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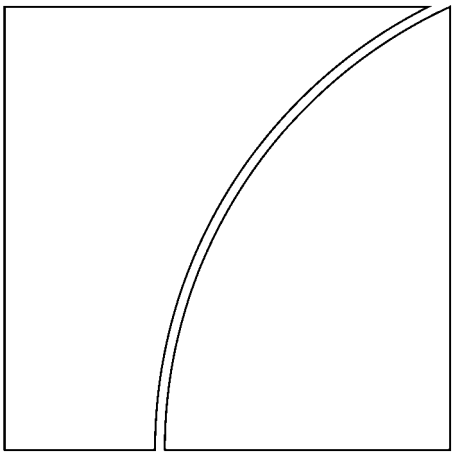

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by Morten L Bech, Leonardo Gambacorta and Enisse Kharroubi

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Monetary policy in a downturn: Are financial crises special?

Morten L Bech, Leonardo Gambacorta and Enisse Kharroubi[1]

Abstract

Accommodative monetary policy during the financial crisis was instrumental in preventing a deeper recession. Views differ, however, on how long such measures should be kept in place. At the heart of this debate is the notion that a protracted period of policy accommodation could create distortions. Some would argue that any distortions will be limited in extent and that further monetary stimuli should bolster the recovery. Others fear that prolonged easing may delay much-needed balance sheet adjustments, thus entrenching weak economic performance. Our analysis, based on a sample of 24 developed countries, indicates that monetary policy is less effective in a financial crisis, when impairments in the monetary transmission mechanism may occur. In particular, the results show that the benefits of accommodative monetary policy during a downturn for the subsequent recovery are more elusive when the downturn is associated with a financial crisis. In addition, we find that private sector deleveraging during a downturn helps to induce a stronger recovery. Both results hold even after controlling for the fiscal policy stance, real exchange rate movements and developments in the international environment. That said, the evidence is tentative owing to the restricted size and other limitations of our sample.

Keywords: monetary policy, financial crisis, recession, deleveraging.

JEL classification: E2, E3, E6, F3, F4, H6, N10.

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Contents

1. Introduction

Almost five years after the onset of the financial crisis, significant parts of the world economy have yet to recover. Recent progress notwithstanding, calibration of the appropriate policy response is complicated by a dearth of economic models that can adequately account for the financial system's interaction with the real economy, particularly in the aftermath of a bust.[2] Against this backdrop, it is perhaps unsurprising that policymakers receive divergent advice from economists with regard to the appropriate role of monetary policy. While conceding that room for manoeuvre is limited, some argue that further stimulus is needed to boost growth. Others are of the view that substantial stimulus has already been provided and that the benefits from additional support are likely to be limited (but they don't see any alternative at the current juncture). A third view is that exceptionally accommodative and prolonged monetary easing can be counterproductive, as it can delay the necessary restructuring of balance sheets[3] and, in the longer run, undermine the credibility of central banks.

These differences of opinion reflect tensions between at least three different strands of the monetary policy literature. The first strand holds that monetary policy should be consistently countercyclical. For example, in standard versions of the New Keynesian model, the stabilisation of inflation is equivalent to stabilising the welfare-relevant output gap. Hence, central banks do not face an inflation-output trade-off when conducting monetary policy, a situation known as "divine coincidence" (Goodfriend and King (1997)). Aghion et al (2012) go one step further and argue that not only should monetary policy smooth the business cycle but that countercyclical monetary policy enhances long-term growth.[4]

The second strand of the literature disputes that "divine coincidence" exists. Central banks do face a trade-off between stabilising inflation and stabilising output.[5] Moreover, in the case of a severe recession, monetary policy effectiveness may be limited due to impairment of the monetary transmission mechanism so that central banks may more than ever be "pushing on a string". This reinforces the case for a conservative central bank that concerns itself only with inflation (Rogoff (1989)).

The third emerging strand of literature springs in part from a dissatisfaction with the way in which the traditional New Keynesian model deals with the financial sector (see references in footnote 2). With limited or no financial frictions and possibly default, any attempt at a cost and benefit analysis of monetary policy before, during and after a financial crisis rests on a very weak foundation. Related to this strand is the so-called risk-taking channel of the monetary transmission mechanism (Borio and Zhu (2008); Adrian and Shin (2010)). In

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[2] Examples of macroeconomic models that more explicitly analyse the link between the financial sector and the real economy include Brunnermeier and Sannikov (2011) and Curdia and Woodford (2011).

[3] The contrasting experiences of Japan and the Nordic countries can be highlighted as examples of the different potential outcomes. In short, the Nordics could not afford very easy monetary (or fiscal policy) in the aftermath, had serious recessions but then recovered relatively quickly (after aggressively repairing banks' balance sheets; see Borio et al (2010)). In Japan, on the other hand, monetary policy was easy and the restructuring of balance sheets was not as intense. The initial recession was less severe but the pain much more protracted.

[4] In particular, Aghion et al (2012) argue that if real short-term interest rates are lower in recessions and higher in upturns, then this has a disproportionately larger positive impact on subsequent growth in industries that are prone to be credit- or liquidity-constrained.

[5] Blanchard and Gali (2005) stress that the "divine coincidence" is due only to a special feature of the New Keynesian model, namely the absence of non-trivial real imperfections. When the baseline New Keynesian model is extended to allow for real wage rigidities, the "divine coincidence" disappears. Central banks do indeed face a trade-off between stabilising inflation and stabilising the welfare-relevant output gap. Mankiw (2005) points out "if supply shocks are not simply shifts in productivity but also represent shifts in how distorted the economy's production process is then it turns out that the divine coincidence also disappears."

general, low interest rates for a prolonged period can increase incentives for asset managers to take on more risks for contractual, behavioural or institutional reasons (for example, to meet a target nominal return; Rajan (2005)). Moreover, during a financial crisis and its aftermath, low interest rates could also induce "evergreening policies" and postpone necessary adjustments in banks' balance sheets (Barseghyan (2010)). Given the low cost of forbearance, very low interest rates may disguise underlying credit weakness; encouraging banks to "extend and pretend" that loans to low-quality borrowers will come good. This is an issue for supervisory authorities in particular. Past experience has shown that low policy rates pave the way for an increase in "zombie lending", ie the rollover of non-viable loans. The experience of Japan in 1990s is instructive: banks permitted debtors to roll over loans on which they could afford the near-zero interest payments but not repayments of principal (Caballero et al (2008)). Very low rates keep poor-quality borrowers afloat, reducing the incentives to reallocate resources to areas of more vigorous growth, and thus may lower potential output. More recent evidence drawn from credit register data suggests that evergreening practices have taken place during the crisis in Italy (Albertazzi and Marchetti (2010)).

In addition, historical evidence indicates that financial cycle busts are associated with permanent output losses and are followed by slow and long recoveries (BCBS (2010)). The possible reasons include: (i) overestimation of potential output and growth during the boom; (ii) misallocation of resources, notably of capital, during that phase; (iii) the oppressive effect of the subsequent debt and capital overhang; and (iv) subsequent disruptions to financial intermediation (Borio (2012)). Moreover, Schularick and Taylor (2011) study the behaviour of money, credit, and macroeconomic indicators on a historical dataset for 12 developed countries over the period 1870–2008. In particular, they document that monetary policy responses to financial crises have been more aggressive since 1945 but that, despite these policies, the output costs of crises have remained large.

