UBS and Citibank shifted the emphasis from commercial banking to investment banking activities (Blundell-Wignall *et al.*, 2008).

CDOs combine assets of various riskiness so that the risk of the final product becomes lower than the overall risk of the underlying assets. The repackaging of risks was viewed by many as eliminating risks that led to a significant rise in the securitisation of US mortgages (Coval *et al.*, 2009). Global CDO issuance increased from USD 67 billion in 2000 to USD 481 billion in 2007 (SIFMA, 2010).

Issuers of CDOs, typically investment banks, earn issuance fees and management fees during the lifetime of the CDOs. At the same time, buyers earn higher yields on CDOs than they would earn on similarly rated bonds. CDOs also allowed commercial banks to place loan portfolios off balance sheet because CDOs are issued in legally independent special purpose vehicles that in turn helped circumvent bank capital regulation and led to higher profits. The sophistication of securitised financial instruments makes it difficult to assess risks properly, especially of new products. If the originator of a financial product is not liable for adverse outcomes and the buyers do not fully understand the details, risks tend to be underestimated. The unwinding of the financial crisis led to a rapid fall in the value of CDOs, which provoked large write-offs.

The rapid rise in derivative trading, notably of credit default swaps (CDSs) has added a non-transparent element to financial markets. Credit default swaps are insurance contracts: the buyer of a CDS pays a fee to the seller and receives a pay-out if the underlying credit instrument defaults.² The main difference to conventional insurance contracts is, however, that CDS issuers are not tightly regulated: the seller does not need to have particular levels of capital reserves to cope with possible future claims and as a result, unlike a regulated insurance company, the sellers of CDSs can have much higher gearing. According to BIS figures, the CDS market was much bigger and grew much faster than the CDO market: the stock of CDSs jumped from USD 6 trillion at the end of 2004 to USD 58 trillion at the peak in 2007. The proliferation of contracts creates large, but unknown, counter-party exposures which can lead to panic, when problems arise. Indeed, the deterioration in credit market conditions coupled with a lack of capital led to the financial collapse of AIG, the world's largest insurance company and heavy losses at monoline insurers, which triggered bond downgrades.

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1. The shadow financial system comprises non-bank financial institutions such as investment banks, hedge funds and special purpose vehicles and covers instruments like collateralised debt obligations (CDOs) and credit default swaps (CDS).
 2. CDS contracts have an asymmetric risk profile. The buyer goes short on bonds by taking up limited risk with a large profit potential while the seller's limited profit is coupled with a large risk. This makes CDS a favourite tool for shorting.

Policy initiatives to lower pro-cyclicality and guard against financial instability: an overview

5.20 Many proposals have been made to dampen the pro-cyclicality of the financial system and to make banks more resilient to sharp economic downturns (FSB, 2009; de Larosière, 2009; FSA, 2009). These proposals are dealt with in international fora to ensure a level playing field and to avoid regulatory arbitrage. The reform proposals focus on strengthening micro-prudential requirements, while also implementing a macro-prudential approach. Wehinger (2008) discusses many of these proposals in greater

depth³⁹ and the OECD has issued a policy framework for effective and efficient financial regulation (OECD, 2009b).

Raising resilience to shocks and reducing the pro-cyclicality of the financial system

5.21 The reform proposals focus on reducing the pro-cyclicality of the financial system in part by raising the capacity of the banking sector to absorb large adverse shocks. International agreements, such as the Basel capital framework have set minimum standards that provided too small a cushion to absorb large losses. However, prudential regulation has differed across countries, with some countries aiming at higher than the minimum capital ratios, while others limited leverage, smoothed provisioning over the cycle or did not allow off-balance sheet vehicles. Recent work by the OECD suggests that the regulatory stance is relatively well correlated with measures of financial soundness (Ahrend *et al.*, 2009) and that countries with a sounder financial system tended to face a lower fiscal cost of financial sector rescue measures and less bank equity destruction during the financial crisis.

5.22 The Basel II capital framework is likely to be enhanced in a number of ways:

- The Basel Committee on Banking Supervision issued a package of proposals to strengthen capital requirements (BIS, 2009). It proposed to raise minimum capital adequacy ratios (CARs) and strengthen the quality of regulatory capital.⁴⁰ Tier 1 capital should be mainly composed of common shares and retained earnings. Details on the future shape of capital regulation will follow after a consultation process. The de Larosière Report (2009) stresses the need to harmonise the definition of regulatory capital in Europe.
- In July 2009, the Basel Committee announced that the quantity and quality of prudential capital for trading book activities will be increased and proposed to strengthen the capital requirements for counter-party credit risk exposures in December 2009.
- The Basel Committee also proposed to implement a counter-cyclical capital framework and is working out details of implementation. Goodhart *et al.* (2004) suggest several ways to render capital ratios less pro-cyclical:
 - Averaging the probability of credit defaults over the cycle.
 - Adjusting the risk parameters in a counter-cyclical way. Goodhart *et al.* (2004) argue that this may not work in practice because it is difficult to identify unambiguously the business cycle and the bubble element of asset price cycles.

39. In addition to the proposals at international level, the financial crisis has also thrown up many country-specific problems. In many cases, deposit guarantee schemes were inadequate or unfunded (Schich, 2008), the integrated European capital markets led to cross-border supervision and bank resolution problems, in the United States the regulatory landscape was fragmented and consumer protection weak, while in the United Kingdom, risk-based supervision turned out to be more than a touch too light. These issues are reviewed in the OECD country surveys.

40. Some countries already had CARs considerably above the Basle minimum. For instance, a tier 1 capital ratio of 7% (instead of 4% in Basel II) and a CAR of 10% have been applied in Canada since 1997. In addition, tier 1 capital in Canada is required to contain 75% common equity and a maximum of 15% of innovative instruments (Ratnovski and Huang, 2009). US regulations provided incentives to raise CARs above 8% (Gilbert, 2006).

- The most viable option in their view is to adjust regulatory parameters as a function of bank-level or aggregate bank lending growth or asset price growth relative to past average changes.

5.23 Closely related to bank capital pro-cyclicality is the cyclical behavior of provisioning. Dynamic provisioning as implemented in Spain since 2000 is one way to smooth provisions. The cornerstone of dynamic provisioning is that provisions are not made when risks materialise but when loans are granted. Expected losses are estimated using credit default probabilities over the business cycle either based on banks' internal estimates or based on a standard approach provided by the regulator. However, dynamic provisioning is not fully compatible with existing international accounting standards (Festic and Krüger, 2009; Panetta *et al.*, 2009). The Basel Committee (BIS, 2009) has underlined the need to harmonise accounting standards in a way that allows forward looking provisioning.

5.24 Limiting leverage by imposing an upper ceiling on the leverage ratio (risk unadjusted assets to capital) has also been suggested by the Basel Committee. If used as a complementary measure to the risk-weighted capital ratio, it will help contain the build-up of excessive leverage and add an additional safeguard against model risk and measurement error. Furthermore, leverage ratios could be adjusted for cyclical developments (Borio *et al.*, 2001) or the regulator could tailor the leverage ratio to the risk implied by the business model of specific banks (Ratnovski and Huang, 2009).⁴¹

5.25 Contingent capital (convertible debt) can provide an additional capital buffer: this debt instrument converts into common equity in the case of predefined events. If for instance, the tier 1 capital of a bank drops below a certain threshold, debt would be converted into equity. It does not only help shoring up bank capital in bad times but it also provides an incentive to avoid risk, if appropriately priced. This may be the only effective way to provide haircuts on debt (given that haircuts on regular debt would trigger or amplify a panic) but this requires an automatic switch which may be difficult to design.

Dealing with incentive problems

5.26 Regulated banks can indulge in excessive risk taking, if they are too big or interconnected to fail. They have to be rescued because their failure can threaten the stability of the whole financial sector, posing large risks to the tax payer.⁴² Moreover, conflicts of interest have arisen with rating agencies, while remuneration packages have skewed incentives towards maximizing profits in the short term.

5.27 To make large and interconnected banks safer, the Basel Committee (BIS, 2009) suggested to implement tighter capital, liquidity and other prudential requirements for systematically important banks, which could also provide incentives to restrain the size of banks. However, a joint FSB, IMF and BIS report (2009) also recognises that assessments of systemic importance will have to involve a high degree of judgment and that they will likely be time-varying and state-dependent. Panetta *et al.* (2009) argue that the extra requirements could be linked to a simple measure such as bank size. There may also be ways to engineer a quick and orderly resolution or wind down of large institutions that are close to bankruptcy. The

41. Some countries already apply leverage caps. US banks cannot have leverage higher than 25 or 33.33 and are encouraged to have leverage ratios below 20 (Gilbert, 2006; FDIC, 2009b). Leverage in Canada cannot exceed 20. However, exceptions for a ratio of up to 23 can be granted or a ratio of lower than 20 can be imposed on a discretionary basis by the Office of the Superintendent of the Financial Institutions (OSFI) (Ratnovski and Huang, 2009). Switzerland and the United Kingdom have decided to phase in a leverage ratio (FSA, 2009).

42. Moral hazard issues also arise from generous deposit guarantee schemes and cumbersome bankruptcy schemes that make it difficult to unwind even small banks in an orderly manner. This is an issue in many European countries. Cross-country differences in deposit guarantee schemes and design features are discussed in Schich (2008).

Basel Committee (BIS, 2009) suggests that systemically important institutions should prepare contingency plans (living wills), which would encourage banks to unravel complex structures, thereby increasing transparency and making tax planning more difficult.

5.28 There are other ways to tackle the too-big-to-fail issue. A radical solution (see for instance, Kay, 2009 and King, 2009) would be to split up banks along business lines into narrow banks and other financial entities. Narrow banks would collect retail deposits and provide payment services and lend to households and SMEs. The remaining financial operations including commercial lending and proprietary trading would be fully deregulated and funded by the markets. Structural separation would not only deal with the too-big-to-fail issue but also help avoiding cross-subsidisation of high risk activities by capital raised for lower risk activities.

5.29 A major objection (FSA, 2009) is that such an arrangement would increase risk taking in the shadow banking system and the likelihood of boom and bust cycles as heavy reliance on wholesale funding increases the risk of runs and contagion. Moreover, instability could also arise if the shadow banking system benefits from higher returns in good times and can thus offer higher rewards on financial investments than the narrow banks on deposits, but this could suddenly change in bad times leading to large scale funding and maturity mismatches across the two sectors (Goodhart, 2009). A middle way between a clean separation of banking and other functions and keeping large financial conglomerates would be to create non-operating holding companies, which would raise capital and invest it in subsidiaries, with the holding company not allowed to shift capital between affiliates (Blundell-Wignall *et al.*, 2009). Such a structure would make it easier for regulators and market participants to spot weaknesses and affiliates could be shut down without affecting other parts of the conglomerate. On the other hand, synergies and economies of scale and scope could still be exploited via shared technology platforms of back office functions.

5.30 The underestimation of risks before the financial crisis struck is closely related to a number of factors (Kirkpatrick, 2009). First, risk management systems failed to evaluate risk properly. Second, supervisory boards were not particularly successful in reining in excessive risk-taking. Third, managerial compensation schemes were skewed towards the short term and thus fostered excessive risk taking. Moreover, managers often have an influence on the terms of performance-based pay and pay is often not linked to performance, especially in the case of losses, or if they are, performance is often not benchmarked. The FSB (2009) suggests that compensation practices should be harmonised for major financial centres and implemented for large, systemically relevant banks and other financial institutions. Compensation packages should include deferral, vesting and claw-back clauses and bonus payments should be limited (as well as dividend pay-outs), when capital is close to the minimum.

5.31 Credit rating agencies currently play an important role in evaluating and publishing information on the risk of default of debt securities, including structured credit products. They face a conflict of interest, however, as the issuers of the security pay a fee for the ratings, rather than the investors. The Basel Committee (BIS, 2009) argues that credit rating agencies should follow the International Organization of Securities Commission's (IOSCO) new code of conduct and standards set at the international level. These include micro-prudential aspects of regulations such as *i)* resolving conflicts of interest, *ii)* responsibilities of the rating agencies for the ratings and *iii)* the quality and integrity of the rating process. Brunnermeier *et al.* (2009), on the other hand, argue that ratings should be removed from the structure of formal regulation altogether so as to avoid giving a statutory role to institutions subject to conflicts of interest and with a mixed track record. Instead, bankers should take responsibility for their own decisions.

5.32 The Warwick Commission (2009) argues that the regulatory framework should promote an allocation of risks to the segments of the financial system that are best placed to cope with them. Banks are good at hedging against credit risks whereas pension funds and insurance companies are better placed to

deal with maturity mismatches and liquidity risks. Consequently, regulatory capital should be set to incentivise banks to focus on their core business of credit risk and discourage them to rely excessively on short-term funding that can amplify maturity mismatch and liquidity risks.

Stronger macro-prudential oversight is needed

5.33 The financial crisis has highlighted that the regulatory and supervisory focus on individual institutions may not sufficiently take into account systemic risks. A stronger macro-prudential oversight that complements and feeds into micro-prudential supervision could help in this respect. Already before the economic and financial crisis erupted, central banks did not only focus on price stability, but also on financial stability. This is not only the case for the central banks that have supervisory or regulatory functions but also for those who do not. This is reflected in the proliferation of financial stability reports by central banks. In many cases these stability reports did sound the alarm bells, but these warnings were not heeded. Better macro-prudential oversight, as proposed at the European level and in the United Kingdom would draw different sets of policymakers together and foster a better dialogue between monetary policy makers and regulators and supervisors with a shared macro-prudential focus. This approach has the potential to address vulnerabilities of the financial system as a whole, complementing the supervision of individual institutions.

5.34 In Europe, an agreement has been reached on a new framework to co-ordinate macro- and micro-prudential supervision. A European Systemic Risk Board (ESRB) is being set up. It will be closely involved with the micro-prudential regulatory authorities, which should significantly improve the flow of information between the two levels of prudential supervision and increase the likelihood that signs of systemic risk are spotted quickly. It will issue financial stability risk warnings and recommendations to be taken into account by supervisors. At the micro-prudential level the European System of Financial Supervisors will help to ensure consistency of national supervision and strengthen the oversight of cross-border entities. In the United Kingdom, under the Banking Act 2009, the Bank of England was given the objective “to contribute to protecting and enhancing the stability of the financial system”. It will have to fulfil its macro-prudential mandate in close co-operation with the Financial Services Authority. Also the US administration has issued similar proposals that would strengthen macro-prudential oversight. They are currently going through the legislative process.

6. The role of other structural policies

Summary

While structural policies are not primarily set to strengthen the resilience of an economy to shocks, they can directly and through their interaction with macroeconomic policies influence the propagation of shocks. Policies and institutions that lead to labour and product market frictions can dampen the initial impact of a shock but also increase its persistence.

Supply side restrictions in the housing market such as strict zoning regulations may reduce the volatility of the construction sector but tend to increase house price volatility. Tax biases towards homeownership, in particular mortgage interest rate deductibility, provide incentives for increased leveraging of households making them more vulnerable to shocks. Property taxes that are linked to current house price valuations, on the other hand, have some potential to stabilise the housing market.

Tax policy that favours debt over equity finance provides additional incentives for increased leveraging of firms making them and banks or other creditors more vulnerable to shocks. Evidence exists that higher debt-equity ratios are associated with greater post-crisis output declines and larger cumulative output losses.

Prevention of large and protracted downturns is crucial as they can lower potential output. In the aftermath of the current crisis, structural unemployment is likely to drift up in a number of countries. However, labour market reforms have made hysteresis effects less pernicious.

6.1 Structural policies can reduce or amplify the effects of a shock on economic activity and affect the speed of adjustment in its aftermath. In addition, resilience to shocks is important as protracted slumps could reduce potential output. A trade-off may exist between structural policy settings to promote growth and stability. For example, stricter employment protection may stabilise employment and income during temporary shocks but may also hinder necessary reallocation processes.

6.2 There are also important interactions between structural policies and macroeconomic policies. As noted in the previous sections, the development of financial and housing markets can have important consequences for the strength and speed of the monetary policy transmission mechanisms. In a similar manner, greater labour market flexibility can steepen the Phillips curve and improve the traction of monetary policy and its ability to confront a large shock. Structural policies also have important interactions with fiscal policy, particularly to the degree that they lend greater resilience to shocks. For example a less resilient economy may require larger automatic stabilisers and discretionary fiscal policy to cushion large downturns. And a less resilient economy may also hinder subsequent consolidation which will impose limits on the scope for pursuing a counter-cyclical fiscal policy. The remainder of this section addresses a number of policy areas where there is scope for structural policies to be better aligned with macroeconomic policies without sacrificing their role in promoting efficiency and also considers how structural policies can influence resilience to shocks.

Labour and product markets

6.3 The type and degree of frictions determines the impact and persistence of different shocks to the economy and thus the need for macroeconomic stabilisation policies. Standard New Keynesian models predict that under a variety of shocks (including cost-push and technology shocks), nominal price or wage

rigidities may cushion the initial impact of a shock but increase its persistence through delayed adjustment and reallocation processes. Under real wage frictions, the initial impact of a shock may be stronger but followed by faster adjustment.⁴³ Independent of the type of rigidity the effect on resilience is ambiguous a priori. One prominent theoretical underpinning for price stickiness is imperfect competition, while wage stickiness is traditionally related to institutional settings in the labour market.

6.4 Labour market institutions differ widely across the OECD countries. Most English-speaking countries have decentralised bargaining systems, with wages reacting relatively fast to labour market pressures and productivity developments. In many continental European countries wage setting mechanisms are underpinned by administrative extensions, minimum wages and implicit or explicit indexation, which may lead to labour market mismatches and the concentration of problems in certain regions or for some groups of workers. However, in some countries wage setting is highly centralised, which makes it possible to internalise the detrimental employment effects of excessive wage pressures (Bassanini and Duval, 2006). Welfare systems also influence the responsiveness of wages to labour market conditions, especially through eligibility and job search conditions combined with job-search assistance. Also employment protection legislation is stringent in some OECD countries. While this may cushion the immediate impact of a shock, it may lead to stronger persistence, as it hinders the adjustment to permanent shocks, and contributes to labour market segmentation.

6.5 Though considerable reform progress has been made, the stringency of regulations that affect competition in product markets still differs considerably across the OECD countries (Figure 6.1). Greater competition leads to a more rapid adjustment in prices, giving more leeway for a monetary policy response to a downturn. Studies by the Eurosystem's Inflation Persistence network found that prices change less frequently in the euro area than in the United States and that implicit pricing contracts and strategic interactions among competing firms are the main sources of price stickiness for producer prices. Inertia in service price inflation is particularly high, reflecting the continuing high degree of segmentation of the services markets across the European Union. Greater persistence would, other things being equal, argue for a more aggressive monetary policy (Coenen, 2007).

Figure 6.1. **Aggregate PMR scores**

6.6 Duval *et al.* (2007) show empirically that synthetic indicators of policies and institutions significantly affect the persistence of output gaps. On the other hand, strict labour and product market regulations can dampen the initial impact of shocks. There is also some evidence that decentralised wage bargaining helps absorb the initial impact of shocks and that mortgage market development reduces output gap persistence. As there is a trade-off between output gap volatility and the persistence of a shock the overall implications on resilience are not clear. Simulations by Duval *et al.* (2007) suggest that for most continental European countries the initial impact of a shock is cushioned but the effect is more persistent, with cumulated output losses tending to exceed the ones in most English speaking countries. A few mostly small European countries (Denmark, Netherlands and Switzerland) combine initial cushioning with a quick adjustment. It should be noted, however, that the simulation results in terms of the net balance between cushioning and persistence are to a large extent driven by the positive impact of mortgage market development on resilience.

43. A seminal paper on real wage rigidities in an otherwise standard New Keynesian model is Blanchard and Gali (2007). DSGE analysis by Duval and Vogel (2008) also supports the view that nominal rigidities may yield smaller but more persistent effects on output under optimal monetary policy and that real rigidities can yield the opposite result.

Housing market

6.7 Housing market developments can have a large effect on the business cycle through various channels. Residential investment constitutes a small albeit volatile component of GDP, while house prices can impact private consumption through wealth and collateral effects (Davis, 2010). Moreover, as discussed in section 4, the size and completeness of mortgage markets can influence the effectiveness of monetary policy.

6.8 On the supply side residential investment is affected by zoning regulations. The housing stock is given in the short run, while its long-run elasticity with respect to relative price changes will depend on the natural or policy-induced scarcity of urban land. While strict zoning regulations tend to stabilise residential investment, they can have the opposite effect on house prices and hence private consumption via wealth and liquidity effects. Barker (2006), for instance, documents that in the United Kingdom tough local zoning regulations and a slow authorisation process are among the reasons for the rigidity of housing supply, and an important factor for both the trend increase in house prices and their high variability. Glaeser *et al.* (2005) and Saks (2005) show that tough zoning laws can also bite in the United States, though there are large differences across cities. Except for the United States and the United Kingdom, evidence on zoning regulations is sparse, but recent OECD country surveys for Denmark, Finland, the Netherlands and Sweden have argued that house prices have been affected by tough zoning laws, the slowness of the planning process as well as disincentives for municipalities to allocate sufficient land for construction purposes.

6.9 Certain aspects of the tax system influence the demand for housing and could push up indebtedness. While the tax system varies greatly across OECD countries, it is generally non-neutral, distorting market participant's decisions in favour of homeownership.⁴⁴ The main advantages for homeowners in the majority of countries result from the combination of deductibility of mortgage interest payments and the non-taxation of imputed rental income and capital gains. A recent study of the US housing market (Poterba and Sinai, 2008) shows that the various tax benefits amount to an average subsidy of 19% of the user costs.⁴⁵ Tax incentives that stimulate home-ownership may not only lead to a higher steady state level of house prices, but could also influence the resilience to shocks.⁴⁶ For example, the tax deductibility of mortgage interest rates provides an incentive to take out loans that are large compared to the house value. This incentive together with mortgage finance innovations such as interest-only loans, has the potential to drive an increased proportion of homeowners into negative equity in the event of adverse macroeconomic shocks or declines in house prices. Furthermore, non-recourse loans such as those existing in the United States, provide an incentive for homeowners in negative equity to walk away from their homes, further depressing house prices and aggravating stress among lenders including financial institutions.⁴⁷

6.10 On the other hand, residential taxes based on actual property prices could be stabilising, as higher house prices lead to higher user costs and increased tax payments reduce disposable income. Moreover, if households extrapolate house price rises into the future they will also anticipate a higher tax burden (MacLennan, 1998 and Muellbauer, 2005). Taxation of residential property tends to be low in Europe at

44. A neutral tax system would not distort the choice between owning and renting as well as between investing in dwellings and others forms of investment.

45. The subsidy varies by income group and is strongest for the highest income groups (about 30% of user costs) and lowest but still sizeable for the lowest income group (8%).

46. In addition, van den Noord (2005) shows that a tax bias towards homeownership can increase house price volatility (see also Swank *et al.*, 2002)

47. André (2010) provides a comprehensive overview of the role of policies on the housing market.

typically less than 1% of GDP, while it is close to 3% of GDP in Canada, the United Kingdom and the United States (Figure 6.2). As property taxes in many countries are not linked to current house values but fixed at some historical value, the stabilising effect of property taxes is further reduced. Transaction taxes, such as a stamp duty, could similarly slow the build up of housing bubbles. However, they can adversely impact the liquidity of the housing market leading to increased price volatility (Westerholm, 2003) as well as reduce labour mobility. In sum, the adverse effects of transaction taxes on stability and efficiency are likely to outweigh potential gains.

Figure 6.2. **Recurrent taxes on immovable property**

Corporate taxation

6.11 Tax policy also influences corporate finance. In most countries debt interest is deductible from corporate income taxation while the cost of equity finance is not. The resulting tax advantage depends on the corporate tax rate as well as personal interest, dividend and capital gains taxes of investors. Interest deductibility may bias corporate decisions towards increased leverage. Despite an OECD wide fall in statutory corporate tax rates since 1990, the tax advantages of debt finance have remained substantial (IMF, 2009). High levels of leverage make companies more vulnerable to shocks.⁴⁸ In addition, because of limited liability of debt, debt financing provides strong incentives for corporations to increase their risk profile enhancing the possibility of boom and bust periods. In the case of financial corporations the tax advantage of debt leads to a bias towards holding hybrid debt instruments, rather than common equity. Furthermore, evidence exists that higher debt-equity ratios are associated with greater post-crisis output declines (Davis and Stone, 2004) and larger cumulative output losses following periods of financial stress (IMF, 2008).

The impact of resilience on trend output growth

6.12 Strengthening resilience to shocks is also crucial as large or protracted cyclical downturns can affect potential output and thus long-term growth. There may be self-reinforcing mechanisms at play so that what starts out as a temporary downturn ends up with protracted or permanent effects – what Phelps (1994) called a structural slump. Cerra and Saxena (2008) show that financial crises can undermine growth severely for protracted periods. Recent OECD estimates suggest that the current crisis is likely to reduce the average area-wide level of medium-term potential output by about 4.5%, with most of the impact felt already in 2009 and 2010. Just under half of the projected medium-term decline is expected to come from a higher cost of capital and associated fall in capital intensity, and the remainder from a combination of higher structural unemployment and lower labour force participation, although there is significant cross-country variation with respect to the latter components.

6.13 Hysteresis channels in the labour market are well understood, although they tend to affect the level rather than the growth rate of employment and output. They include a ratcheting up of structural unemployment due to insider-outsider dynamics, a loss of morale and skills by the unemployed, stigmatisation of the jobless which reduces their subsequent employment prospects and a reduction in regional labour mobility, especially if house prices are flat or falling. Most of these effects should wane in the long term. Recent institutional reforms to product and labour markets imply, however, that most OECD countries may be somewhat less vulnerable to labour market hysteresis effects than they have been in the past (Guichard and Rusticelli, 2010).

48. Unlike dividend payments, debt servicing costs change little with economic conditions aggravating liquidity constraints during downturns. Further, creditors might in anticipation of economic stress refrain from rolling over funds or providing credit.

6.14 There may also be hysteresis effects on productivity that could have a persistent impact on potential growth by affecting the drivers of innovation and productivity growth. For example government expenditure in growth-enhancing areas may be crowded out by increased transfer spending. Entrepreneurship and innovation may fall due to increased uncertainties or borrowing constraints. On the other hand a severe downturn may lead to better resource allocation as the least productive firms/activities are shut down (Baily *et al.*, 2001). Overall the relative strengths of positive and negative forces on TFP growth are difficult to pin down and evidence of previous downturns suggests considerable heterogeneity in the response of productivity growth.

7. Factors that shape the scope for policy to react to shocks

Summary

The scope for policy to react to shocks differs across countries. A number of factors ranging from the structural features of the economy, institutions and policy settings play an important part in influencing the scope for policy.

First, the characteristics of the economy, the types of shocks the economy faces as well as differences in preferences for stabilisation and trade-offs among policy goals suggest that the optimal degree of stabilisation should vary across countries.

Second, the assignment of instruments to deal with shocks can influence the scope of policy. In normal times, the presumption prevails that one instrument should be used to reach one policy objective, but during crises the appropriate policy mix may change or require that different policy areas act in concert. When some policies are impaired or not sufficiently developed, policy settings may need to take these factors into consideration.

Third, the scope for policy to react to shocks is generally greater when there are sufficient safety margins. For instance, lower debt and deficit levels provide fiscal policy with a wider margin to react to a large shock. Also the costs and benefits of a greater safety margin for monetary policy via a higher inflation target, compared with the use of non-conventional monetary policy measures should be assessed. As a consequence of the crisis, fiscal policy will be less able to respond to large future shocks for some time, which should have implications for margins built into other policy areas.

Fourth, the ability to react is influenced by the credibility of policies. A sustained track record is an important attribute and credibility can be bolstered by different institutions and types of rules. However, improved credibility due to a rules-based system can involve a trade-off in constraining policy from reacting to a large shock.

Fifth, policy-making is facing considerable uncertainties in understanding the source of shocks, how the economy responds to them and how policy affects the economy. The uncertainties will determine the best policy response, for instance, whether it should be quick and aggressive or rather slow. Policymakers may also want to design policy bearing in mind the worst possible outcomes.

7.1 A standard feature of most policy analyses is that macroeconomic policy should stabilise output and inflation as market failures and frictions make it impossible for households and firms to cope with economic fluctuations on their own. While there is a strong case for some stabilisation, the desirable amount of stabilisation is more difficult to pin down and depends on a number of factors. These include considerations such as:

- *The nature of the economy* – In confronting shocks, some economies are more resilient and the need for active stabilisation policy will also depend on the degree of automatic stabilisation provided by fiscal policy. In addition, small open economies are less able to offset large shocks originating elsewhere and may thus need to place a greater emphasis on policies that enhance the resilience of the economy.
- *The nature and size of shocks hitting the economy* – For example, some economies are more susceptible to commodity price movements than others and may have greater specialisation in sectors that are prone to larger swings in demand and prices. Supply shocks are also generally harder to address than demand shocks.

- *Different preferences for output and inflation variability* – Countries can put different weights on output or inflation stabilisation. Central bank mandates, for instance, differ in this respect. The demand for stabilisation may also reflect a desire for risk diversification. For example, one hypothesis is that larger social safety nets may be related to greater external openness and thereby exposure to external shocks.
- *Uncertainty* – Policymakers face considerable uncertainties in stabilising the economy. In some cases uncertainties about the nature of the shock would argue for taking a more conservative approach whereas in other cases, the constellation of uncertainties may demand a rapid and robust response.

7.2 Furthermore, while the case for stabilisation rests on minimising welfare-reducing short-term fluctuations, different models show different welfare gains due to stabilisation (Box 7.1). Unless carefully designed, stabilisation efforts may also undermine instrument stability. On the other hand, large and protracted shocks may affect the level of potential output (Furceri and Mourougane, 2009), strengthening the case for an aggressive policy response to prevent or mitigate the consequences. This section assesses first the typically recommended policy responses to different types of shocks. The section then considers a number of factors that may constrain the choice of instrument. Finally, the discussion turns to the potential impact of uncertainty on policy choices.

Box 7.1. The welfare gains from smoothing the cycle

In 1977, James Tobin noted that it would take a heap of Harberger triangles to fill an Okun gap, or that the social costs of unemployment were larger than the deadweight losses due to taxation (Tobin, 1977). The view on the welfare gains from smoothing cycles has varied since then, reflecting macroeconomic policy errors during the 1970s and the advent of new economic models as well as the recent economic crisis. Lucas (1987), for instance, used a simple growth framework that provides an estimate of the welfare gains from eliminating all consumption variability for a risk-averse consumer. Such a consumer prefers a deterministic consumption path to a risky one, other things being equal. Under standard assumptions, the welfare gain from stabilisation is trivial (one-twentieth of 1% of consumption). The same feature is a hallmark of basic growth models: if technology shocks drive the economy, resources are always allocated efficiently, and monetary or fiscal policy that tries to reduce the amplitude of shocks will also reduce welfare by reducing growth. In such models, the cumulated welfare gains due to a marginally higher growth trajectory would be far larger than the gains derived from smoothing the cycle.

Subsequent research has pointed out that the welfare gains from smoothing the cycle may be larger, but the extent is quite uncertain. For example changes to the utility function used in the models (non-expected utility rather than constant relative risk aversion) or using assumptions about habit formation can lead to large welfare costs when economies are volatile. In this literature (Alvarez and Jerman, 2004 and Tallarini, 2000), welfare gains from eliminating consumption variability are often above 10% of consumption. However, they imply an implausibly high aversion to risk (Lucas, 2003). Other models have included features, such as incomplete risk insurance and differently situated agents (for instance, employment shocks do not affect everybody in the same way) (Krusell and Smith, 2002 and Storesletten *et al.*, 2001). Smoothing the cycle in the presence of heterogeneity leads to welfare gains that are 0.1 to 1% of consumption and in some variants considerably higher. Indeed, Rawlsian preferences may justify more stabilisation. The welfare gains are considerably bigger still for low-wealth, unemployed people. Crucial here is also, that small, transient shocks at the aggregate level can lead to persistent shocks to the earning of a fraction of households.

Important in the current context is a recent paper by Barro (2009). In a model that includes rare but large disasters, he shows that the welfare implications of disaster risk are large – society would be willing to lower real GDP by about 20% each year to eliminate disaster risk due to sharp economic contractions or the damage inflicted by wars.

Appropriate instruments

7.3 The assignment of instruments to policy objectives is a complicated question. In general, a basic presumption is that one policy instrument is needed for each objective, or that a single instrument is

unlikely to be sufficient in meeting multiple objectives. A second consideration is whether the appropriate policy mix is in place to meet a range of stabilisation objectives (output, unemployment, inflation, financial sector stability). Furthermore, policy in one area needs to take into account the stance of other policies and that may change with changes in the economic environment.

7.4 The appropriate policy instrument will differ depending on the type of shock. The following analysis considers three general types of shocks: Demand, supply and price and financial shocks. In order to keep the discussion tractable mainly temporary shocks are considered under the assumption that policymakers have full information about the nature of the shock (uncertainty issues are considered in the final section) and that there is scope to use policy. The discussion largely draws on the new-Keynesian literature and initially considers policies for normally sized shocks. During pronounced shocks or combinations of shocks additional measures or flanking policies may become appropriate.

Demand shocks

7.5 The standard policy prescription for responding to a temporary demand shock is uncontested. The normal first line of defence is through the operation of automatic stabilisers and monetary policy. Demand shocks may be domestically driven or arise due to changes in external demand. In both cases, a negative, temporary shock would generally lead to monetary policy easing. In the open economy setting, a difference in monetary policy response may arise with the policymaker taking into account the exchange rate channel and using an inflation target based on a somewhat longer horizon than in a closed economy setting (Ball, 1999; Svensson, 2000).

7.6 While fiscal policy has a place in the policy arsenal it should not be overburdened. A larger size of government helps in stabilising output via the automatic stabilisers. However, fiscal policy instruments that underpin the automatic stabilisers are designed in the first instance to cater for equity or efficiency objectives, with automatic stabilisation arising as a side-benefit. They should not be adjusted for the sake of stabilisation alone. During normal times, discretionary fiscal policy (fine tuning) is generally not seen as appropriate, as uncertainties about taxes and benefits are likely to have adverse effects on the level of output, implementation lags could result in a pro-cyclical fiscal impulse and political economy factors can hinder the withdrawal of stimulus.

7.7 While a monetary policy response – with automatic stabilisers operating – dominates a discretionary fiscal policy response in normal times that ranking can be reversed when financial markets are impaired and when monetary policy has hit the zero bound and has to rely on unconventional monetary policy tools. Discretionary fiscal policy during a large and protracted shock may become more potent and can play a supporting role to monetary policy and the automatic stabilisers. In the absence of long-run solvency concerns (see below), temporary discretionary fiscal policy responses to a demand shock could boost aggregate demand, helping to narrow the output gap. A fiscal response is likely more potent when financial markets are impaired, as savings offsets are less likely to undermine the intended fiscal impulse.

7.8 If the shock is idiosyncratic, a small open economy may not be capable of offsetting the shock with discretionary fiscal policy. For example, leakages may severely reduce the effectiveness of a fiscal stimulus, either discretionary or from the automatic stabilisers. For example, simulations of the OECD's global model (Hervé *et al.*, 2007) suggest that spillovers relative to own country effects are larger in the euro area than in Japan and the United States. Notwithstanding these results, in the euro area where monetary policy focuses on area-wide developments, discretionary fiscal policy by individual countries should probably play a more important role in stabilisation (Beetsma and Jensen, 2000).⁴⁹

49. In line with this, Gali and Perotti (2003) point out that discretionary fiscal policy became more counter-cyclical in EMU countries after the Maastricht Treaty.