In our view, this debate raises a fundamental question about how far the impact of monetary policy in downturns associated with a financial crisis differs from its impact during downturns without such a crisis. This paper looks at historical episodes and seeks to establish a set of stylised facts that could provide guidance for further research. Inevitably, though, financial crises are rare events, and fortunately so. This presents a challenge for any empirical analysis as the number of observations is bound to be small, thereby affecting the quality of any inference. The problem can be addressed in three ways: by looking back further in time, by looking across a wider range of countries, or by doing both. The downside is that all such nostrums involve the comparison of potentially very different economies and episodes.

In this paper, we look at a set of 24 developed countries from the mid-1960s and investigate what drove the strength of the recoveries. In particular, we are interested in the effects (if any) that monetary policy during the downturn may have had on the strength of the subsequent recovery. Furthermore, we seek to assess whether the impact of monetary policy is different if the downturn is associated with a financial crisis. Using a simple regression framework, we find that easy monetary policy during a "normal" downturn leads to a stronger recovery afterwards. However, this relationship is not apparent for accommodative monetary policy during downturns associated with a financial crisis. In the case of a financial crisis, we also find that deleveraging is beneficial for the subsequent recovery. These results also hold after controlling for the fiscal policy stance, real exchange rate movements, and economic conditions in other countries.

The paper is structured as follows. The following two sections present, respectively, our empirical methodology and our data. In Section IV, we discuss our results and the last section concludes.

2. Downturns and recoveries

Our empirical framework is simple but non-standard. To start with, we construct a cross section of downturns and subsequent recoveries from a sample of 24 developed countries based on data going back to 1960.[6] As some series are not available on a quarterly frequency, we use annual data. We define downturns as periods of one or more consecutive years with negative real GDP growth. With a view to expanding the number of observations, we include forecasted value for real GDP until 2016 from the OECD's Economic Outlook database. We index the downturns by *k*. For example, the first downturn in the first country in our sample (Australia) has the index *k = 1* while the first downturn in the second country (Austria) has the index *k = 4* as Australia has experienced three downturns since 1960 according to our methodology. Moreover, we distinguish whether or not a financial crisis occurred in connection with the downturn. Specifically, we say that a financial crisis is associated with the downturn if a crisis occurred in the country during the two years prior to the bust or during the downturn itself.[7] To date a financial crisis, we rely on a combination of Borio and Drehmann (2009), Laeven and Valencia (2008 and 2010) and Reinhart and Rogoff (2009).[8]

Similarly, we define the subsequent recovery as the period from the trough to the year when real GDP recovers to its previous peak.[9] The recoveries inherit the index from the downturns. For ease of exposition, we refer to the combination of a downturn and a recovery as a "downturn cycle" or just cycle.

A graph is helpful to illustrate the methodology. Figure 1 shows Finland's real GDP since 1960 in terms of both annual growth and level measured in log dollars. Local peaks in real GDP are shown in green whereas downturns and recoveries are marked in red and blue, respectively.

Over this period, Finland experienced two downturn cycles according to our methodology. The first one saw real GDP peak in 1990, after which the downturn phase continued through 1993. The Finnish economy recovered to its 1990 level in 1996. The economic crisis in the early 1990s was triggered in part by the collapse of the former Soviet Union, Finland's main trading partner at the time. However, prior to the bust, Finland had also undergone a period of financial liberalisation. This led to a domestic credit and housing boom; fuelled in part by large capital inflows. As a consequence of rapidly falling asset prices and corporate bankruptcies, a major banking crisis erupted in 1991. Marked in the graph by the dashed vertical line, the country's financial crisis occurred within one year of the peak and the cycle can therefore be treated as a downturn with a financial crisis.

Finland saw another fall in real GDP during the recent global financial crisis, but it did not experience a domestic financial crisis. Our procedure finds that 2008 was the year of peak GDP and that the slump ended in 2009. Based on the OECD forecast, Finland's real GDP will recover to just above its 2008 level in 2012. Hence, according to our methodology, the

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6 The countries are: Australia (AU), Austria (AT), Belgium (BE), Canada (CA), Denmark (DK), Germany (DE), Finland (FI), France (FR), Greece (GR), Iceland (IS), Ireland (IE), Italy (IT), Japan (JP), South Korea (KR), Luxembourg (LX), the Netherlands (NE), Norway (NO), New Zealand (NZ), Portugal (PO), Spain (SP), Sweden (SW), Switzerland (CH), the United Kingdom (UK) and the United States (US).

7 We rely on other studies to identify crises and their timing. A sizeable number of crises are declared to take place in the last quarter of the year in which they happen. Restricting the definition of downturns associated with a financial crisis to those for which a financial crisis happens at most one year before the downturn would exclude a non-trivial number of downturns that were actually preceded by a financial crisis at least five quarters before.

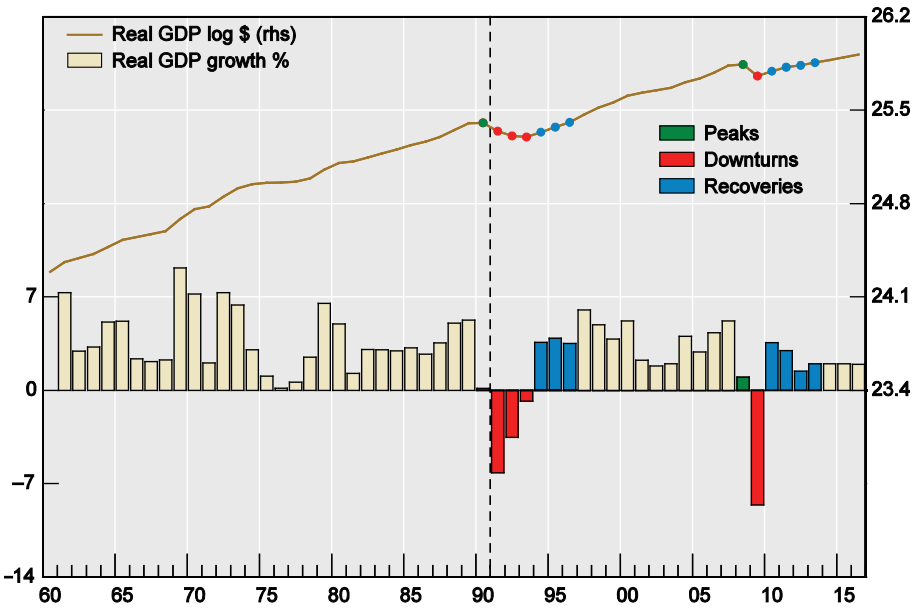
8 In cases where these sources disagree on the timing of the financial crisis, we relied on judgment and correspondence with central banks.

9 We treat potential "double dips" as follows. If peak real GDP for episode k+1 is lower than that of episode k, then the two episodes are merged and considered as one. The episode index is adjusted accordingly by removing the latter episode.

recovery is already complete and the episode can be included in our sample. Similar graphs for the other countries in our sample are shown in Annex 1.

Figure 1

Business cycle in Finland



Note: The vertical dashed line represents a financial crisis.

Source: OECD Economic Outlook.

Using our dating methodology, we identify 79 downturns for the 24 countries. Moreover, the sources listed above identify 34 financial crises for the countries over the sample period. Switzerland, for example, saw five downturns and two financial crises while only one downturn and one financial crisis are listed for Ireland, as data is only available from 1990. Four financial crises were not associated with a downturn in real GDP (Spain 1977, Iceland 1985, New Zealand 1987 and Norway 1990).[10] The full list of episodes is reported in Table 1.

Descriptive statistics for our key variables are provided in Table 2. As expected, the episodes associated with financial crises are more severe and longer-lasting than those without. When there is no financial crisis the average output loss is 1.9% in real terms and the average length of an episode is 3.8 years. With a financial crisis, we find that the loss is about 8.2% and the duration is longer at 5.1 years.

3. Basic findings

This paper's main purpose is to investigate how the impact of monetary policy on economic activity differs across cycles with or without financial crises. As a first take, we split the sample into two and regress the average (real) GDP growth rate over the cycle ($\dot{y}_k^c$) on the monetary policy stance at the peak (i_k^p), ie coming into the cycle, and the average stance of monetary policy over the cycle itself (i_k^c).[11] That is, we run regressions of the following type

[10] Due to some data limitations we had to discard two other episodes: Luxemburg 1974 and Japan 1973. The last case is also a borderline case on our definition of a recession (see the figure for Japan in Annex 1).

[11] From Table 2, we note that the average change in the real interest rate is equal to –1.06 during a complete cycle associated with a financial crisis and practically around zero in the remaining cases.

$$\dot{y}_k^c = \alpha + \beta i_k^p + \gamma i_k^c + \varepsilon_k \quad (1)$$

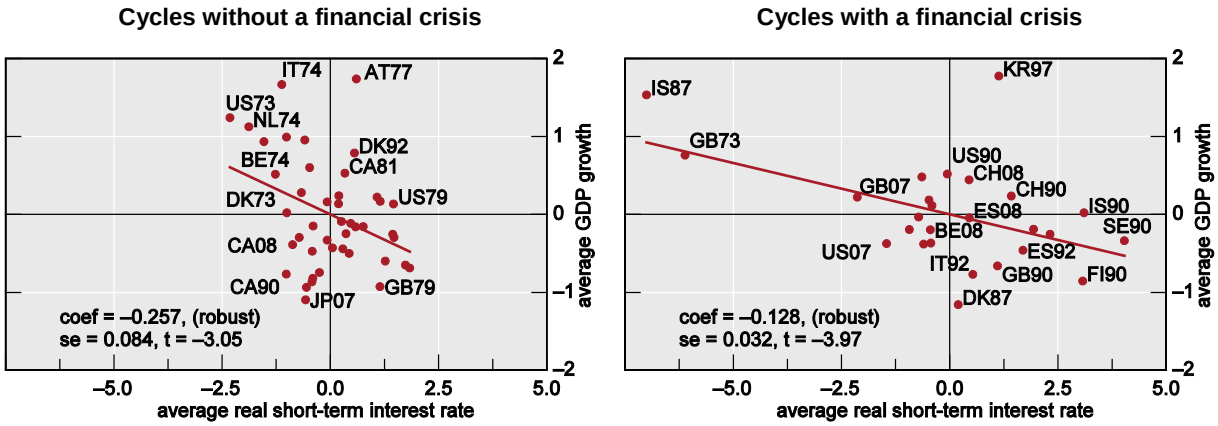
where the monetary policy stance is measured as the real short-term interest rate. In doing so, however, we had to drop a number of observations. First, two cycles (Korea 1979 and Iceland 1982) were clear outliers. In South Korea the downturn in the late 1970s was associated with an average real short-term interest rate of more than 30%, while in Iceland the average rate of inflation during the downturn at the beginning of the 1980s approached 70%.

Figure 2 summarises the results for the sample split according to cycle type. Each panel shows the impact of the average real short-term interest rate over the cycle on the average output growth over the cycle controlling for the real short-term interest rate at the peak. That is, we plot the residuals from regressing i_k^c on i_k^p against the residuals from regressing $\dot{y}_k^c$ on i_k^p.

Both panels show a negative correlation, which implies that accommodative monetary policy (ie a lower real interest rate) is associated with higher average output growth over the cycle. However, the magnitude of the correlation differs. In the case of cycles associated with financial crises, the correlation (right-hand panel) is half that of cycles not associated with a financial crisis (left-hand panel).

Figure 2

Monetary policy and financial crises



Note: Partial-regression plots.

While correlation does not imply causality, the results are consistent with the notion that monetary policy is less effective when applied in connection with a financial crisis. We would ascribe this to impairment of the transmission mechanisms. For example, overindebted economic agents may not consume the windfall of lower interest payments but rather seek to repay debt. Moreover, a struggling banking system may be less inclined to pass on lower rates to the rest of the economy. In other words, the lower elasticity of output growth with respect to the real interest rate means that, all else being equal, a larger cut in the policy rate is needed to yield a given increase in demand.

However, endogeneity issues represent an important caveat. As monetary policy is not set in a vacuum but responds to macroeconomic conditions, it is impossible to distinguish between cause and effect with any great certainty.[12] In order to mitigate this problem, we consider – in

[12] To avoid having to rely on expectations of the future path of monetary and fiscal policies, we excluded from this specific exercise the cases for which a full recovery would not be complete by 2012.

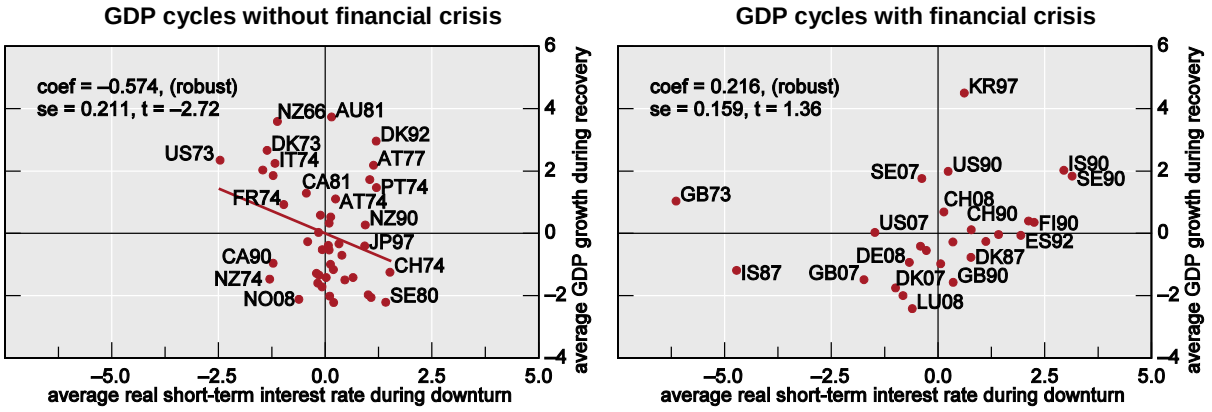
a second take – the narrower question of how monetary policy in the downturn influences the subsequent recovery (controlling for the severity of the downturn). Here we separate in time the policy decision from the outcome in the hope that the task of identification thus becomes more straightforward. That is, we run regressions of the following type

$$\dot{y}_k^r = \alpha + \beta i_k^p + \gamma i_k^d + \delta \dot{y}_k^d + \varepsilon_k \qquad (2)$$

where $\dot{y}_k^r$ and $\dot{y}_k^d$ are the average (real) GDP growth rate during the recovery and downturn, respectively. Moreover, i_k^d is the average real short-term interest rate during the downturn. Figure 3 summarises the results for the sample split according to cycle type. Each panel shows the impact of the average real short-term interest rate during the downturn on the average GDP growth during the recovery, controlling for the average growth during downturn as well as the real short-term interest rate at the peak.[13]

Figure 3

Monetary policy in downturns and subsequent recovery strength



Note: Partial-regression plots.