7.9 When a large shock is common across countries a co-ordinated policy response may become beneficial. In the case of fiscal policy, co-ordination diminishes the problem of cross-border demand leakages, though the impact of the automatic stabilisers will already be co-ordinating part of the response (OECD, 2008). However, a non-co-operative equilibrium is likely to result in a failure of co-ordinating additional discretionary responses in the absence of other mechanisms to commit policy. In the recent crisis, the near simultaneous and large fiscal easing suggests that the theoretical concern of free riding may be less of a concern in the face of a large common shock, although this does not provide evidence as to whether a better co-ordinated response would have been more effective. In the case of monetary policy, policy co-ordination was more apparent. This included the co-ordinated cut of policy rates by several central banks of up to 50 basis points in October 2008 and also the subsequent co-ordination of part of the non-conventional monetary policy measures, such as swap agreements.

Supply and price shocks

7.10 The appropriate policy response to a supply shock is more difficult to determine than for a demand shock. First, a supply shock will also have implications for demand. A positive supply shock that is perceived as long-lasting will raise permanent income and if households are not liquidity constrained, demand will also rise. The relative importance of the impact on the supply and demand side needs to be taken into account, when reacting to the shock and the balance between demand and supply side effects is likely to vary across countries. On the other hand, labour market reforms that boost productivity could raise uncertainties about job losses and lead to precautionary saving so that the demand and supply response could diverge considerably. Second, differentiating between supply and price shocks is often difficult in practice (as well as in New-Keynesian models), though the policy response may be similar. For instance, the appropriate policy response to a positive commodity price shock in a commodity-importing country would look much the same as to a negative productivity shock. However, the uncertainty in determining whether a price or relative price shock represents a supply or demand shock makes selecting the appropriate policy response more challenging (see below).

7.11 Temporary supply shocks arise in a number of ways with some differences in the appropriate instruments to be deployed. For example, monetary policy can usefully respond to temporary productivity shocks when the supply response outweighs the effect on demand. In this case, changes to real marginal costs may be felt in prices, though not completely in the short run due to price stickiness. Thus, with a positive productivity shock, inflation will be lower and the real interest rate rises, reducing interest rate sensitive demand components. In this context, monetary policy, by lowering nominal interest rates, will help in closing the output gap.

7.12 Temporary changes to mark-ups and shocks to commodity prices can have important impacts and pose dilemmas for the policy response. In particular, energy prices are both volatile and important inputs into the production process. As such higher energy prices can affect potential output, if sustained. In addition, inflation and output will move in opposite directions. Initially, policy should “look through” the immediate disturbance and policy should change only if second round effects on inflation become likely. For commodity exporters on the other hand, a positive commodity price shock will raise the terms of trade and the associated rise in demand will lead to inflationary pressures. In this case, a rise in interest rates, which would also have an effect through the exchange rate channel, would be consistent with an inflation targeting regime.

7.13 Demographic shocks or shocks to capital stocks (resulting, for instance, from natural disasters) are likely to have more permanent effects. In contrast to temporary supply shocks, macroeconomic policies are less useful in this context. Macroeconomic policies should not attempt to offset the effects of permanent shocks, but monetary policy may still help in smoothing adjustment. Also the automatic stabilisers may slow the adjustment to a negative permanent supply shock rather than speed it up and may

even require an offsetting discretionary policy response to avoid permanent and possibly unsustainable effects on deficits and government debt. In dealing with such shocks, structural policies that facilitate resource reallocation are of great importance.

Financial shocks

7.14 Financial shocks can take a wide variety of forms and have effects on both the supply and demand side. Shocks to the risk premium, the risk free interest rate and credit shocks are considered. Shocks to the risk premium and the risk free interest rate can have important macroeconomic effects. For example, a higher cost of capital implies a lower equilibrium output and transitory wealth effects on consumption and investment can be large. In this case, monetary policy could be eased. However, in practice, it is difficult to assess what drives risk premia. Determining what drives movements in lending rates is difficult, but nonetheless essential as their changes will influence financial conditions (Giammarioli and Valla, 2004).

7.15 Monetary policy may also attempt to offset credit market shocks as they influence financial conditions. Such shocks can occur through changes in balance sheets (the financial accelerator) and through the supply of loanable funds by banks (Bernanke and Gertler, 1995; Bernanke and Blinder, 1988). There are a number of other instruments that have a strong and more direct impact on credit growth than interest rates and can target particularly vulnerable sectors. Credit booms are often characterised by a shift into riskier forms of lending. Risk weights attached to such lending categories could be changed when setting banks' required capital, while varying margin requirements could be an appropriate instrument for dealing with vulnerabilities building up in the capital markets. The best approach is likely to involve a portfolio of instruments.

7.16 At the international level, the transmission of financial shocks has arguably become faster and the inter-linkages between the financial sectors susceptible to the transmission of shocks across borders have become stronger (Trichet, 2009). One of the factors contributing to the severity of the current crisis is how many financial sectors were exposed to systemic risk. In part this was due to financial institutions becoming highly leveraged and interconnected. In these conditions, macroeconomic policy had to ease aggressively. The priority should be given to develop micro and macro-prudential regulation to improve the robustness of financial institutions to shocks originating both domestically and abroad. In particular, given the threats posed by systemic risk in highly interconnected economies, developing better early-warning systems requires more attention. Furthermore, the effective regulation of financial sectors would benefit from international co-ordination to ensure that there is a level playing field and possibilities of regulatory arbitrage are minimised.

Safety margins

7.17 Deficit and debt levels prior to a large shock will circumscribe the scope for fiscal policy to respond to it. The relevance of having in place a sound fiscal policy was examined in section 3, revealing that policy was better able to react when deficits were relatively low. Cushions for fiscal policy were clearly too small before this crisis in many countries, raising the issue of how wide safety margins should be (Box 7.2). The issue of appropriate safety margins for fiscal policy has arisen in the context of the Stability and Growth Pact requirements in the European Union. For example, Dalsgaard and de Serres (1999) estimated that governments maintaining budgets close to balance would have a 90% probability of being able to allow the automatic stabilisers to operate freely without breaching the 3% deficit limit when faced by shocks calibrated on historical experience. Codogno and Nucci (2008) re-examined the necessary safety margins and found that in countries where output gaps were very volatile larger safety margins would be needed. Fiscal safety margins are not simply a European issue. With demographic developments beginning to strain budgets, the marked erosion of already weak fiscal positions undermines the ability of

many countries to react effectively to another large shock for some time. In this context, countries may need to reconsider the appropriate safety margins they need to build into other policies.

Box 7.2. Safety margins for monetary and fiscal policy

With interest rates hitting the zero bound or being close to it in many countries in reaction to the economic crisis and deficits soaring in a large number of countries, the question arises what safety margins should be built up in good times to avoid constraining policy in bad times. To address this question, simulations using a DSGE model were run. The model assumes forward-looking behavior, that shocks can be correctly identified, that both fiscal and monetary policy react optimally to shocks and that policy commitments are credible (Adam, 2010). Policy-making in such models operates thus in the best of all worlds and the simulated safety margins are likely to be a lower bound.

In a first set of simulations, the standard deviation of shocks over the past 25 years is used to see how large swings in deficits would be in response to shocks (no deficit is assumed in the baseline scenario). The distributions are computed by simulating the model 1 000 times starting the simulations either with a zero initial debt level or one corresponding to 60% of GDP. Under the shocks that occurred during the great moderation era, the deficit/GDP ratio would never swing by more than 3% of GDP (Figure 7.1). If the initial debt level were 60% of GDP, the distribution of deficit changes widens considerably, though also in this case, the swing in the deficit would only seldom surpass 3% of GDP. In the 60% case, the distribution widens because the simultaneous monetary policy response implies a greater real interest rate risk for the budget.

Figure 7.1. Safety margins for fiscal and monetary policy in the face of shocks

Figure 7.1 also shows the corresponding distribution of nominal interest rates. The zero lower bound is never binding, independently of the government debt level. Interestingly, a higher debt/GDP ratio implies that monetary policy is setting interest rates that are less volatile. This is optimal because it attenuates the real interest rate risk for the government budget. Yet, since monetary policy stabilises the economy only through variations in the real interest rate, it also implies that with higher debt levels, monetary policy can not contribute as much to stabilising the economy.

These simulations indicate that relatively small disturbances do not pose a problem as the distributions for debt and interest rate changes are also small. As a robustness check, the standard deviations of the technology and demand shock are doubled. Even in this case, a swing in the deficit of more than 3% of GDP would remain rare, even in the case of 60% initial debt. Also the likelihood to hit the zero interest rate bound would remain negligible. However, in the case of a tripling of the standard deviation the likelihood of a swing in the deficit of more than 3% of GDP would rise to nearly 10%. A larger standard deviation of shocks also has implications for the distribution of interest rates. The zero bound is not an issue, when debt is high, but becomes slightly binding under the low debt scenario. In this case, monetary policy is used more aggressively, because it has less adverse implications for the variability of government deficits. Tripling the shock size would raise the likelihood of hitting the zero bound to nearly 7% in a low debt environment, as countries can afford a high variance in interest rates due to low levels of government debt.

The sensitivity of the safety margin simulations was tested with respect to higher nominal rigidities and a more elastic labour supply. The simulation of higher nominal rigidities is motivated by the observation that price stickiness is stronger in Europe than in the United States, the model being calibrated on US parameters. The work of the Inflation Persistence Network (Alvarez *et al.*, 2006), for instance, has documented that prices tend to be changed less frequently in European countries than in the United States. In the sensitivity analysis the price stickiness parameter is raised by 20%. The simulation results show that both the distributions for deficits and interest rates widen (Figure 7.2). However, the deficit distribution widens by only little, but that of interest rates considerably: with stronger nominal rigidities, interest rate policy becomes more effective and is thus used more aggressively, which raises the likelihood of hitting the zero bound. In the case of a higher labour supply elasticity, the distribution of interest rates narrows considerably as households are more willing to adjust labour (or leisure) in response to economic disturbances (Figure 7.3). This stabilises private consumption and implies less variability of interest rates.

Figure 7.2. Safety margins for monetary and fiscal policy with greater price stickiness

Figure 7.3. Safety margins for monetary and fiscal policy with a higher labour supply elasticity

7.18 In the case of monetary policy, a large adverse shock can raise the spectre of deflation and cause the zero bound for interest rates to become binding. The consequences of deflation for debtors can aggravate the downturn, while very low levels of inflation or deflation can impair the functioning of labour markets (OECD, 2006; OECD, 2009c). Inflation targets provide a safety margin, largely through their effects in anchoring inflation expectations. A survey of a number of studies that examined different inflation targets under the assumption that there are no alternatives to stabilisation via interest rates found that an inflation target of around 2% entails only a small risk of hitting the zero bound and a very small risk

of tipping the economy into a deflationary spiral (Yates, 2004). These studies also reveal that the probability of the zero bound becoming binding rises exponentially, if the inflation target were to be lowered.⁵⁰ The economic and financial crisis has shown that hitting the zero bound is not just a remote possibility and the case for raising inflation targets should be re-examined (Box 7.3).

Box 7.3. The benefits and costs of raising the inflation target

A somewhat higher inflation target provides central banks more ammunition when facing large adverse shocks and reduces the frequency of hitting the zero nominal bound (Blanchard *et al.*, 2010). A higher inflation rate could be justified if the size of shocks the economy is facing is expected to be higher in the future or if the neutral real interest rate falls (lowering the nominal interest rate that is consistent with a given inflation target). For Japan, where the zero nominal bound has been a significant constraint on monetary policy, Krugman (1998) and later Leigh (2009) suggested raising the inflation target to around 4%.

The principle arguments against raising the target are that higher inflation induces efficiency losses, such as by distorting relative prices (Goodfriend and King, 1997). Furthermore, inflation can interact with the tax code to introduce various distortions. For example, tax deductibility of nominal interest payments in the presence of higher expected inflation can strengthen the bias towards debt financing.

In general, the costs of inflation may not be significant for relatively low inflation rates. For example, Summers (1991) suggested that inflation rates of up to around 3% could be justified and may have more credibility as monetary authorities would not wish inflation rates to rise much further. Empirically, such rates of inflation are correlated with higher growth rates. Furthermore, new-Keynesian models generally suggest that some inflation is beneficial when there are nominal downward rigidities in prices and wages. A higher inflation rate can facilitate real adjustments.

At higher inflation rates there are a number of additional concerns. Higher inflation rates are associated with greater inflation variability, which may require a stronger monetary policy reaction leading to more output volatility and may partially offset some of the safety margin. Increased inflation volatility could have another adverse consequence if it leads to less well anchored inflation expectations. Given that the current inflation targets are well-established and accepted by the public, adopting a new target introduces considerable uncertainty. Any change would need to be carefully evaluated and communicated to the public to ensure that the new targets acquire similar credibility, which would probably be difficult to achieve at a time of high government debt. Finally, the relationship with higher growth rates breaks down as inflation rises.

In the aftermath of a major shock the consequences of restricted room for monetary policy manoeuvre are apparent, but such shocks should be exceptional. Furthermore, monetary policy did not become completely ineffective in the recent crisis; rather it relied on non-conventional tools albeit with greater uncertainty about their effects. In this light, policymakers in choosing an appropriate inflation target need to balance the ongoing costs of higher inflation against the occasional but nonetheless significant costs of a major crisis where monetary policy becomes less effective.

7.19 Price-level targeting would provide another way to reduce the risk of hitting the zero bound. In this case the central bank commits to a price level rather than an inflation rate. If the price level undershoots the target, agents will expect inflation to rise to bring the price level back to its target path. Higher inflation expectations will lower the long-term real interest rate, thereby supporting activity and pushing up prices. This reduces the need for large shifts in policy rates, thereby reducing the probability of hitting the zero bound and falling into a liquidity trap (Ambler, 2009 and Cournède and Moccero, 2009). However, successful price level targeting is predicated on a sufficient degree of forward looking behaviour of economic agents and the self-regulating capacity of price-level targeting hinges on a high degree of monetary policy credibility.

50. The results depend on a variety of modelling differences and also assumptions about the size of the shocks. An additional factor that could contribute to hitting the zero bound more frequently included lower equilibrium real interest rates.

The influence of credibility and institutions

7.20 The scope for responding to shocks can be influenced by the credibility of policy, the rules guiding policy and the policy stance when a shock hits. Optimal stabilisation often assumes that policy makers can make credible commitments on how to conduct policy in the future. The ability to commit greatly helps in stabilising an economy following economic disturbances because it anchors private sector expectations. As the private sector is forward-looking, the ability to commit to future policies allows policy makers to smooth the effects of shocks through the influence of expectations. When optimal policies are not possible – such as when time inconsistency problems arise – putting constraints on policy may enhance policy credibility, but at the cost of not being able to respond appropriately to all contingencies.

7.21 Credibility of counter-cyclical policy can be fostered in a number of ways. First, by acting consistently over long periods of time, governments and central banks can establish a track record and reputation for implementing counter-cyclical policy in an effective way. To an extent, automatic stabilisers achieve this by design, whereas discretionary fiscal policy may lead to instrument instability. An alternative or complementary approach is to rely on different types of institutions. For example, in the case of monetary policy this was attempted by giving central banks operational independence and an explicit mandate. For fiscal policy, some recent innovations – such as in Australia, where a separate body provides advice on whether large-scale government infrastructure investment is consistent with macroeconomic stability – aim at providing institutional support to counter-cyclical policy. Finally, as highlighted in sections 3 and 4, relying on rules or targets can lend credibility to policy. However, a consequence of keeping rules relatively simple is that they may become a constraint during a large shock, making policy pro-cyclical. While breaching the rules may be attractive to enhance short-run welfare this comes at the cost of undermining credibility. In this context, well-defined but exceptional cases when rules can be relaxed may help policy react to rare shocks without impairing credibility. Without such clauses and confidence that they are only being invoked during exceptional times – which may call for an independent body to declare exceptional times – credibility may suffer.

The uncertainties surrounding policy

7.22 Deciding the appropriate policy framework and response depends on the pervasive uncertainties affecting policy formulation. Greenspan (2004) views uncertainty as a defining characteristic for monetary policy, but it equally applies to fiscal policy and financial regulation. The uncertainties surrounding policy reflect the risk associated with a known probability distribution and when the probability distribution is unknown (so-called Knightian uncertainty). Uncertainty implies that policy-makers can no longer be confident that their understanding of the state of the economy accurately reflects the true state of the economy. In this case, policymakers may exercise more caution, because additional information will provide a more solid basis for decision-making and there is thus a benefit from waiting (Brainard, 1967). The policymaker encounters such uncertainties in understanding the structure of the economy and how policy choices affect the economy, as well as the nature of shocks hitting the economy.

7.23 Structural or statistical models are always incomplete descriptions of how the economy works, but are essential in guiding policy. For instance, inflation targeting, with its emphasis on projections of the future state of the economy arguable helped improve monetary policy. However, the abstractions needed in keeping such models tractable also mean that they fail to take account of all the possible mechanisms and may under-play the temporal nature of some economic relationships. Furthermore, key aspects of models may be unobservable and in particular after structural change it may take time to uncover the new parameters. The effects of policies based on intermediate targets and simple rules are harder to gauge, with incomplete knowledge of the economy. The appropriateness of intermediate targets can hinge on the stability of uncertain structural relationships. For example, monetary aggregates can generate misleading signals regarding inflationary pressures, if velocity shocks occur. In the case of monetary policy,

uncertainties are often assessed by fan charts, which take into account previous forecast errors, while fiscal policy uncertainties are often assessed by changing assumptions compared to the baseline.

7.24 Assessing the current state of the economy correctly and understanding the shocks hitting the economy is also a major source of uncertainty. A critical issue is the timeliness and accuracy of data, which are often only available with a considerable lag and subject to revisions. The current phase of the cycle and the lags in observing the effect of shocks on the economy can interact to create considerable uncertainty. For example, with the flattening of the Phillips curve, the effect of a reduction in potential on inflationary pressures may only become apparent with a considerable lag.