The two panels highlight a difference in the impact of monetary policy on the strength of recovery depending on the presence or absence of a financial crisis. The left-hand panel shows that for "normal" downturns, lower levels of real interest rates are associated with stronger recoveries (left-hand panel). That is, an accommodative monetary policy is beneficial for the subsequent recovery. For downturns associated with a financial crisis, however, there is no statistically significant relationship between monetary policy during the downturn and the strength of the recovery (right-hand panel). In other words, we do not find, in this sample at least, that lower real interest rates improve subsequent economic growth when a financial crisis is involved.

4. Robustness checks

In the rest of the paper, we basically try to undo the basic finding with regards to the relative ineffectiveness of monetary policy as an aid to recovery after a financial crisis. We introduce a range of additional controls for other macroeconomic policies such as fiscal and exchange rate depreciation. We also investigate the role of leverage and international economic conditions. Moreover, we try an alternative way to measure the strength (severity) of the recovery (downturn). While we glean interesting insights along the way, the basic finding remains.

[13] That is we plot the residuals obtained from regressing $\dot{y}_k^r$ and i_k^d on both i_k^p and $\dot{y}_k^d$.

With the additional controls, the partial regression graphs used above are no longer fit for purpose. Hence, we turn to a nested regression framework. Again, average real GDP growth during the recovery is our dependent variable. We have

$$\dot{y}_k^r = \alpha + \left(\beta_1 + \beta_2 D_k^{FC}\right)\dot{y}_k^d + \left(\beta_3 + \beta_4 D_k^{FC}\right)i_k^p +$$

$$\left(\beta_5 + \beta_6 D_k^{FC}\right)i_k^d + \sum_{j=1}^{n}\left(\beta_{6+j} + \beta_{6+j} D_k^{FC}\right)x_k^j + \varepsilon_k \quad (3)$$

where D_k^{FC} is a dummy variable indicating whether a financial crisis is associated with the downturn and x_k^j are additional control variables. In this setup, the statistical significance of the coefficient on the interaction between monetary policy stance during the downturn and the financial crisis dummy (β_6) provides a test of whether the impact of monetary policy is different across the two types of downturns. In addition, the significance of the sum of β_5 and β_6 provides a test of the effectiveness of monetary policy in connection with financial crises. Our general approach is to go from simple to more complex specifications of equation (3) while being mindful of the limited degrees of freedom available.

The baseline regression without additional controls is presented in the first column of Table 3. In this nested model, where we use all the information coming from the different cycles, the effect of monetary policy on the strength of recovery again differs across cycles with and without financial crises. We find that easy monetary policy during a "normal" downturn phase leads to a stronger recovery. The coefficient for "normal" downturn episodes is –0.676***, suggesting that a 1 percentage point decrease in the real interest rate during the downturn increases average real GDP growth by 0.7 percentage points during the recovery.[14]

In contrast, the marginal effect for downturn cycles with a financial crisis is 0.894***. Hence, the sum of $\beta_5 + \beta_6$ is positive (–0.676+0.894 = 0.218*), which taken at face value implies that accommodative monetary policy weakens the subsequent recovery in downturns associated with financial crises. However, this result is only marginally significant (see the second F-test reported at the bottom of the Table 3) and it disappears once we include additional controls.

To sum up: what is robust across specifications is that monetary policy in a downturn associated with a financial crisis is less effective in strengthening the subsequent recovery than it would be in a "normal" downturn. However, the results in no way imply that monetary policy should be tight in such instances. Moreover, this analysis does not take into account the effect of monetary policy during the downturn on the downturn itself. Presumably, a tighter monetary policy would lead to a deeper downturn in the first place.

4.1 Fiscal policy

Monetary policy is not the only tool available to counter an economic bust. Fiscal policy has also an important role and failure to account for this may well bias the results. Within our methodology, fiscal policy could conceivably matter both at the peak and during the downturn.

We measure the fiscal policy stance in a given year as the primary fiscal balance relative to GDP. In general, fiscal policy is more expansionary in downturn cycles associated with a financial crisis (–2.5% of GDP on average) compared with cycles without (–1.8% of GDP on average). As reported in columns B and C in Table 3, the fiscal policy stance (measured both coming into and during the downturn) is not found to have any significant effect on the strength of the recovery. Of note, however, are the results presented in column D where we control only for fiscal policy during the downturn. Here, the recovery is strengthened by an expansionary fiscal policy during "normal" downturns but not in downturns associated with

[14] One, two and three stars denote statistical significance at the 10%, 5% and 1% levels, respectively.

financial crises. In any case, controlling for fiscal policy does not undo the basic finding on the effectiveness of monetary policy.

4.2 The exchange rate and international economic conditions

Given the many observations from smaller open economies, a natural question is how robust the results are when we control for the exchange rate movements and economic conditions abroad. For example, exchange rate depreciation tends to boost output and can assist in the repair of corporate balance sheets by increasing competitiveness and profits (see Table 4). More generally, an export-driven recovery is a typical escape route from a financial crisis. To control for these mechanisms, we include in our regressions, one at a time, the real effective exchange rate, a measure of a country's terms of trade, the growth in global GDP, and the ratio of exports to imports. All variables are measured during the downturn period. It turns out that a depreciation of the exchange rate during a downturn associated with a financial crisis is beneficial for the subsequent recovery. Similarly, a deterioration in the terms of trade increases competiveness and has a positive effect on the strength of recovery. [15]

4.3 Expectations about future economic conditions

A more fundamental and potentially crucial omission is that we do not control for expectations about the future state of the economy. For example, policy choices during the downturn are influenced by expectations about the strength of worldwide growth. To the extent that policymakers *correctly* anticipate, say, a negative terms of trade shock they might loosen policy more. This would tend to induce a spurious positive correlation between monetary policy in the downturn and monetary policy in the recovery. We try to remove this effect by including the relevant variables for the international conditions measured over the recovery period. Here, endogeneity or reverse causality could be a worry, as changes in economic conditions abroad might be in response to the economic state of larger countries, ie the strength of the US recovery, for example. As our cross-sectional analysis covers mostly smaller economies, however, this is unlikely to be a serious problem. With these caveats in mind, the regressions (not reported) showed no significant changes in the coefficients for monetary policy.[16]

4.4 The role of leverage

Debt and leverage have been found to play a crucial part in the booms prior to financial busts (Fisher (1933); Hayek (1939); Kindleberger (1978); Valencia (2011)). Hence, we also control for deleveraging during the downturn. The results of regressions where we include deleveraging are shown in Table 5. Deleveraging is measured as the average change over the downturn of either private debt to GDP (provided by all financial intermediaries or only credit provided by banks to GDP; see columns A and B in Table 5) or the average real growth of private credit (provided by all financial intermediaries or only provided by banks;

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[15] The significance of the effect is however very limited and we don't find for advanced economies the strong results typically detected for emerging market economies (see Haussmann, Pritchett and Rodrik (2006)). This could reflect the lesser effectiveness of an export-driven growth model for large, more closed economies, partly owing to beggar-thy-neighbour situations. More generally, deliberately induced exchange rate depreciation may result in unwelcome capital flows and exchange rate pressure elsewhere if economic and financial cycles are not synchronised.