7.25 In addition, some potentially useful concepts are difficult to measure even when data is timely. The well-known end-point problem in estimating the output gap using an HP filter is one such example. Furthermore, a measurement error concerning the level of the output gap can be persistent, if structural changes occur. The uncertainty surrounding the estimate is also likely to be high when the Phillips curve is flatter (Koske and Pain, 2008). For fiscal policy, errors in estimating cyclically-adjusted balances stemming from errors in output gaps can lead to biased estimates of steady-state debt-GDP ratios. Furthermore, if the output gap errors stem from demand-side developments, automatic stabilisers play a useful role, but if errors stem from supply-side factors, this will not be the case.

7.26 Given the problems in establishing policy-relevant facts, alternatives or complements may be available. For example Walsh (2004) suggests the change in the output gap suffers from fewer measurement problems than the level. Similarly, changes in unemployment rates can give less distorted information than estimates of levels and the natural rate. Koske and Pain (2008) suggest taking explicit account of the uncertainty by analysing different scenarios about the state and structure of the economy. In addition, calibrated uncertainty or the range of likely revisions could accompany estimates. More generally, the optimal weight to be put on a variable declines the worse the measurement. For example, in planning exit strategies from the current loose monetary stance, if there is greater uncertainty about the size of the output gap than the rate at which it is closing, monetary policy may begin to tighten gradually. On the other hand if there is less uncertainty about the size of the output gap than its closing, monetary policy may delay the tightening, but tighten rapidly when it does move.

7.27 While the Brainard principle of conservatism is one approach to cope with uncertainty, the literature suggests (for instance, Hansen and Sargent, 2003) that policymakers should assume the worst. In this context, the choice of policy should consider the expected effect of policy under different assumptions about the shocks facing the economy and the potential differences resulting from alternative models of the economy. In this light, it is necessary to assess whether the costs of errors are symmetric. The preferred policy may switch from welfare maximisation under certainty to policies that entail less welfare in the steady state, but take into account the possibility of catastrophic, but rare, events.

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Tables and Figures

Table 2.1. **Output cycle asymmetries between expansions and downturns over the long run**

Annual data, unweighted average of OECD countries

	All cycles excluding last cycle		Last cycle only		Last expansion relative to previous expansions	
	Length asymmetry	Size asymmetry	Length asymmetry	Size asymmetry	Length comparison	Size comparison
1790-2009						
Level cycle	2.7	4.2	8.2	28.8	2.9	1.6
Deviation cycle	1.2	1.0	1.5	3.1	1.2	2.3
Growth cycle	0.9	1.0	1.4	0.9	1.4	0.3
1946-2009						
Level cycle	7.3	38.7	8.2	28.8	1.6	1.2
Deviation cycle	1.2	1.0	1.5	3.1	1.2	1.5
Growth cycle	1.0	0.9	1.4	0.9	1.3	0.5

Notes: The sample excludes the Czech Republic, Hungary, Ireland, Luxembourg, Poland and Slovakia.

Length asymmetry = length of expansion / length of downturn

Size asymmetry = size of expansion / size of downturn

The last two columns compare the length and size of the last expansion relative to previous expansions.

Source: Calculations based on data obtained from Barro and Ursua (2008), "Macroeconomic Crises since 1870", BPEA, Online Appendix.

Table 2.2. **Cycle asymmetries**

1950 where available to 2009, level cycle, quarterly data, unweighted average of OECD countries

	All cycles excluding last cycle		Last cycle only		Last expansion relative to previous expansions	
	Length asymmetry	Size asymmetry	Length asymmetry	Size asymmetry	Length comparison	Size comparison
Real GDP	6.3	14.1	11.5	32.5	2.5	3.2
Output gap	1.4	1.0	2.1	4.2	1.2	0.8
Private consumption	8.7	34.3	11.7	30.1	2.1	1.9
Investment	2.4	4.0	5.1	11.6	1.3	1.0
Long-term interest rate	0.9	1.0	1.6	1.5	1.5	0.7
Short-term interest rate	1.0	1.0	1.6	5.3	2.0	0.7
Real short-term interest rate	1.1	1.0	1.3	1.5	1.0	0.6
Government net lending	1.2	1.1	1.7	7.4	1.2	1.0
Unemployment rate	1.1	7.9	1.3	19.0	0.9	0.3
Stock market index	1.2	2.3	4.1	10.4	1.9	1.6
Real house prices	1.3	1.9	9.2	26.0	3.6	4.0

Notes: Length asymmetry = length of expansion / length of downturn

Size asymmetry = size of expansion / size of downturn

The last two columns compare the length and size of the last expansion relative to previous expansions.

Source: OECD calculations based on the OECD Economic Outlook 86 database and Datastream.

Table 2.3. **Cycle concordance within countries**

Level cycle of real GDP, 1970 to 2008

	Canada	Germany	France	Japan	United Kingdom	United States
Investment	0.82 **	0.69 **	0.71 **	0.65	0.77 **	0.81 **
Investment and stock building	0.76 **	0.70 **	0.65 **	0.60	0.64	0.80 **
Stock building	0.59 *	0.55 **	0.57 **	0.56	0.56 *	0.56 **
Private consumption	0.96 **	0.53	0.93	0.88**	0.87 **	0.93 **
Government consumption	0.66	0.50	NA	0.41*	0.49 *	0.74
Unemployment rate	0.32 **	0.38	0.60	0.50	0.31 **	0.34
Real short-term interest rate	0.57 *	0.64	0.51	0.45	0.39	0.53
Real short-term interest rate	0.58 *	0.61 **	0.55	0.47	0.51	0.38
Long-term interest rate	0.50	0.43	0.40	0.43	0.38	0.52
Government net lending	0.76 **	0.59	0.60 **	0.63**	0.43	0.70 **
Real stock prices	0.67	0.57	0.63	0.62*	0.48	0.65 **
Real house prices	0.69	0.53	0.74	0.80**	0.76 **	0.70 **
Real oil prices	0.53	0.51	0.52	0.53	0.49	0.53

Note: The concordance index reported in this table takes the value of 1 if two cycles overlap perfectly and 0 if there is no overlap between the cycles. * and ** indicate statistical significance at the 10% and 5% levels.

Source: OECD calculations based on the OECD Economic Outlook 86 database and Datastream.

Table 2.4. **Concordance of GDP cycles across countries**

Level cycle

	Annual data, 1870-2009		Quarterly data, 1970:q1-2008:q4	
	Germany	United States	Germany	United States
Australia	0.85 **	0.74 **	0.70	0.79 **
Austria	0.86 **	0.79 **	0.82 **	0.88
Belgium	0.80 **	0.72 **	0.83 **	0.78
Canada	0.78 **	0.86 **	0.80 *	0.97 **
Denmark	0.75 **	0.74 **	0.76 **	0.74
Finland	0.81 **	0.67 **	0.78 **	0.79
France	0.81 **	0.72 **	0.87 **	0.91 **
Germany		0.76 **		0.84 **
Greece	0.76 **	0.58 **	0.65	0.63
Iceland	0.74 **	0.69 **	0.73	0.75
Ireland			0.81 **	0.91 **
Italy	0.77 **	0.73 **	0.82 **	0.81
Japan	0.77 **	0.78 **	0.70	0.79
Korea	0.77 **	0.78 **	0.72	0.82
Luxembourg			0.83 **	0.89 *
Mexico	0.81 **	0.71 **	0.72	0.83
Netherlands	0.81 **	0.71 **	0.86 **	0.90 *
New Zealand	0.66 **	0.67 **	0.71	0.81
Norway	0.80 **	0.76 **	0.81 **	0.86
Portugal	0.65 **	0.67 **	0.82 **	0.80
Spain	0.78 **	0.79 **	0.84 **	0.86
Sweden	0.71 **	0.72 **	0.77	0.83
Switzerland	0.75 *	0.68 **	0.84 **	0.85 **
Turkey	0.78 **	0.76 **	0.64 **	0.76
United Kingdom	0.79 **	0.86 **	0.82 **	0.90 **
United States	0.76 **		0.84 **	

Note: Data start in 1870 except for Korea (1912), Mexico (1895) and Turkey (1923). The concordance index reported in this table takes the value of 1 if two cycles overlap perfectly and 0 if there is no overlap between the cycles. * and ** indicate statistical significance at the 10% and 5% levels.

Source: Calculations based on data obtained from Barro and Ursua (2008), "Macroeconomic Crises since 1870", BPEA, Online Appendix and OECD Economic Outlook 86 database.

Table 2.5. **Factors contributing to the great moderation**

Multivariate regression coefficients

Regressors	1970-1989	1990-2009
<i>Volatility of:</i>		
Private consumption	0.435**	0.468**
Stock building	0.000	0.000
Investment	0.028*	0.029**
Unemployment	0.070**	0.007**
Working age population	-0.497	0.336**
Real stock prices	-0.016	0.012**
Real house prices	0.004	0.02**
Openness	0.039**	0.001
CPI inflation	0.006*	-0.004
Primary government balance	-0.022	-0.004
Level of		
Primary government balance	-0.096	-0.017

Note: Dependent variable = volatility of real GDP growth.

Volatility is calculated as the standard deviation for 20-quarter overlapping windows. Countries with dubious quarterly data are not taken into account. The sample covers Australia, Canada, Switzerland, Germany, France, United Kingdom, Italy, Japan, Norway, Sweden and the United States. The estimations are obtained using fixed effect OLS.

* and ** indicate statistical significance at the 10% and 5% levels.

Source: OECD calculations based on the OECD Economic Outlook 86 database.

Table 3.1. **Fiscal policy reaction functions**

Panel of OECD countries, 1970-2009

	Level equations			First difference equations		
Cycle is measured using the output gap						
Cycle	0.189 **	0.030	-0.050	0.087 **	0.162 **	0.060
Lagged government balances		0.830 **	0.715 **		-0.020	-0.060
Public debt		0.014 **	0.019 **		0.046 **	0.063 **
Real house price growth		-0.036 **	0.024 **		0.010	0.010
Real stock price growth		0.007 **	0.005 **		0.000	0.000
Openness			0.024 **			0.010
Population			0.040			-0.319 *
Public sector size			-0.156 **			-0.367 **
Debt service			-0.001 *			-0.002 **
GDP volatility			-0.314 **			-0.276 **
Inflation			0.074 **			0.112 **
Cycle is measured using real GDP growth						
Cycle	0.280 **	0.092 **	0.050	0.065 **	0.065 **	0.103 **
Lagged government balances		0.829 **	0.717 **		-0.010	-0.070
Public debt		0.014 **	0.019 **		-0.040 **	0.058 **
Real house price growth		0.027 **	0.010		0.010	0.000
Real stock price growth		0.007 **	0.006 **		0.000	0.000
Openness			0.022 **			0.000
Population			0.030			-0.330 *
Public sector size			-0.129 **			-0.489 **
Debt service			-0.001 **			-0.002 **
GDP volatility			-0.264 **			-0.240 **
Inflation			0.070 **			0.129 **

Note: Dependent variable = cyclically-adjusted general government balances as a percentage of potential output.

* and ** denote statistical significance at the 10% and 5% levels. The coefficient estimates are obtained using fixed effect OLS. The results are largely unchanged to the use of alternative estimators such as the Kiviet estimator or the first-difference and system GMM estimators were used to check sensitivity. The panel covers all OECD countries. The time series dimension is determined by the availability of the house price variable that differs across countries.

Source: OECD calculations based on the OECD Economic Outlook 86 database.

Table 3.2. **Non-linearities in fiscal policy reaction functions**

Coefficients for cycle sensitivity for 3-regime non-linear specification, panel of OECD countries, 1970-2009

Threshold variable = government net lending	Weak balance	Middle balance	Strong balance
Dependent variable			
Net lending	0.135 *	0.384 **	0.633 **
Cyclically-adjusted net lending	-0.220 **	0.155 **	0.367 **
Primary balance	0.029	0.317 **	0.576 **
Cyclically-adjusted primary balance	-0.269 **	0.024	0.307 **
Threshold variable = government debt	Low debt	Middle debt	High debt
Net lending	0.322 **	0.122 *	0.359 **
Cyclically-adjusted net lending	-0.011	0.157 **	0.028
Primary balance	0.380 **	0.134 **	0.322 **
Cyclically-adjusted primary balance	0.104 *	-0.08	0.045
Threshold variable = government size	Low size	Middle size	High size
Net lending	0.259 **	0.388 **	0.588 **
Cyclically-adjusted net lending	0.123	0.014	0.188 *
Primary balance	0.228 **	0.375 **	0.604 **
Cyclically-adjusted primary balance	0.075	-0.039	0.097 **

Notes: * and ** denote statistical significance at the 10% and 5% levels. The cycle is measured by real GDP growth rates. The estimations include all covariates shown in Table 3.1. A negative (positive) coefficient indicates a pro-cyclical (counter-cyclical) fiscal response.

Source: OECD calculations based on the OECD Economic Outlook 86 database.

Table 3.3. Main fiscal rules currently applied in OECD countries

Country	Date and name	Characteristics of the set of rules			
		Budget target	Expenditure target	Rule to deal with revenue windfalls	Golden rule
Australia	Charter of Budget Honesty (1998)	yes	no	no	no
Austria	Stability and Growth Pact (1997) Domestic Stability Pact (2000)	yes	yes	no	no
Belgium	Stability and Growth Pact (1997) National budget rule (2000)	yes	no	yes	no
Czech Republic	Stability and Growth Pact (2004) Law on budgetary rules (2004)	yes	yes	no	no
Denmark	Medium-term fiscal strategy (1998)	yes	yes	no	no
Finland	Stability and Growth Pact (1997) Multiyear spending limits (since 1991)	yes	yes	no	no
France	Stability and Growth Pact (1997) Central government expenditure ceiling (1998)	yes	yes	Since 2006	no
Germany	Stability and Growth Pact (1997) Domestic Stability Pact (2002)	yes	no	no	no
Greece	Stability and Growth Pact (1997)	yes	no	no	no
Hungary	Stability and Growth Pact (2004) Fiscal Responsibility law (2008)	yes	yes	no	no
Ireland	Stability and Growth Pact (1997)	yes	no	no	no
Italy	Stability and Growth Pact (1997) Domestic Stability Pact (since 1999)	yes	no	no	no
Luxembourg	Stability and Growth Pact (1997) Coalition agreement on expenditure ceiling (since 1999)	yes	no	no	no
Mexico	Budget and fiscal responsibility law (2006)	yes	no	yes	no
Netherlands	Stability and Growth Pact (1997) Coalition agreement on multiyear expenditure targets (since 1994)	yes	yes	yes	no
New Zealand	Fiscal responsibility act (1994)	yes	yes	no	no
Norway	Fiscal Stability guidelines (2001)	yes	no	yes	no
Poland	Stability and Growth Pact (2004) Act on Public Finance (1999)	yes	no	no	no
Portugal	Stability and Growth Pact (1997)	yes	no	no	no
Slovak Republic	Stability and Growth Pact (2004)	yes	no	no	no
Spain	Stability and Growth Pact (1997) Fiscal Stability Law (since 2001)	yes	no	no	no
Sweden	Fiscal budget act (since 1996)	yes	yes	no	no
Switzerland	Debt containment rule (2001, but in force since 2003)	yes	yes	yes	no
United Kingdom	Code for fiscal stability (1998)	yes	no	no	yes
United States	PAYGO rules (2010)	yes	no	no	no

Source: Based on Guichard *et al.* (2007).

Table 3.4. Saving offsets
Unbalanced panel, quarterly data: 1970q1-2008q4

Dependent variable: Private savings (as % of GDP)				
	16 OECD (1 348 obs.)	6 large (728 obs.)	16 OECD (1 371 obs.)	6 large (734 obs.)
Long run coefficients				
Cyclically-adjusted net lending	-0.413 ***	-0.386 ***		
Cyclically-adjusted government spending			0.473 **	0.373 *
Cyclically-adjusted government revenue			-1.195 ***	-0.861 ***
Government investment			-0.157	-0.484
Old age (ratio of above 65 year olds in population 15-64)	0.192	0.503	-0.083	-0.267
House price index	3.595	-2.420 **	1.959	-1.510
Stock price index	-0.549	-1.763 **	0.442	-0.102
Money supply (M2 or M3 as % of GDP)	0.024	-0.067	0.048	-0.076
CPI inflation	-0.421 **	-0.187	-0.252	0.090
Real short-term interest rate	-0.059	-0.011	0.010	0.089
Short run coefficients				
Error-correction	-0.444 ***	-0.400 ***	-0.469 ***	-0.400 ***
Private savings (lagged)	-0.028	-0.129 **	-0.073 *	-0.144 ***
Cyclically-adjusted net lending	-0.377 ***	-0.421 ***		
Cyclically-adjusted government spending			0.333 *	0.237 *
Cyclically-adjusted government revenue			-1.091 ***	-0.910 ***
Government investment			0.165	0.030
House price index	-0.268	-5.455		
Growth in terms of trade	0.020	0.026 **	0.006	0.020 **
GDP per capita growth	0.100 **	0.060 *	0.052	0.061

Note: 6 large refers to the United States, Japan, Germany, France, Italy and the United Kingdom. Quarterly data for Canada are not available. The estimates reflect the average effect across countries obtained from the mean group estimator. Other estimators explicitly accounting for reverse causality (difference and system GMM) have also been applied and similar results were obtained.

***, ** and * refer to significance at the 1%, 5% and 10% level respectively.

Source: OECD calculations based on the OECD Economic Outlook 86 database.

Table 3.5. **Non-linearities in saving offsets**
 Unbalanced panel, 18 EU countries, annual data: 1970-2008

Dependent variable: Private savings (as % of GDP)		
	Coefficient on cyclically-adjusted net lending (% of potential GDP)	
Threshold variable: Public debt (% of GDP)	Low (< 76%)	High (> 76%)
Long run offset	-0.526	-1.091
Short run offset	-0.401	-0.513
Threshold variable: Private credit (% of GDP)	Low (< 62%)	High (> 62%)
Long run offset	-0.771	-1.177
Short run offset	-0.474	-0.443
Threshold variable: Distortionary taxation (ratio direct to indirect tax revenue)	Low distortion (< 104%)	High distortion (> 104%)
Long run offset	-0.578	-0.890
Short run offset	-0.275	-0.553

Note: Low (high) regime refers to the regime below (above) a certain threshold value of the threshold variable. The value of the threshold variable is selected as to minimize the sum of squared residuals of the estimated two-regime model. Following Hansen (1999) the equality of the coefficients across regimes can be tested using a likelihood ratio test and the distribution of the test statistic is derived via bootstrapping. In each case, the test statistic indicated the existence of two distinct regimes. The following control variables were included in all regression but are not reported: Old age (ratio of above 65 year olds to the population aged 15-64), house price index, stock price index, money supply, CPI inflation, real short term interest rate, growth in terms of trade and GDP per capita growth.