[16] If policymakers are forward-looking, the expectation of a strong recovery should be translated into high interest rates during the downturn. If this holds true, our estimates of the effects of monetary policy on the subsequent recovery would be biased upwards. This means that, if an endogeneity issue is in place, the "true" effect of reducing interest rates on the subsequent recovery is larger in normal downturns (the absolute value of the slope in panel a of Figure 3 would be larger). Conversely, in a financial crisis this bias is less likely to apply, due to the greater uncertainty. This should reinforce the diff-in-diff results that monetary policy is less effective in a financial crisis.

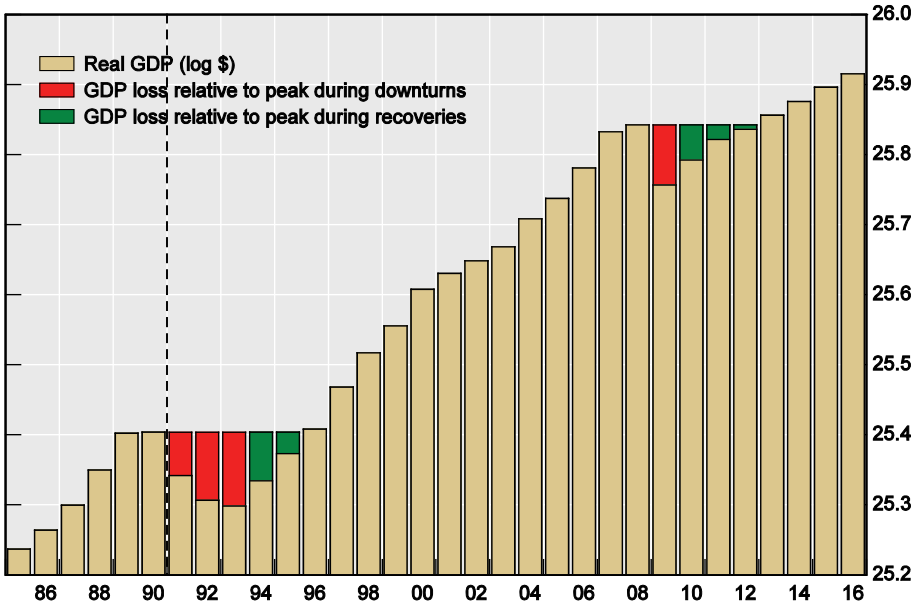
see columns C and D in Table 5).[17] In all specifications the coefficient on the change in leverage is positive (but not statistically significant) during "normal" downturn episodes and negative (and significant) in the cases of downturns associated with a financial crisis. This suggests that deleveraging during a normal downturn does not produce significant benefits during the subsequent recovery. By contrast, deleveraging during a downturn associated with a financial crisis is positively and significantly correlated with the strength of the subsequent recovery. For example, in column A we have $\beta_9 + \beta_{10} = -6.44^{**}$, which implies that a 10 percentage point decrease in the debt-to-GDP ratio leads to a 0.6 percentage point increase in average output growth during the recovery.

A potential rationale for the different impact of leverage across the two types of downturns is the following. In normal business cycles (where debt levels are not excessive), any increase in leverage would help to finance profitable investment projects and consumption. After a financial crisis, by contrast, such benefits are more than offset by the costs of failing to repair balance sheets.

The introduction of the leverage variable does not change the main results on the effectiveness of monetary policy in a financial crisis. This suggests that any delaying effect that monetary policy may have on deleveraging is not the only channel through which monetary policy may fail to ignite a strong recovery whenever financial crises occur.

Figure 4

GDP losses relative to peaks for Finland 1985–2016



Note: The vertical dashed line represents a financial crisis Source: OECD *Economic Outlook*.

4.5 GDP loss

We test the robustness of our findings by using an alternative measure for the strength of the recovery. In particular, we take the cumulative sum of differences between the peak real GDP and the real GDPs realised during the recovery phase. This can be graphically

[17] We did not include in Table 5 the initial levels of debt-to-GDP ratios (at the peak) because they turned out not to be significant.

interpreted as an area that represents the relative GDP loss that the economy suffers during the recovery with respect to the pre-crisis GDP. This means that, everything else being equal, the smallest area represents the strongest recovery. Therefore, we compute the strength of the recovery by multiplying this sum by minus one. A graphical illustration of the alternative dependent variable for the case of Finland is represented in Figure 4. Specifically, it is represented by the sum of the green and the red histograms.

As mentioned above, we relate the strength of recovery episodes to the severity of the preceding downturn, which in this case we measure as the relative cumulative sum of GDP losses during this period.

The results reported in Table 6 for the baseline specification indicate that the use of this alternative measure does not change the study's main message: it still holds that the effect of monetary policy in a normal downturn differs from that in an episode associated with a financial crisis.[18]

4.6 Additional robustness checks

We also checked if our results are driven by observations associated with the recent (global) financial crisis. This has a cost in terms of degrees of freedom as the number of observations drops from 73 to 53. Nevertheless, the results indicate that the main conclusions regarding the reduced effectiveness of monetary policy in a downturn associated with a financial crisis are still statistically valid.

Our empirical methodology involves comparing different economies across time. In all the regressions presented so far, we sought to mitigate the effect of different institutional characteristics by using robust standards errors clustered by country. However, time variation also plays an important role. In our econometric exercise, we analyse business cycles over more than 40 years, comparing potentially very different episodes. To gauge the importance of this problem, we ran all the regressions using clustering by time (year). The standard errors remain practically the same and, if anything, tend to fall slightly, increasing the statistical significance of the results.

The final robustness test was to employ an alternative measure of the monetary policy stance. We used the difference between the real policy rate and the natural rate (Altunbas et al (2010)). This measure turned out to be highly correlated with the real interest rate, the monetary policy indicator used in the main regressions (0.94***). Not surprisingly, the main results remained unchanged.

5. Conclusions

Most agree that, in the face of a severe financial crisis, a forceful response by the central bank is required. Both liquidity support and monetary easing are justified if the implosion of the financial system is to be prevented with its destructive effect on the real economy. However, views differ on how long monetary policy should remain accommodative. Concerns exist that protracted easing may delay the necessary balance sheet adjustments and hence prolong economic weakness (BIS (2012)).

[18] Shifting from a model in growth rates to a model in level produces two interesting changes that deserve attention: First, the R-squared of these regressions is significantly higher than those reported in Tables 3–5. Second, in all specifications, the severity of the downturn does matter. It takes longer to get back to the previous peak when the GDP drop is large. Intuitively, therefore, the downturn's severity is negatively related to the strength of the recovery. The coefficient suggests that for every percentage point in real GDP lost during the downturn (relative to the peak) an additional 0.9-1 percentage points will be lost during the recovery. Economic downturns are like quicksand. The deeper you sink, the harder it is to get out (Bordo and Haubich (2011)).

In this paper, we construct a cross section of downturns and subsequent recoveries from a sample of 24 developed countries with data going back to the 1960s. Across these episodes, we investigate the extent to which different types of monetary policy affect the strength of the recovery. We control for the stance of fiscal policy, exchange rate movements, economic conditions abroad, and the evolution of debt aggregates. We find a number of interesting results, although our conclusions must remain tentative in view of the limited data sample.

First, easy monetary policy during the downturn does lead to a stronger recovery in the case of normal downturns. However, in downturns associated with a financial crisis, this result is no longer statistically significant.

Second, deleveraging (measured by changes in the private debt-to-GDP ratio or by the real growth of private debt) during a downturn associated with a financial crisis has a positive effect on the subsequent recovery: a 10% reduction in the debt-to-GDP ratio during the downturn leads to a 0.6 percentage point increase in the average output growth during the recovery.

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Table 1

Downturns and financial crises

	Australia	**Austria**	**Belgium**	**Canada**	**Denmark**	**Germany**	**France**	**Finland**
Downturns	1981	1974	1974	1981	1973	1992	1974	1990
	1990	1977	1980	1990	1979	2002	1992	2008
		1980	1992	2008	1987	2008	2008	
		2008	2008		1992			
					2007			
Financial crisis	1989	2008	2008		1987	2007	1994	1991
					2008		2008	
	Greece	**Iceland**	**Ireland**	**Italy**	**Japan**	**Korea**	**Luxembourg**	**Netherlands**
Downturns	**2008**	**1982**	2007	1974	**1973**	**1979**	**1974**	1974
		1987		1992	1997	1997	1980	1980
		1990		2002	2007		2008	2008
		2008		**2007**				
Financial crisis	**2008**	**1985**	2008	1992	1992	1997	2008	2008
		1993						
		2008						
	Norway	**New Zealand**	**Portugal**	**Spain**	**Sweden**	**Switzerland**	**UK**	**USA**
Downturns	1987	1966	1974	1980	1976	1974	1973	1973
	2008	1974	1982	1992	1980	1981	1979	1979
		1990	1992	2008	1990	1990	1990	1981
		2007	2002		2007	2002	2008	1990
			2008			2008		2007
Financial crisis	**1990**	**1987**	2008	**1977**	1991	1991	1973	1988
				1993	2008	2007	1990	2007
				2008			2007	

Note: Financial crisis years in bold are not included in the sample because of (i) the absence of any downturn in real GDP or (ii) incomplete recovery. Downturn years in bold characters indicate years in which a GDP downturn occurred but could not be included in sample estimation because of (i) missing data, (ii) abnormal data or (iii) incomplete recovery.

Table 2

Descriptive statistics

	Number of observations	Real GDP loss	Length (years)	CPI inflation*	Nominal interest rate*	Real interest rate change*	Primary fiscal balance to GDP change*	Real effective exchange rate change**	Private debt in real terms change***	Private debt to GDP change***
	Full downturn cycle									
All episodes	73	4.44	4.34	6.13	6.85	-0.42	-1.91	-0.59	3.75%	3.83%
- with financial crisis	29	8.24	5.10	4.36	5.60	-1.06	-2.54	-1.85	5.15%	8.01%
- no financial crisis	44	1.93	3.84	7.30	7.67	-0.01	-1.82	0.23	2.82%	1.08%
	Downturn									
All episodes	73	3.95	2.48	6.74	7.60	-0.28	-1.52	-0.48	4.29%	4.74%
- with financial crisis	29	5.82	2.72	4.74	6.63	-0.42	-2.16	-2.00	6.14%	9.12%
- no financial crisis	44	2.72	2.32	8.06	8.24	-0.20	-1.43	0.51	3.06%	1.85%
	Recovery									
All episodes	73	0.48	1.86	5.11	5.70	-0.55	-2.46	-0.58	2.26%	-0.61%
- with financial crisis	29	2.42	2.38	3.67	3.82	-2.15	-2.97	-1.13	-0.20%	-2.60%
- no financial crisis	44	-0.79	1.52	6.02	6.90	0.49	-2.46	-0.27	3.12%	0.09%

Notes *: Averages for recoveries include 72 episodes (all) instead of 73 and 28 episodes with financial crises instead of 29. **: Averages for recoveries include 69 episodes (all) instead of 73, 25 episodes with financial crises instead of 29. ***: Averages for recoveries include 54 episodes (all) instead of 73, 14 episodes with financial crises instead of 29, 40 episodes without financial crises instead of 44.

Table 3

Baseline regressions

Dependent variable: Recovery strength					
Explanatory variables		**A**	**B**	**C**	**D**
1.	Severity of downturn	-0.282	-0.302*	-0.211	-0.277
		(0.173)	(0.170)	(0.192)	(0.163)
2.	× financial crisis	0.139	0.152	-0.062	0.044
		(0.169)	(0.185)	(0.246)	(0.216)
3.	MPS at peak	0.512**	0.561**	0.468*	0.547**
		(0.216)	(0.229)	(0.227)	(0.235)
4.	× financial crisis	-0.599**	-0.675***	-0.579**	-0.632**
		(0.214)	(0.224)	(0.272)	(0.235)
5.	MPS during downturn	-0.676***	-0.725***	-0.629**	-0.708***
		(0.228)	(0.239)	(0.290)	(0.247)
6.	× financial crisis	0.894***	0.993***	0.892**	0.924***
		(0.262)	(0.289)	(0.322)	(0.283)
7.	PFB at peak		-0.0963	0.176	
			(0.083)	(0.235)	
8.	× financial crisis			-0.269	
				(0.283)	
9.	PFB during downturn		0.026	-0.329	-0.162**
			(0.106)	(0.262)	(0.0728)
10.	× financial crisis			0.475	0.250*
				(0.285)	(0.133)
Obs.		73	73	73	73
Adj. R^2		0.092	0.089	0.135	0.143
F–test, H_0: $\beta_3 + \beta_4 + \beta_5 + \beta_6 = 0$		1.017	1.248	1.378	1.187
p-value		0.324	0.276	0.253	0.288
F–test, H_0: $\beta_5 + \beta_6 = 0$		3.656	3.971	3.153	3.404
p-value		0.069	0.059	0.089	0.079
F–test, H_0: $\beta_9 + \beta_{10} = 0$				2.009	0.762
p-value				0.170	0.392

Notes: MPS = Monetary policy stance, PFB = Primary Fiscal Balance to GDP, Robust standard errors clustered at the country level in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The numbers of β-coefficients in the null hypotheses correspond to the numbers assigned to the explanatory variables.