Source: OECD calculations based on the OECD Economic Outlook 86 database.

Table 4.1. **Monetary policy reaction functions**

1985-2009

	Constant	Interest rate (lagged)	Output gap (3 leads)	Inflation (3 leads)	Other	Adjusted R ²	Observations
AUS	0.16*	-0.13**	0.09	0.23***		0.36	114
CAN	-0.09	-0.27***	0.05	-0.05	Usa IRS	0.47	114
CZE	0.61	-0.59***	-0.23	1.10***		0.61	55
DNK	-0.50	-0.41***	0.08	0.37**	Deu IRS	0.25	115
HUN	0.62	-0.37***	0.23	0.45***		0.45	56
ISL	1.77**	-0.31**	0.28**	0.28**		0.75	75
KOR	-4.17***	-0.51***	0.14	1.53***	Usa IRS	0.71	62
MEX	6.29*	-3.08**	-0.05	3.13***	Usa IRS	0.78	93
NZL	0.57**	-0.19***	0.41***	0.2***		0.56	115
SWE	2.49	-0.38***	-0.10	0.76***	trend	0.81	72
CHE	0.25*	-0.25***	-0.01	0.32***		0.36	115
GBR	0.18**	-0.14***	0.11	0.21**		0.18	114
USA	-0.03	-0.17***	0.18**	0.35**		0.56	115

Note: Inflation is the OECD measure of core inflation, except for Australia, the Czech Republic and the United Kingdom, where it is the CPI. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

The table contains the long-run coefficients from equations, for which the F test indicates that there is a long-run relationship. The estimated equation is an ARDL model with the following specification:

$$\Delta i_t = c + \alpha_i i_{t-1} + \beta \pi_{t+3} + \gamma y_{t+3} + \sum_{i=1}^{p-1} \varphi' \Delta z_{t-i} + \delta' \Delta x_{t-1} + u_t$$

where, i_t is the short-run interest rate, π_t is the inflation rate at time t , and y_t is the output gap, z_t is composed of i_t , π_t , and y_t while x_t contains the terms π_t and y_t .

Source: OECD calculations based on the OECD Economic Outlook 86 database.

Table 5.1. Panel estimation results for bank capital

Panel A – Country-level data (Bank profitability database)				
	Loan growth	GDP growth	House price growth	Share price growth
Dependent variable	Level equation			
Tier 1 ratio	-0.043 **	-0.229 *	0.007	-0.004
Tier 2 ratio	-0.002	0.015	-0.001	-0.002
Leverage ratio (total capital/total assets)	-0.019 **	-0.011	-0.009	-0.004
Leverage ratio (SNA) (total assets/total capital)	0.030	-0.314 **	-0.035	-0.035 **
	First difference equation			
Tier 1 ratio	-0.023	-0.099	-0.003	0.002
Tier 2 ratio	0.000	0.040 **	0.005	-0.002 *
Leverage ratio (total capital/total assets)	-0.014 **	-0.028	0.001	-0.004
Leverage ratio (SNA) (total assets/total capital)	-0.029	-0.343 **	-0.019	-0.028 **
Panel B - Bank-level data (Bankscope database)				
Independent variable	Loan growth	Loan growth	Loan growth	Loan growth
Dependent variable	Capital 1	Capital 2	Capital 3	Capital 4
Level equation	-0.002 *	-0.003 **	-0.009 **	-0.003
First difference equation	-0.004	-0.004 **	-0.004	-0.005 **
Panel C Country-specific results				
Independent variable	Loan growth	Loan growth	Loan growth	Loan growth
Dependent variable	Capital 1	Capital 2	Capital 3	Capital 4
Pro-cyclical (-)	BEL CAN CZE DEU DNK ESP FIN PRT SVK SWE	DEU DNK FRA HUN MEX NOR POL PRT SVK	CH CZE DEU DNK FRA HUN MEX NOR POL PRT SVK SWE	DEU DNK KOR SWE USA
Counter-cyclical (+)	CHE FRA ISL	--	NZL	NZL

Notes: * and ** denote statistical significance at the 10% and %5 levels. The results are obtained using a dynamic specification where the dependent variable is regressed on its lagged value and the measure of the cycle (real loan growth, GDP growth, real share and real house price growth). In Panel C, these results are obtained by interacting the cycle variable with country dummies. Country names are not shown if the coefficient estimates are not significant. Capital 1, 2, 3 and 4 are defined as follows. Capital 1 = tier1 capital over risk weighted assets, capital 2 = common shares over total assets, capital 3 = total equity over total assets, capital 4 = the sum of total capital and subordinated debt over total assets.

Source: OECD calculations based on the OECD Economic Outlook 86 database, OECD Bank Profitability Database and Bankscope.

Table 5.2. Panel estimation results for other bank ratios

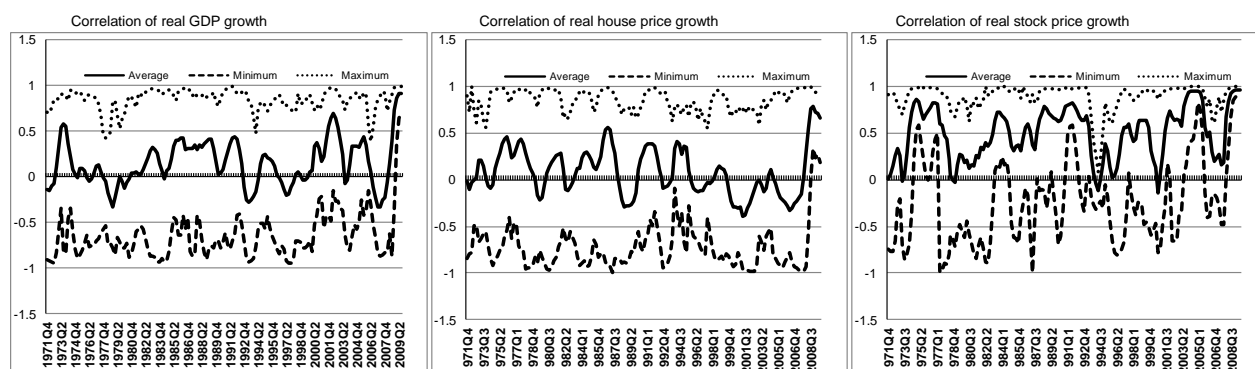
Panel A - Country-level data (Bank profitability database)				
	Loan growth	GDP growth	House price growth	Share price growth
Levels				
Provisions	-0.011 **	-0.113 **	-0.011	-0.004
Funding gap	-0.559 **	-1.562 **	-0.239 **	-0.028
Roa 1	0.010 **	0.091 **	0.011 **	0.004 *
Roe 1	0.224 **	1.633 **	0.189 *	0.081 **
First differences				
Provisions	-0.008	-0.093 **	-0.004	0.001
Funding gap	-0.369 **	-0.880 **	-0.110	-0.013
Roa 1	0.009 *	0.088 **	0.012 *	0.000
Roe 1	0.236 *	1.849 **	0.172	0.041
Panel B - Bank-level data (Bankscope database)				
	Level equation	First difference equation		
Provisions	-0.005 **	-0.010 **		
Loan loss reserves	-0.006 **	-0.005 **		
Return on assets	0.001	-0.001		
Return on equity	0.016 **	0.003		
Liquidity 1	-0.088 **	-0.048 **		
Liquidity 2	-0.050 **	-0.022 **		
Funding gap	-0.376 **	-0.137 **		
Bank equity growth	0.356 **	0.295 **		
Panel C – Country-specific results				
	Pro-cyclicality (-)	Counter-cyclicality (+)		
Provisions	AUT, BEL, CZE, ESP, FIN, ITA, PRT, SVK, SWE	--		
Loan loss reserves	AUT, CAN, CHE, CZE, DEU, ISL, JPN, POL, SWE, US	--		
Liquidity 2	AUS, AUT, BEL, CAN, DNK, FIN, GBR, HUN, LUX, MEX, NLD, NZL, POL, PRT, SVK, SWE	--		
Return on equity	ESP, FIN, FRA, GBR, POL, SVK	NOR, NZL, US, TUR		
Bank equity growth	AUS, AUT, CHE, CZE, DEU, DNK, ESP, GRC, ISL, ITA, JPN, KOR, LUX, NLD, NZL, POL, SWE, US	TUR		

Notes: * and ** denote statistical significance at the 10% and 5% levels. The results are obtained using a dynamic specification where the dependent variable is regressed on its lagged value and measures of the cycle (real loan growth, real GDP growth, real share price and house price growth). The return on equity (Roe) and return on assets (Roa) are based on profits before tax. Liquidity 1 = liquid assets/(deposits+short-term funding), liquidity 2 = liquid assets/(all funding), the funding gap is the ratio of deposits over loans. Country names are not shown if the coefficient estimates are not significant. These results are obtained by interacting the cycle variable with country dummies.

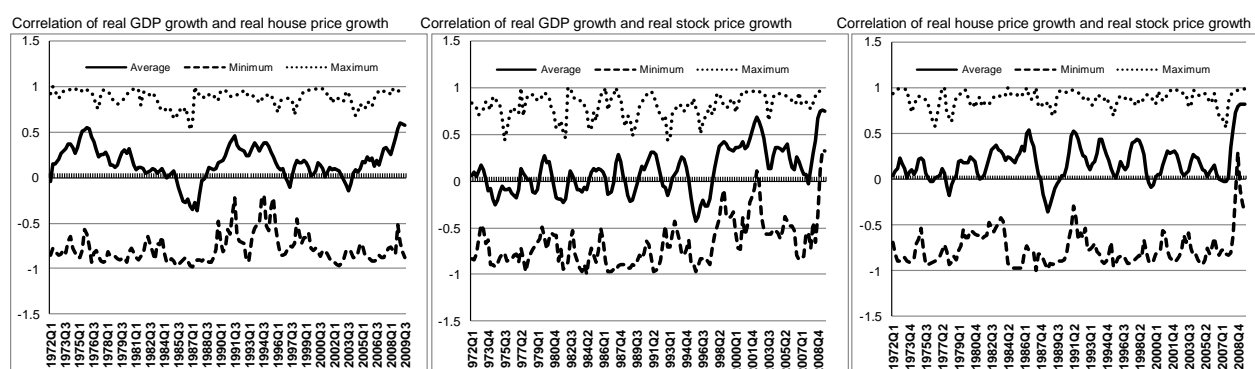
Source: OECD calculations based on the OECD Economic Outlook 86 database, OECD Bank Profitability Database and Bankscope.

Figure 2.1. 10-quarter rolling-window correlations of macroeconomic variables

Panel A - 10-quarter rolling-window correlations against the United States



Panel B - 10-quarter rolling-window correlations of macroeconomic variable pairs within a country

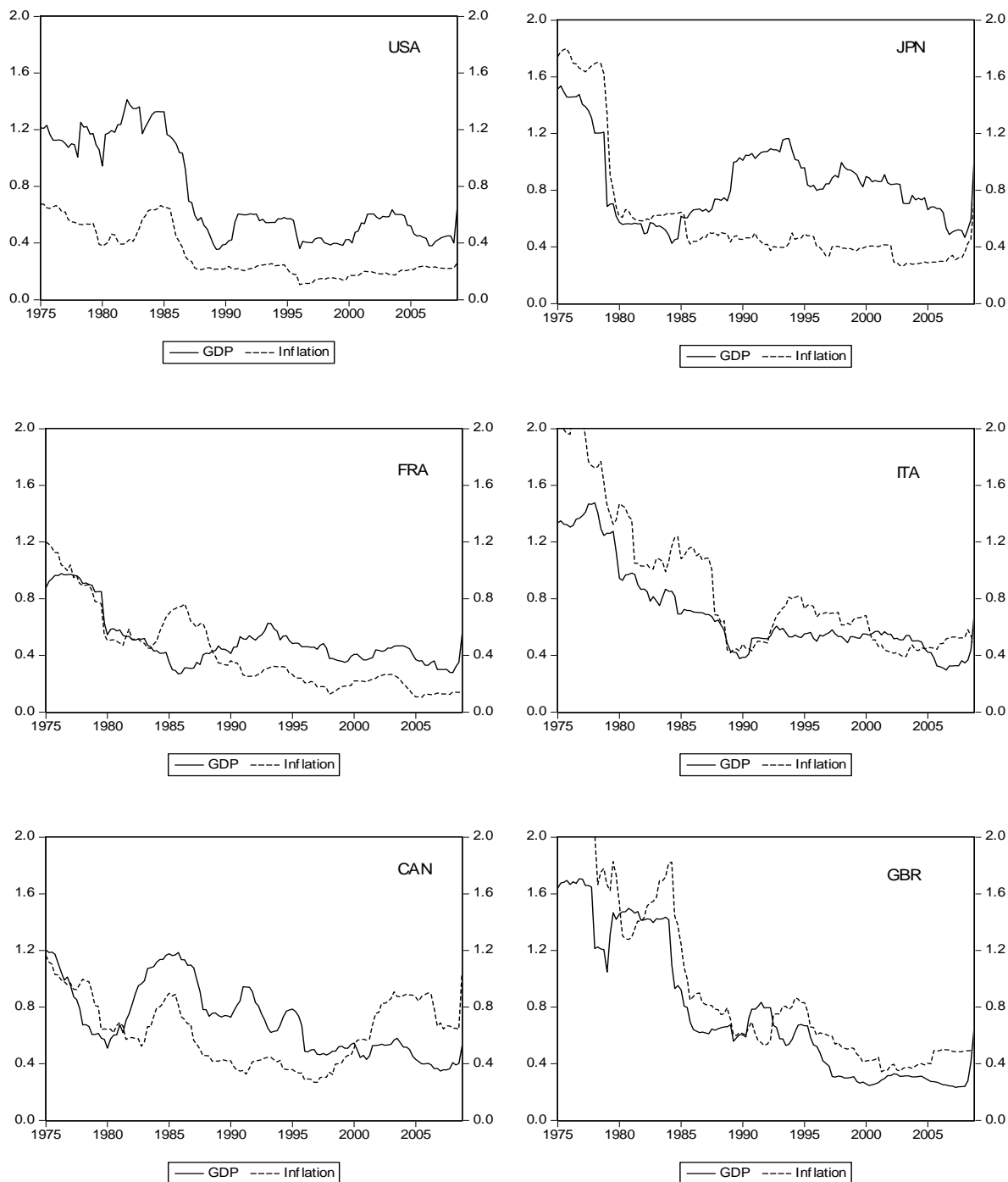


Note: Average/minimum/maximum is the unweighted average/lowest/highest correlation of individual OECD countries' variables against the corresponding US variable (Panel A) or of the variable pairs for each OECD country (Panel B).

Source: OECD calculations based on the OECD Economic Outlook 86 database and Datastream.

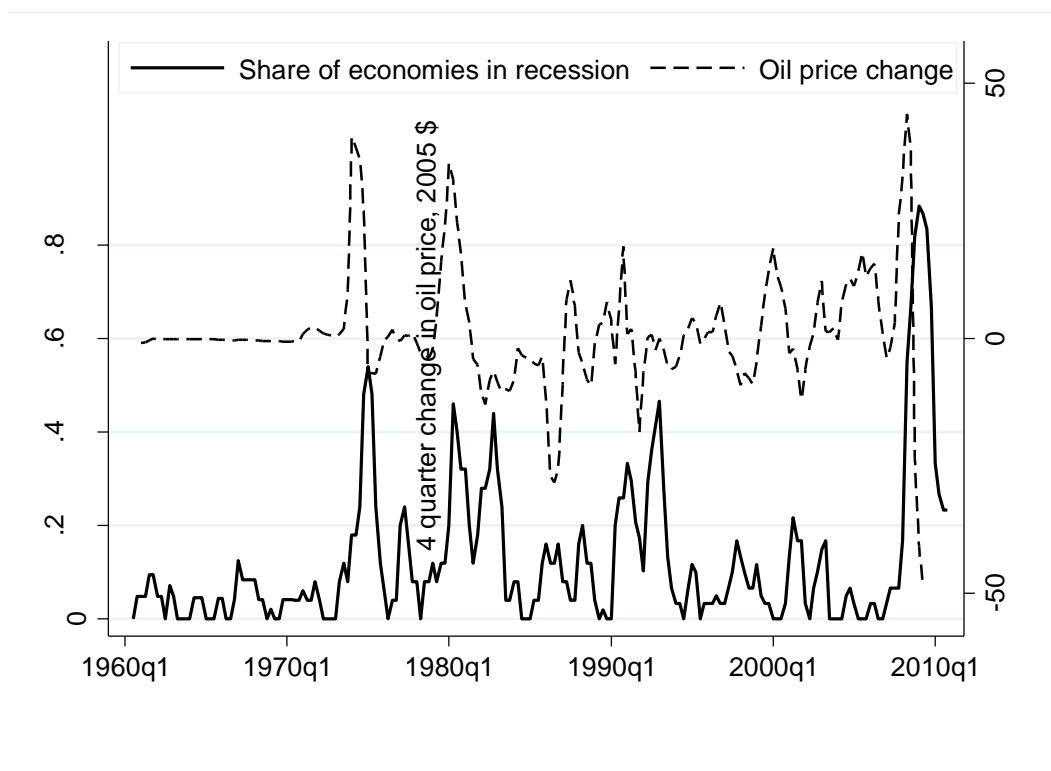
Figure 2.2. **The great moderation**

20 quarter rolling standard deviations of quarterly real GDP growth
and quarterly inflation rate, as measured by the GDP deflator



Source: OECD Economic Outlook 86 database.

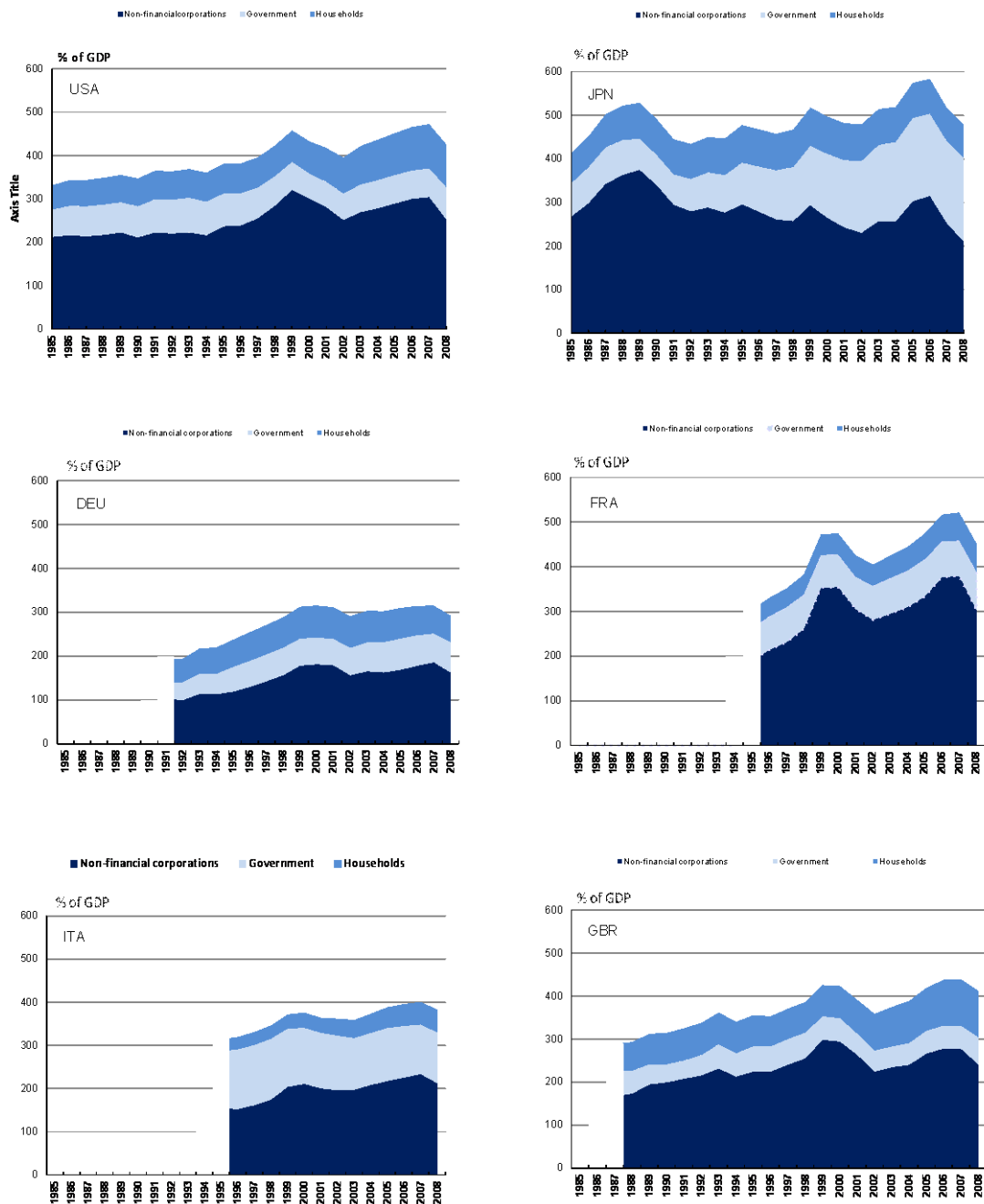
Figure 2.3. Oil price volatility and the synchronisation of recessions



Source: OECD Economic Outlook 86 database.

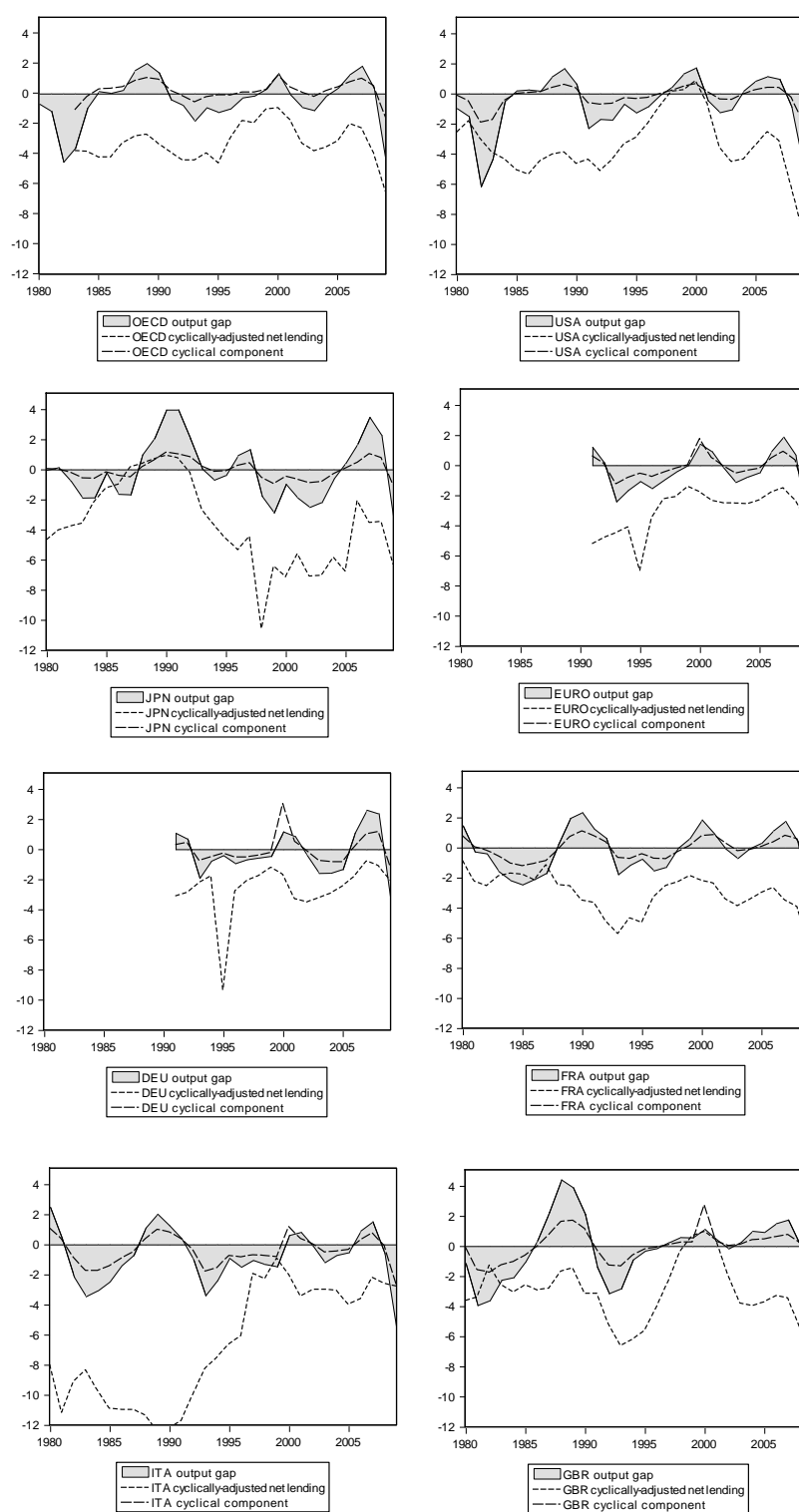
Figure 2.4. Household, government and non-financial corporation liabilities

Per cent of GDP



Source: OECD Annual National Accounts.

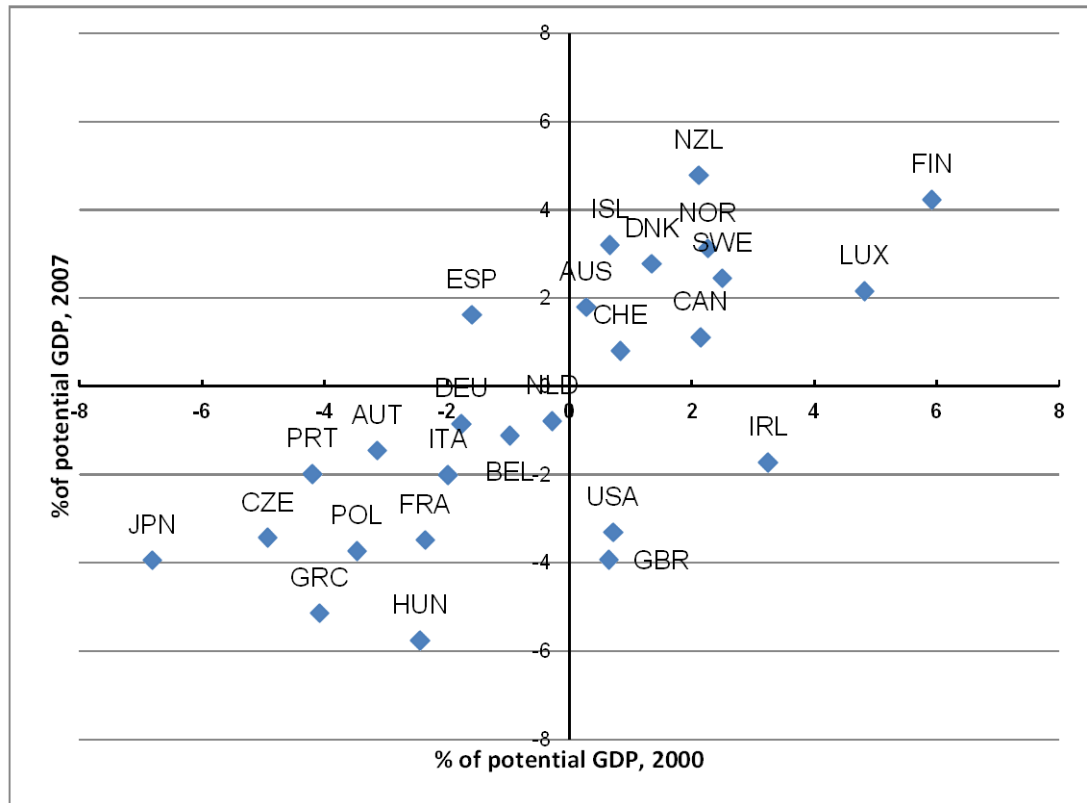
Figure 3.1. Fiscal stance over the cycle



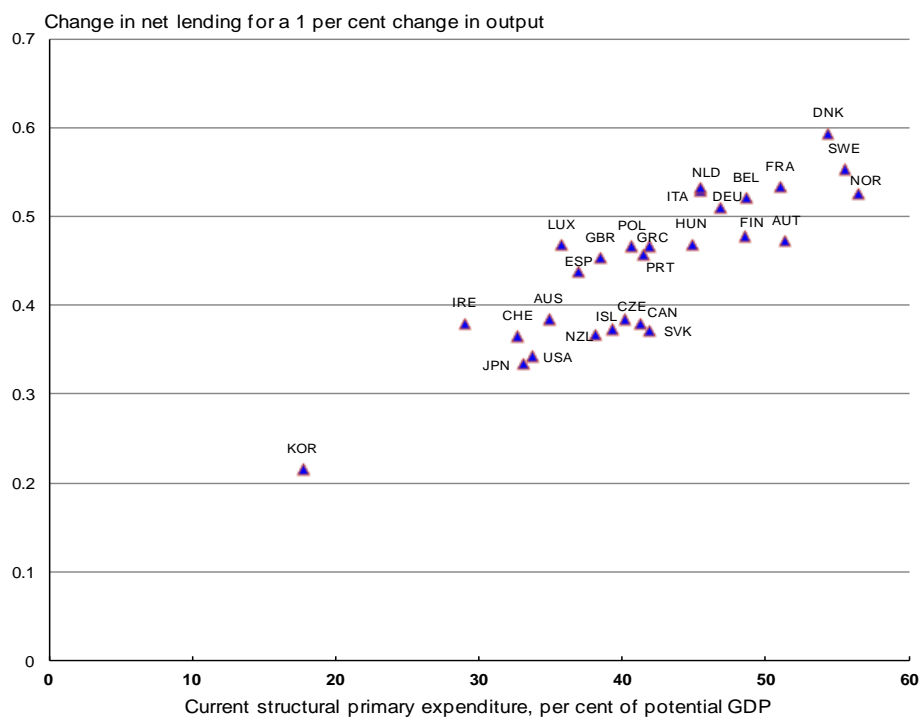
Source: OECD Economic Outlook 86 database.

Figure 3.2. **Fiscal positions on the eve of downturns**

Cyclically-adjusted net lending

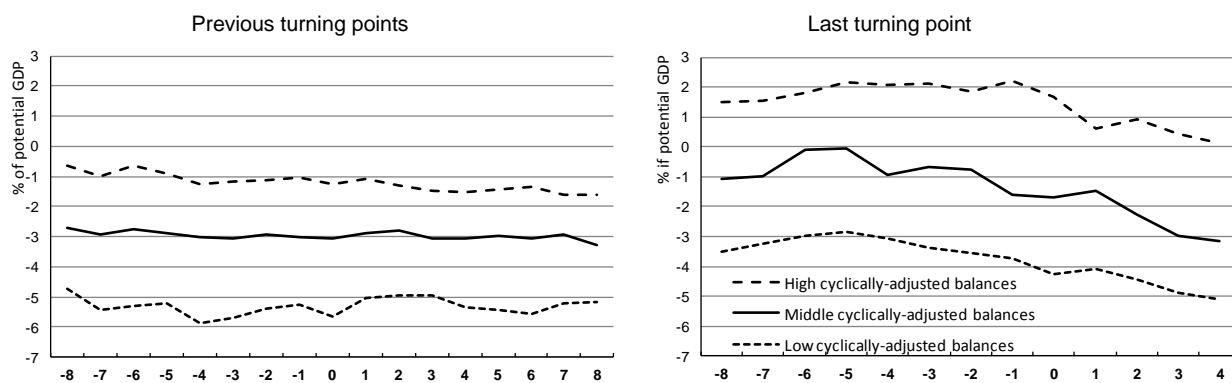


Source: OECD Economic Outlook 86 database.

Figure 3.3. **Government size and cyclical sensitivity**

Source: Girouard and André (2005).

Figure 3.4. Changes in cyclically-adjusted balances around turning points

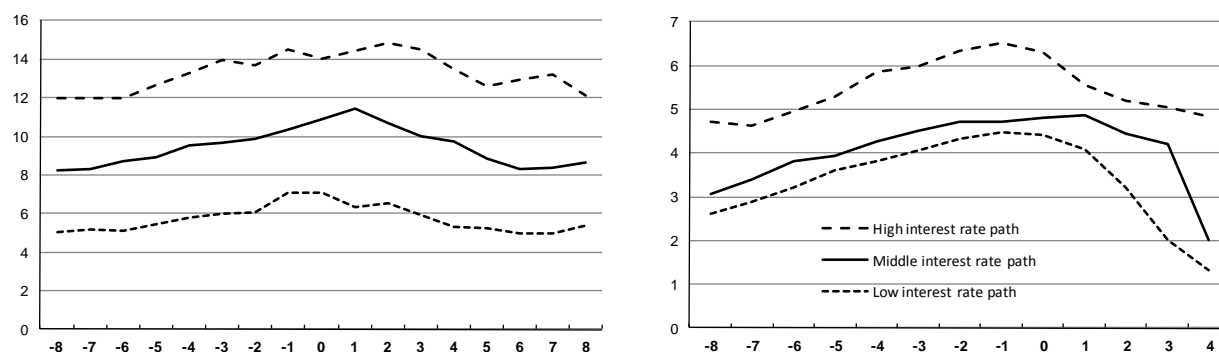


Note: The evolution of cyclically-adjusted balances just prior to and after when the economy enters a (technical) recession is displayed in the two panels. The middle, high and low cyclically-adjusted balance are the median, upper quintile and lower quintile of the observations for all OECD countries.

Source: OECD Economic Outlook 86 database.

Figure 4.1. **Short-term interest rates around turning points**

Note: Scales vary



Note: The evolution of short-term interest rates just prior to and after when the economy enters a (technical) recession are displayed in the two panels. The middle, high and low interest rate paths are the median, upper quintile and lower quintile of the observations for all OECD countries. During the last downturn the relationship between the short-term interest rates and policy rates weakened, with policy rates falling more quickly than the short-term interest rates.

Source: OECD Economic Outlook 86 database.