Table 4

Regressions with controls for international activity during the downturn

Dependent variable: Recovery strength					
Explanatory variables		**A**	**B**	**C**	**D**
1.	Severity of downturn	-0.231	-0.232	-0.247	-0.261*
		(0.158)	(0.166)	(0.165)	(0.140)
2.	× financial crisis	0.0776	-0.106	0.0606	0.120
		(0.182)	(0.232)	(0.185)	(0.166)
3.	MPS at peak	0.573**	0.512*	0.543*	0.532**
		(0.244)	(0.248)	(0.305)	(0.241)
4.	× financial crisis	-0.686***	-0.553*	-0.705**	-0.638**
		(0.238)	(0.271)	(0.301)	(0.239)
5.	MPS during downturn	-0.732***	-0.687**	-0.714**	-0.698**
		(0.251)	(0.271)	(0.347)	(0.250)
6.	× financial crisis	0.865***	0.903***	0.949**	0.804**
		(0.263)	(0.318)	(0.357)	(0.286)
7.	PFB during downturn	-0.157**	-0.152*	-0.162**	-0.153*
		(0.071)	(0.078)	(0.071)	(0.074)
8.	× financial crisis	0.296**	0.217	0.319**	0.308*
		(0.131)	(0.143)	(0.142)	(0.159)
9.	Δ real exchange rate	0.0618			
		(0.056)			
10.	× financial crisis	-0.238**			
		(0.102)			
11.	World GDP growth		21.18		
			(22.24)		
12.	× financial crisis		-33.80		
			(27.28)		
13.	Δ terms of trade			2.201	
				(7.774)	
14.	× financial crisis			-45.91**	
				(19.61)	
15.	Δ exports to imports ratio				15.27
					(22.05)
	× financial crisis				30.47
					(37.20)
Obs		73	73	73	73
Adj. R^2		0.203	0.148	0.208	0.197
F–test, H_0: $\beta_3 + \beta_4 + \beta_5 + \beta_6 = 0$		0.0843	2.028	0.819	0.003
p-value		0.774	0.168	0.369	0.995
F–test, H_0: $\beta_5 + \beta_6 = 0$		4.389	2.437	7.583	0.702
p-value		0.063	0.133	0.077	0.411
F–test, H_0: $\beta_7 + \beta_8 = 0$		1.723	0.410	1.601	1.329
p-value		0.203	0.529	0.211	0.261

Notes: MPS = Monetary policy stance, PFB = Primary Fiscal Balance to GDP, Δ denotes year on year change in variable. Robust standard errors clustered at the country level in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The numbers of β-coefficients in the null hypotheses of the F-tests correspond to the numbers assigned to the explanatory variables.

Table 5

Leverage, monetary policy and recovery strength

Dependent variable: Recovery strength					
Explanatory variables		**A**	**B**	**C**	**D**
1.	Severity of downturn	-0.268	-0.265	-0.237	-0.238
		(0.163)	(0.159)	(0.166)	(0.164)
2.	× financial crisis	-0.189	-0.235	-0.110	-0.112
		(0.249)	(0.271)	(0.201)	(0.204)
3.	MPS at peak	0.541**	0.539**	0.508**	0.517**
		(0.240)	(0.238)	(0.232)	(0.237)
4.	× financial crisis	-0.614**	-0.616**	-0.551**	-0.555**
		(0.236)	(0.234)	(0.239)	(0.241)
5.	MPS during downturn	-0.703**	-0.699**	-0.672**	-0.680**
		(0.257)	(0.256)	(0.244)	(0.242)
6.	× financial crisis	0.894***	0.872***	0.857***	0.849***
		(0.288)	(0.278)	(0.291)	(0.285)
7.	PFB during downturn	-0.161**	-0.159**	-0.157*	-0.156*
		(0.074)	(0.0741)	(0.0759)	(0.0758)
8.	× financial crisis	0.226*	0.206*	0.264**	0.264**
		(0.127)	(0.117)	(0.119)	(0.120)
9.	Δ private credit to GDP	0.071			
		(4.121)			
10.	× financial crisis	-6.510**			
		(3.257)			
11.	Δ private credit by banks to GDP		0.749		
			(7.732)		
12.	× financial crisis		-7.676*		
			(3.398)		
13.	Δ real private credit			1.521	
				(4.066)	
14.	× financial crisis			-9.315***	
				(3.099)	
15.	Δ real private credit by banks				0.459
					(4.820)
	× financial crisis				-8.537**
					(3.645)
Obs.		73	73	73	73
Adj. R^2		0.159	0.197	0.153	0.155
F–test, H_0: $\beta_3 + \beta_4 + \beta_5 + \beta_6 = 0$		1.002	0.793	1.248	1.077
p-value		0.328	0.383	0.276	0.311
F–test, H_0: $\beta_5 + \beta_6 = 0$		3.160	3.253	1.873	1.622
p-value		0.089	0.085	0.185	0.216
F–test, H_0: $\beta_7 + \beta_8 = 0$		0.583	0.396	1.911	1.867
p-value		0.453	0.536	0.181	0.186

Notes: MPS = Monetary policy stance, PFB = Primary Fiscal Balance to GDP, Δ denotes year on year change in variable. Robust standard errors clustered at the country level in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The numbers of β-coefficients in the null hypotheses of the F-tests correspond to the numbers assigned to the explanatory variables.

Table 6

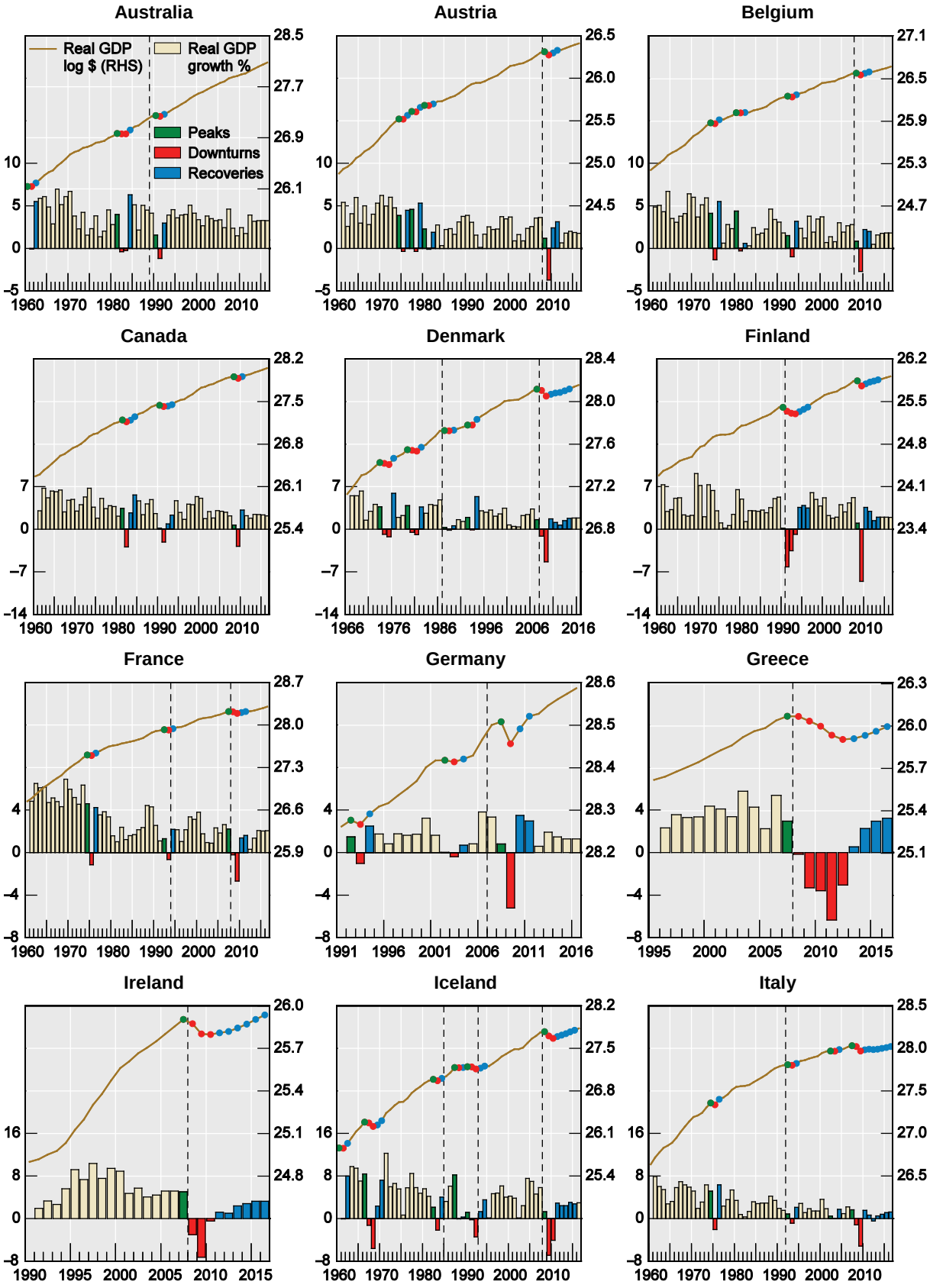
Alternative measures of recovery strength: in log level terms

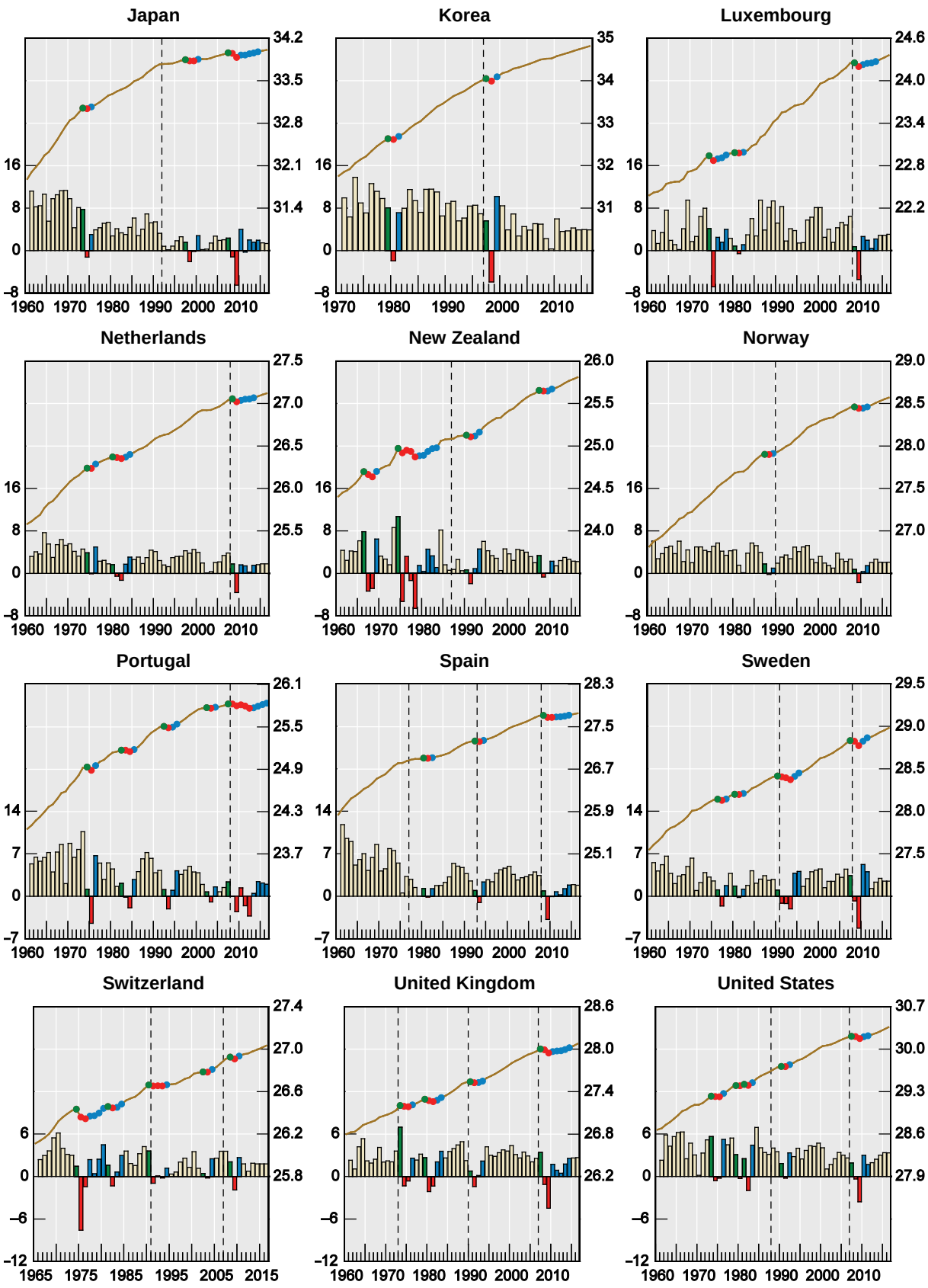
Dependent variable: recovery strength in log level terms				
Explanatory variables	**A**	**B**	**C**	**D**
1. Severity of downturn	-0.888***	-0.964***	-0.965***	-1.000***
	(0.131)	(0.0527)	(0.0599)	(0.0474)
2. × financial crisis		0.0842	0.0937	0.300
		(0.152)	(0.154)	(0.217)
3. MPS stance at peak	-0.154	0.632**	0.666**	0.613*
	(0.142)	(0.276)	(0.295)	(0.327)
4. × financial crisis		-0.947***	-1.007**	-0.900**
		(0.334)	(0.357)	(0.377)
5. MPS during downturn	0.204	-0.763***	-0.797**	-0.743**
	(0.192)	(0.270)	(0.286)	(0.313)
6. × financial crisis		1.288***	1.363***	1.239***
		(0.379)	(0.397)	(0.424)
7. PFB during downturn			-0.089	0.198
			(0.271)	(0.271)
8. × financial crisis				-0.355
				(0.432)
Obs.	73	73	73	73
Adj. R^2	0.706	0.718	0.710	0.729
F–test, H_0: $\beta_3 + \beta_4 + \beta_5 + \beta_6 = 0$		1.130	1.277	1.256
p-value		0.299	0.271	0.275
F–test, H_0: $\beta_5 + \beta_6 = 0$		3.994	4.639	2.224
p-value		0.0582	0.0425	0.150
F–test, H_0: $\beta_9 + \beta_{10} = 0$				1.134
p-value				0.298

Notes: MPS = Monetary policy stance, PFB = Primary Fiscal Balance to GDP, Robust standard errors clustered at the country level in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The numbers of β-coefficients in the null hypotheses correspond to the numbers assigned to the explanatory variables.

Annex 1

All downturn cycle episodes





[1] Vertical lines represent financial crises.

Source: OECD, Economic Outlook.