Figure 4.2. Taylor rules and actual short-term interest rates

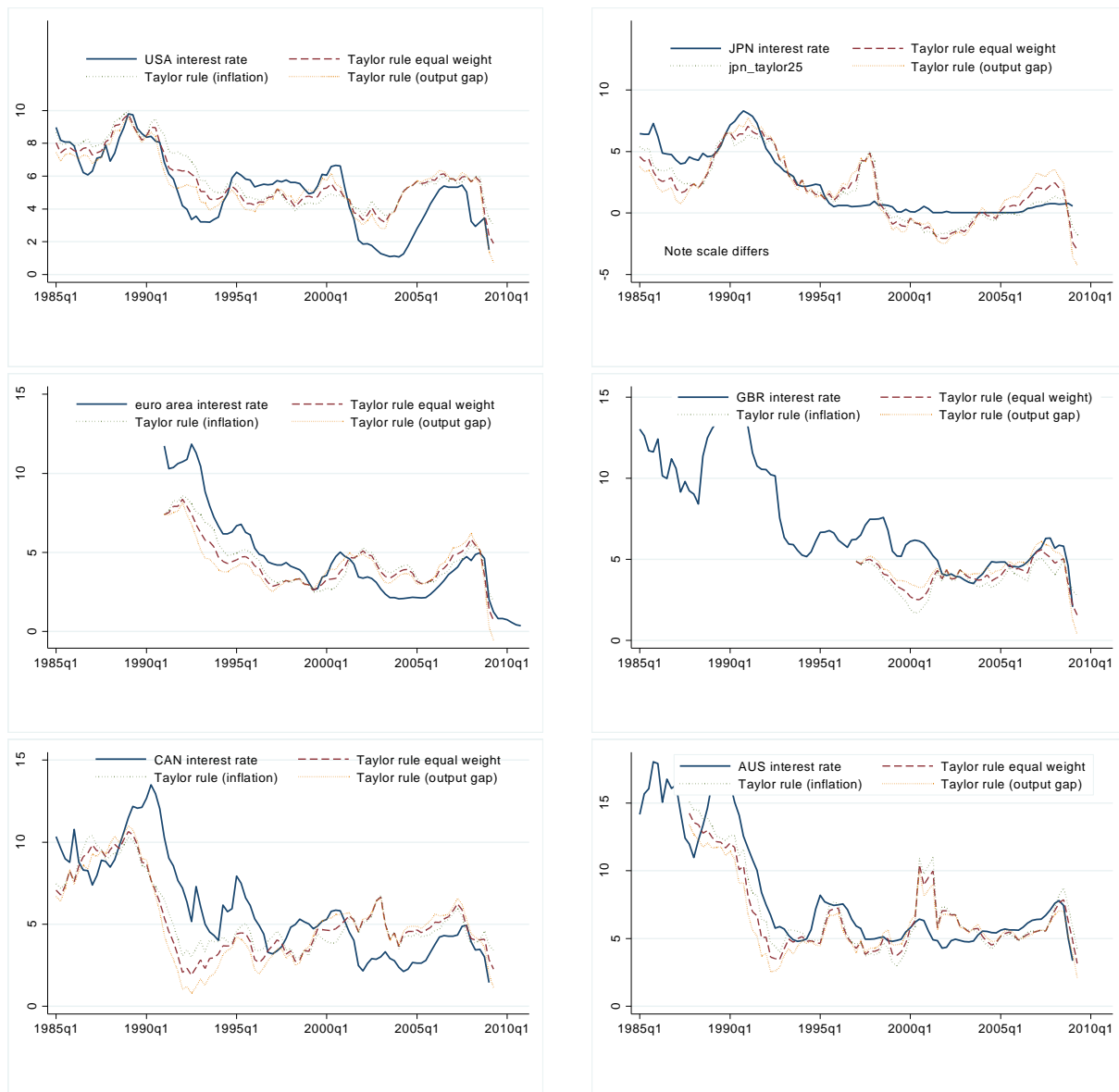


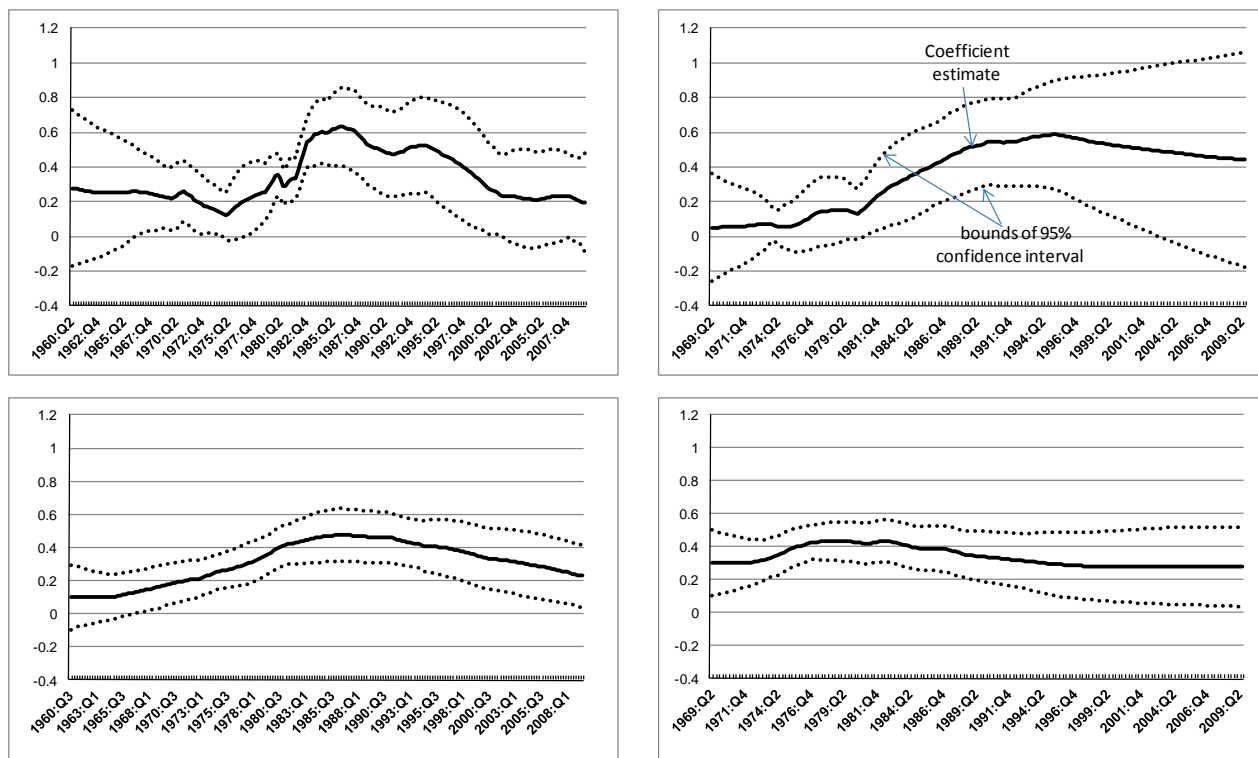
Figure 4.2. (continued)



Note: Taylor rules with equal weights for inflation and the output gap; Taylor rule (inflation) is with a higher relative weight for inflation; Taylor rule (output gap) gives a higher relative weight to the output gap.

Source: OECD Economic Outlook 86 database.

Figure 4.3. **Response of long to short-term interest rates**
Coefficient estimates and the bounds of 95% confidence interval



Note: The coefficients for the response of the long to the short rates are taken from time-varying estimates. These are updated estimates based on Courmede *et al.* (2008).

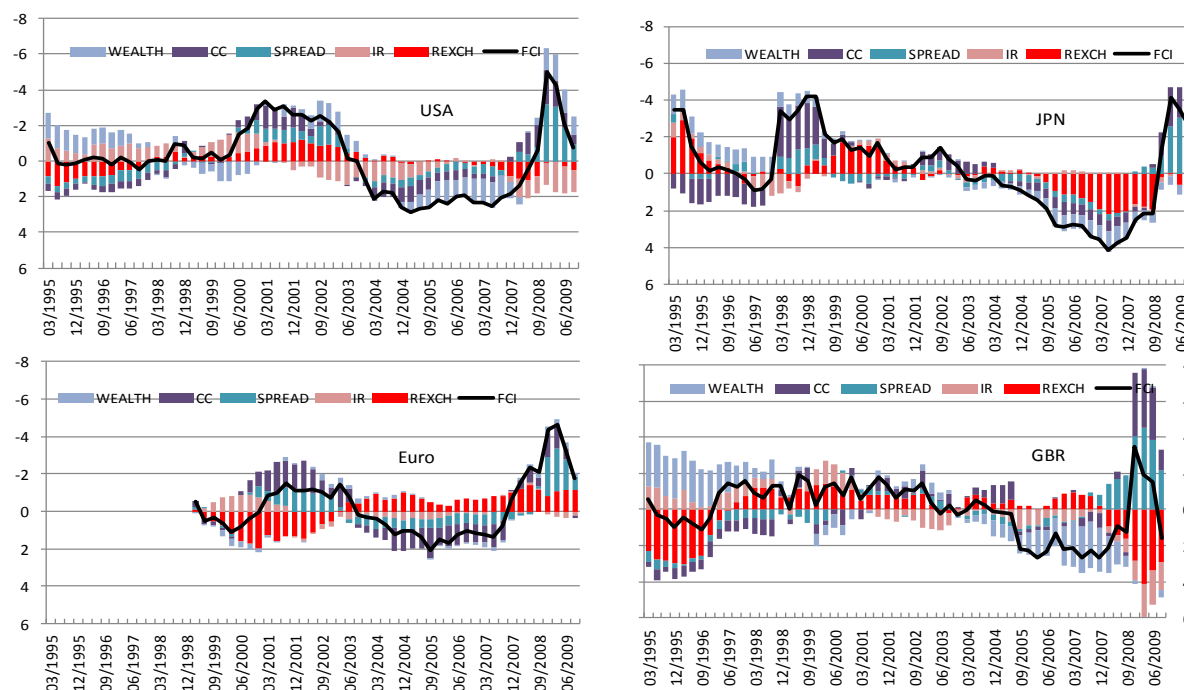
Source: OECD Economic Outlook 86 database.

Figure 4.4. Short-term interest rates and financial conditions

Panel A. Short-term interest rates and financial conditions index (inverted)



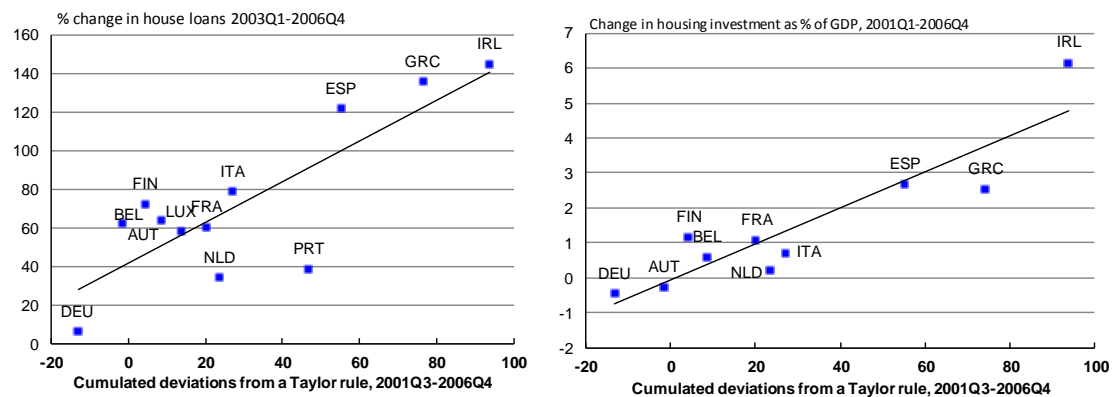
Panel B. Decomposition of the financial conditions index



Note: Wealth stands for the financial wealth of households, CC – credit conditions, spreads – corporate bond spreads over similar dated government bonds, IR - the real long-term interest rate, REXCH – the real exchange rate and FCI – the overall financial conditions index.

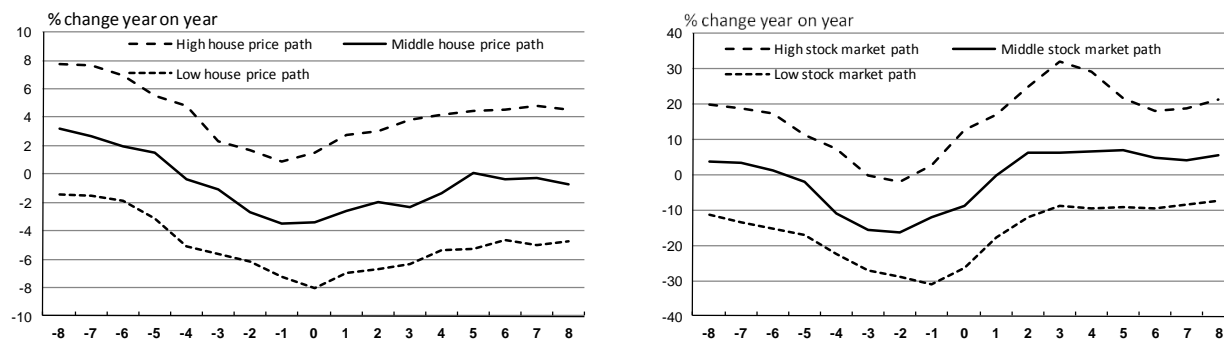
Source: Guichard *et al.* (2009).

Figure 4.5. Deviations from the Taylor rule and housing activity



Source: Ahrend *et al.* (2008).

Figure 4.6. Asset prices around turning points



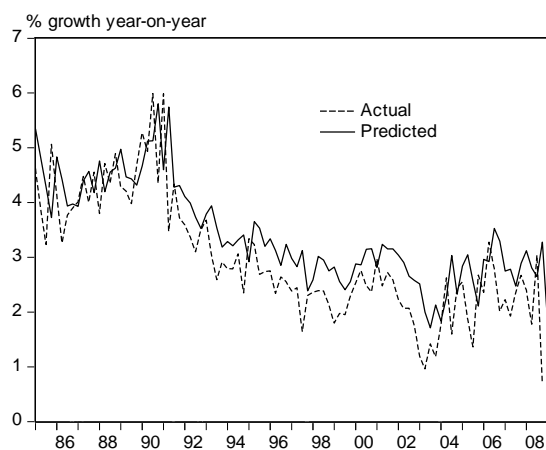
Note: The evolution of real house prices and real stock market indices just prior to and after when the economy enters a (technical) recession are displayed in the two panels. The middle, high and low paths are the median, upper quintile and lower quintile of the observations for all OECD countries.

Source: OECD Economic Outlook 86 database.

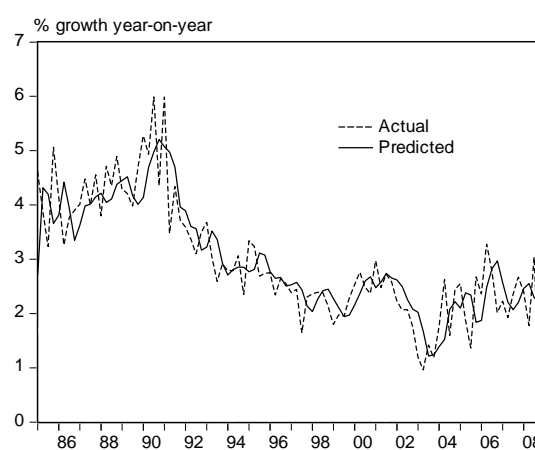
Figure 4.7. Core inflation and core inflation adjusted for house price movements

United States

Calibrated on the period 1965-1985



Calibrated on the period 1985-2005

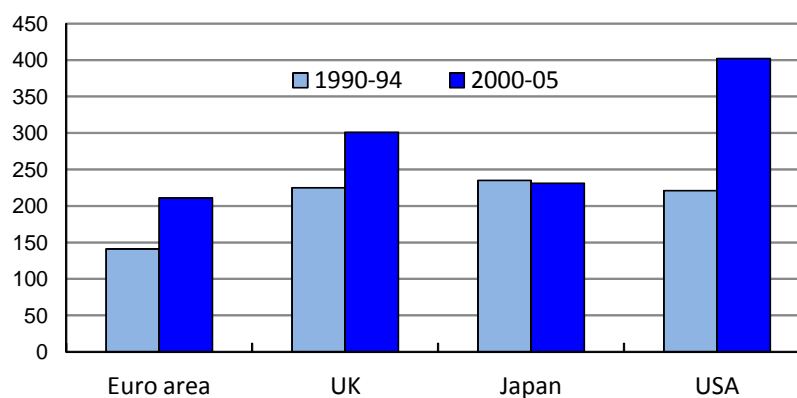


Note: The core inflation adjustment for house price movements is based on the estimates from a Kalman filter (the one step ahead predicted signal).

Source: OECD Economic Outlook 86 database.

Figure 5.1. Size of capital markets

% of GDP

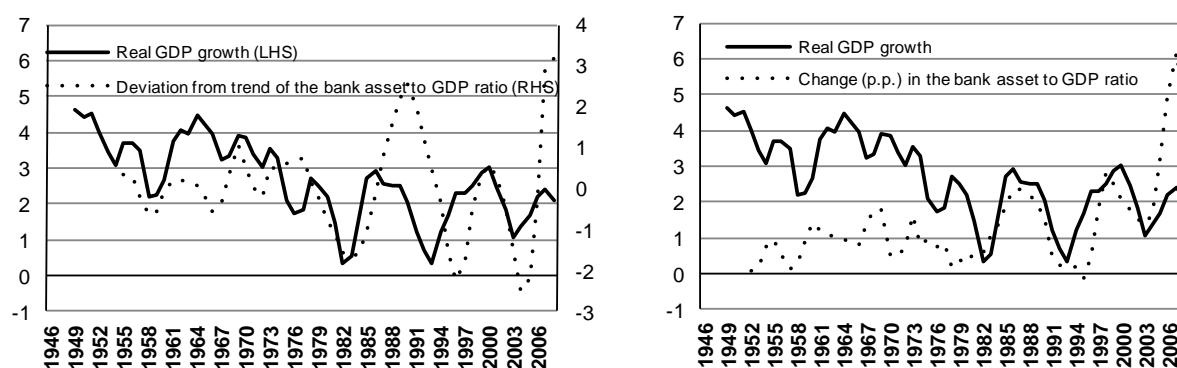


Note: The figures are calculated as the sum of stock market capitalisation, private sector credit and private domestic debt securities issuance as a percentage of GDP.

Source: Hartmann *et al.* (2007).

Figure 5.2. Cycles in the real economy and the financial sector of OECD countries

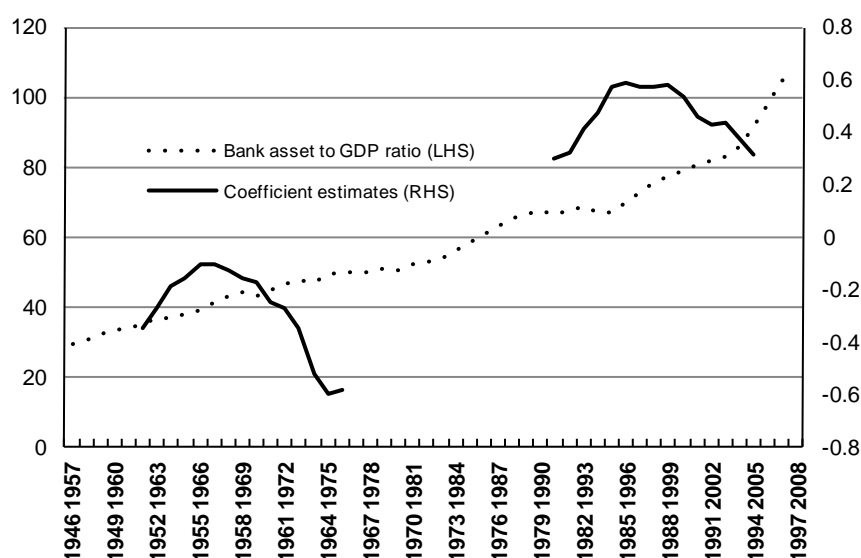
Unweighted average of OECD countries



Notes: OECD staff calculations based on data provided by Alan M. Taylor (Schularick and Taylor, 2009). The series plotted are arithmetic averages of individual series of the following countries: Australia, Canada, Switzerland, Germany, Denmark, Spain, France, UK, Italy, Netherlands, Norway, Sweden, US. GDP growth is the rate of growth of real GDP, deviation from trend of the bank asset/GDP ratio is the deviation of the bank asset/GDP ratio from its trend (trend is computed using the HP filter). The series are 3-year moving averages. Banking assets are defined as total domestic currency assets of banks and banking institutions.

Source: Schularick and Taylor (2009) and OECD Economic Outlook 86 database.

Figure 5.3. Pro-cyclicality of the banking sector: rolling window estimations

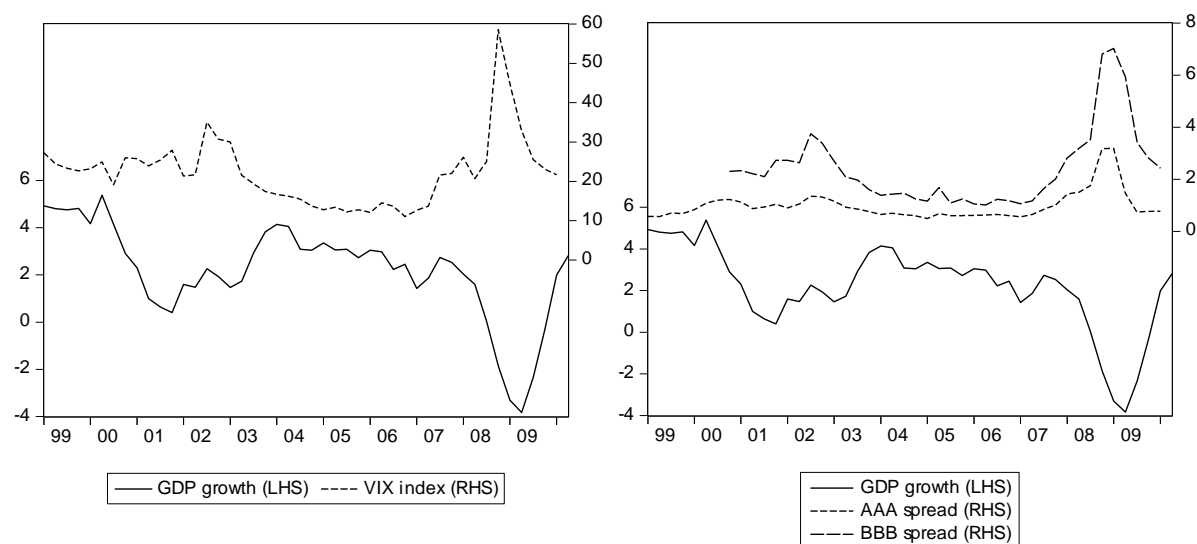


Note: Coefficient estimates are displayed only if they are statistically significant. The estimations are performed using difference GMM. The percentage point change in the bank asset/GDP ratio is the dependent variable and GDP growth and lagged changes in percentage points of the bank asset to GDP ratio are the independent variables. The data points for bank asset-to-GDP ratio refer to the end of the period. The bank asset-to-GDP ratio is calculated as the unweighted average of the ratio of 13 OECD countries.

Source: Schularick and Taylor (2009) and OECD Economic Outlook 86 database.

Figure 5.4. The pro-cyclical nature of stock market volatility and corporate bond spreads

United States, 1999-2010

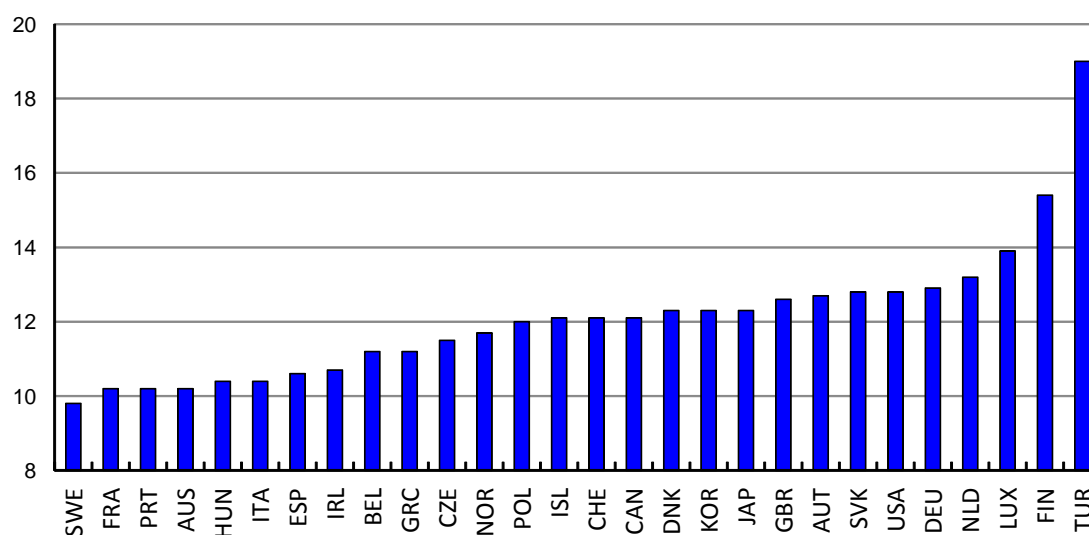


Notes: The spread is for yields of corporate AAA or BBB 5-7 or 7-10 year bonds over the government bond yield. The VIX index is a market-based measure of stock-market volatility.

Source: OECD Economic Outlook 86 database, Chicago Board Options Exchange and Datastream.

Figure 5.5. Capital buffers in OECD countries

Capital adequacy ratio, 2007

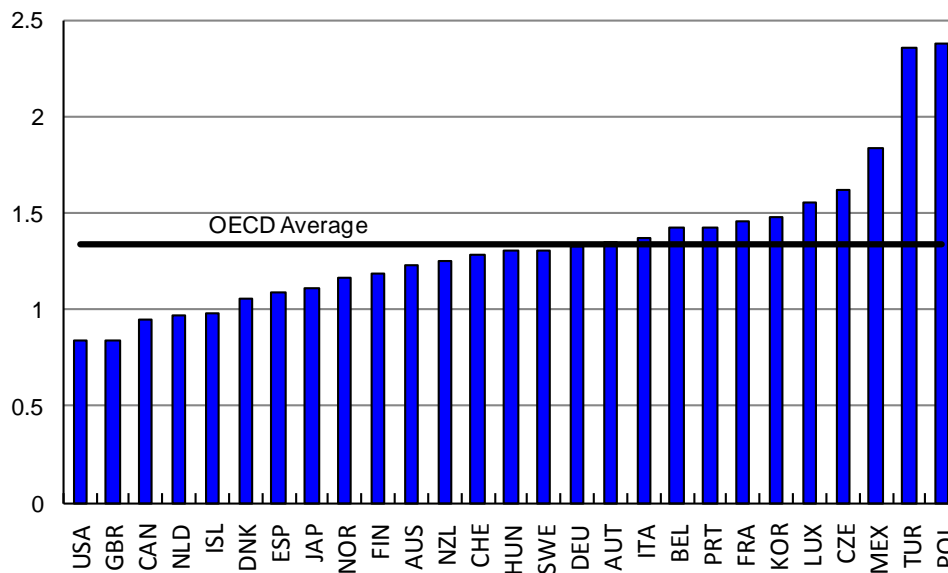


Notes: The figures are not fully comparable because of differences in national regulation.

Source: IMF.

Figure 6.1. Aggregate PMR scores

2008

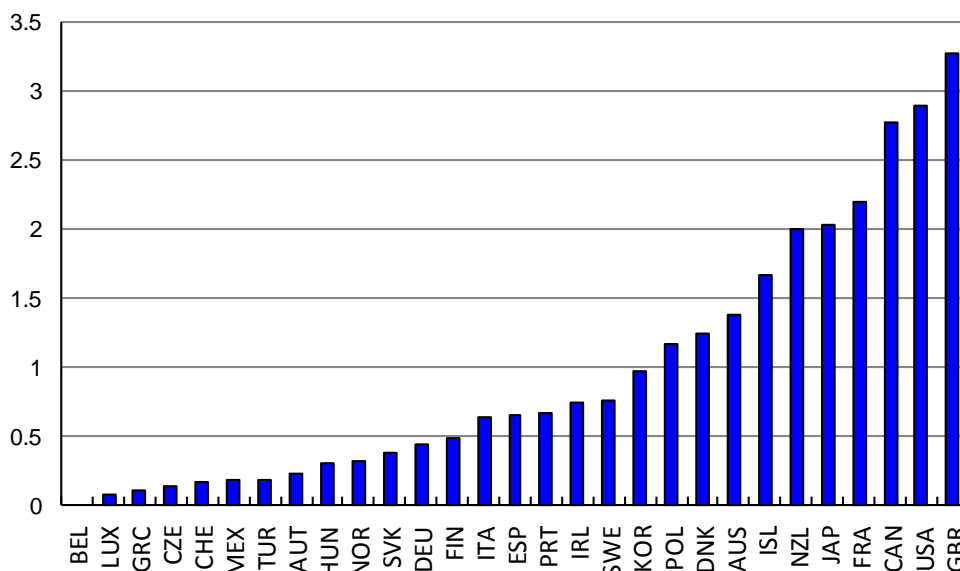


Note: Index scale from 0-6 from least to most restrictive. Countries are ranked according to the indicator score on aggregate.

Source: OECD Product Market Regulation Database.

Figure 6.2. Recurrent taxes on immovable property

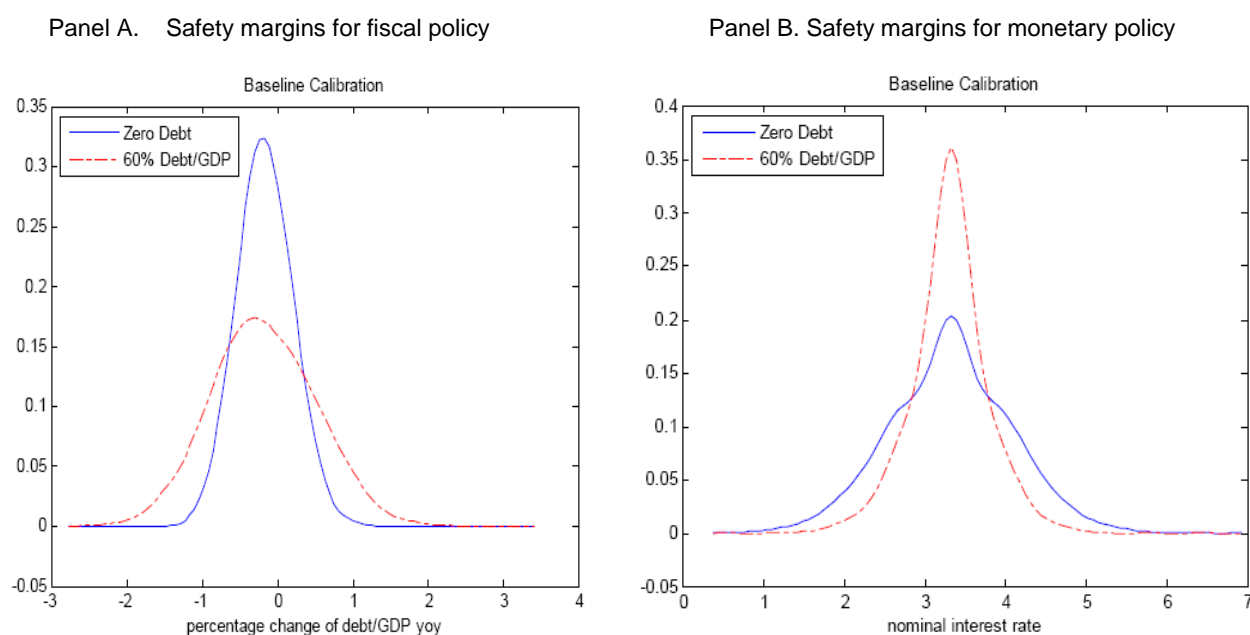
2008, % of GDP



Note: Data for Australia, Greece, Mexico and Poland refer to 2007.

Source: OECD Tax Revenue Database.

Figure 7.1. Safety margins for fiscal and monetary policy in the face of shocks



Note: The figure shows the distribution of the government deficit and the interest rate following standard shocks either with a zero initial debt level or one corresponding to 60% of GDP.

Figure 7.2. Safety margins for monetary and fiscal policy with greater price stickiness

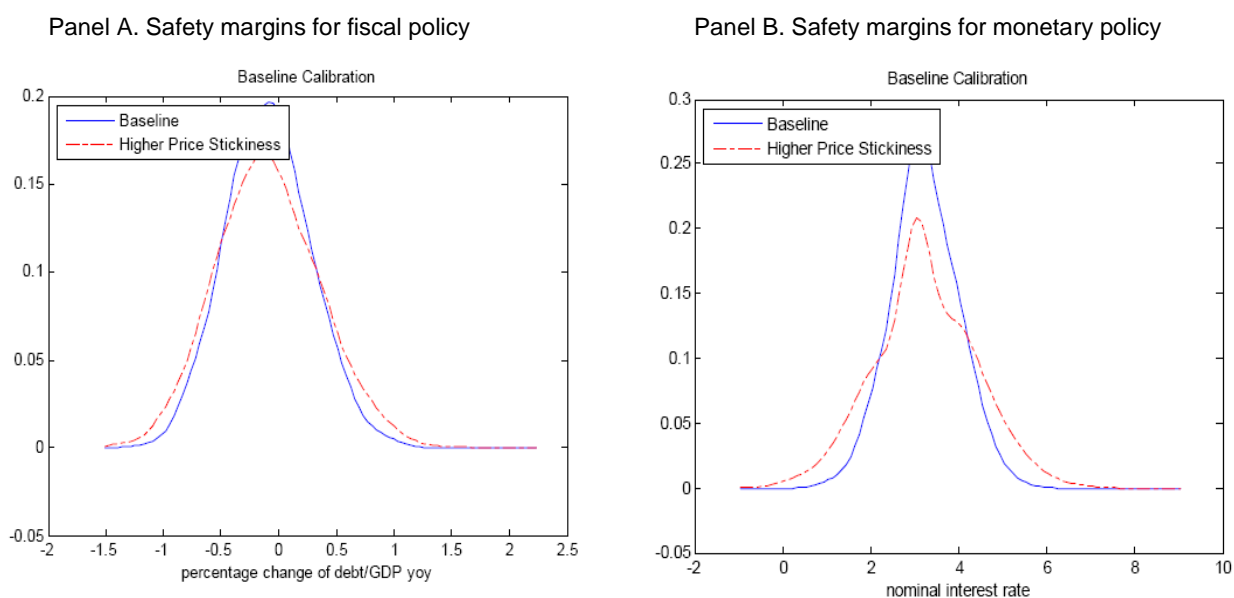
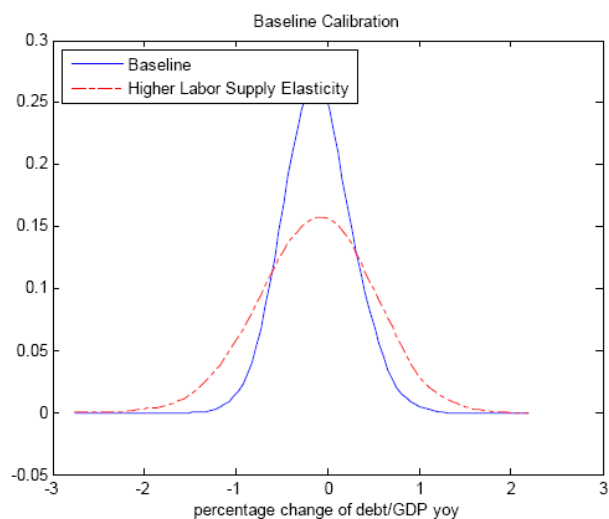
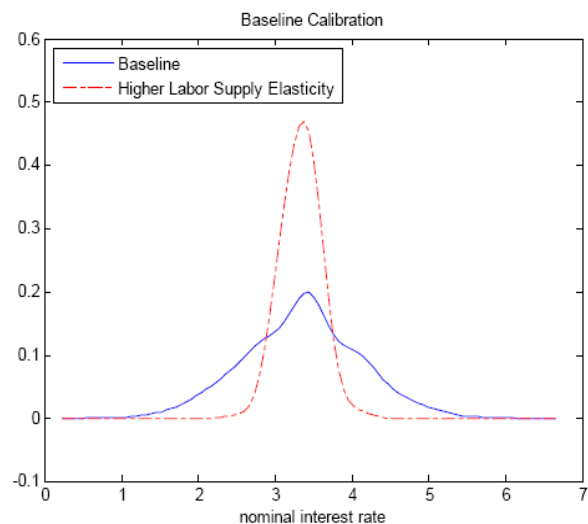


Figure 7.3. **Safety margins for monetary and fiscal policy with a higher labour supply elasticity**

Panel A. Safety margins for fiscal policy



Panel B. Safety margins for monetary policy



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