From Recession to Recovery:

How Soon and How Strong

By **Prakash Kannan, Alasdair Scott, and Marco E. Terrones***

Abstract

This paper examines recessions and recoveries in advanced economies and the role of countercyclical macroeconomic policies. Are recessions and recoveries associated with financial crises different from others? What are the main features of globally synchronized recessions? Can countercyclical policies help to shorten recessions and strengthen recoveries? The results suggest that recessions associated with financial crises tend to be unusually severe and that recoveries from such recessions are typically slow. Similarly, globally synchronized recessions are often long and deep, and recoveries from these recessions are generally weak. Countercyclical monetary policy can help shorten recessions, but its effectiveness is limited in financial crises. By contrast, expansionary fiscal policy seems particularly effective in shortening recessions associated with financial crises and in boosting recoveries. However, its effectiveness is a decreasing function of the level of public debt. These findings suggest that the current recession is likely to be unusually long and severe and the recovery sluggish.

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I. INTRODUCTION

The global economy is experiencing the deepest downturn in the post–World War II period, as the financial crisis rapidly spreads around the world. A large number of advanced economies have fallen into recession, and economies in the rest of the world have slowed abruptly. Global trade and financial flows are shrinking, while output and employment losses mount. Credit markets remain frozen as borrowers are engaged in a drawn-out deleveraging process and banks struggle to improve their financial health.

Many aspects of the current crisis are new and unanticipated.[1] Uniquely, the current disruption combines a financial crisis at the heart of the world's largest economy with a global downturn. But financial crises—episodes during which there is widespread disruption to financial institutions and the functioning of financial markets—are not new.[2] Nor are globally synchronized downturns. Therefore, history can be a useful guide to understanding the present.

To put the current cycle in historical perspective, we address some broad questions about the nature of recessions and recoveries and the role of countercyclical policies. In particular,

- Are recessions and recoveries associated with financial crises different from other types of recessions and recoveries?
- Are globally synchronized recessions different?
- What role do policies play in determining the shape of recessions and recoveries?

To shed light on these questions, this paper examines the dynamics of business cycles over the past half century. It complements existing literature on the business cycle along several dimensions.[3] These include a comprehensive study of recessions and recoveries in 21 advanced economies,[4] a classification of recessions based on their underlying sources, and an assessment of the impact of fiscal and monetary policies in recessions and recoveries. Similar

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[1] For detailed accounts of the financial aspects of this crisis, see IMF (2008), Greenlaw and others (2008), and Brunnermeier (2009).

[2] A classic analysis of financial crises is Kindleberger (1978). Reinhart and Rogoff (2008b) show that financial crises have occurred with "equal opportunity" in advanced and less advanced economies.

[3] In particular, this work builds on Chapter 3 of the April 2002 *World Economic Outlook*, Chapter 4 of the October 2008 *World Economic Outlook*, and Claessens, Kose, and Terrones (2008).

[4] The sample includes the following countries: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, and United States.

to most other studies in this area, this paper makes extensive use of event analysis and statistical associations.

The main findings of the paper related to common elements across business cycles are as follows:

- Recessions in the advanced economies over the past two decades have become less frequent and milder, whereas expansions have become longer, reflecting in part the "Great Moderation" of advanced economies' business cycles.

- Recessions associated with financial crises have been more severe and longer lasting than recessions associated with other shocks. Recoveries from such recessions have been typically slower, associated with weak domestic demand and tight credit conditions.

- Recessions that are highly synchronized across countries have been longer and deeper than those confined to one region. Recoveries from these recessions have typically been weak, with exports playing a much more limited role than in less synchronized recessions.

The implications of these findings for the current situation are sobering. The current downturn is highly synchronized and is associated with a deep financial crisis, a rare combination in the postwar period. Accordingly, the downturn is likely to be unusually severe, and the recovery is expected to be sluggish. It is not surprising therefore that many commentators looking for historical parallels for the current episode focus on the Great Depression of the 1930s, by far the deepest and longest recession in the history of most advanced economies

Regarding policies, these are the main findings:

- Monetary policy seems to have played an important role in ending recessions and strengthening recoveries. Its effectiveness, however, is weakened in the aftermath of a financial crisis.

- Fiscal stimulus appears to be particularly helpful during recessions associated with financial crises. Stimulus is also associated with stronger recoveries; however, the impact of fiscal policy on the strength of the recovery is found to be smaller for economies that have higher levels of public debt.

This suggests that in order to mitigate the severity of the current recession and to strengthen the recovery, aggressive monetary and particularly fiscal measures are needed to support aggregate demand in the short term, but care must be taken to preserve public debt sustainability over the medium run. Even with such measures, a return to steady economic

growth depends on restoring the health of the financial sector. Indeed, one of the most important lessons from the Great Depression, and from more recent episodes of financial crisis, is that restoring confidence in the financial sector is key for recovery to take hold.

The rest of the paper is structured as follows. The second section presents key stylized facts on recessions and recoveries for the advanced economies during the past 50 years. The third section reviews the key differences across recessions and recoveries resulting from different types of shocks and different degrees of synchronization. Particular attention is paid to the influence of financial crises. The fourth section analyzes the effects of discretionary monetary and fiscal policies on the severity of recessions and on the strength of recoveries. It also examines how the level of public debt conditions the effectiveness of fiscal policy. The last section places the current downturn in historical perspective and discusses some policy implications.

II. Business Cycles in the Advanced Economies

To put the current recession in historical perspective, we first identify the features of prior cycles. Each cycle is divided into two main phases: a recession phase, characterized by a decline in economic activity, and an expansion phase. Following the long-standing tradition of Burns and Mitchell (1946), this chapter employs a "classical" approach to dating turning points in a large sample of advanced economies from 1960 to the present. It focuses on quarterly changes in real GDP to determine cyclical peaks and troughs (Figure 1).[5]

We consider the two main properties of the cycle:

- Duration: the number of quarters from peak to trough in a recession, or from trough to the next peak in an expansion.

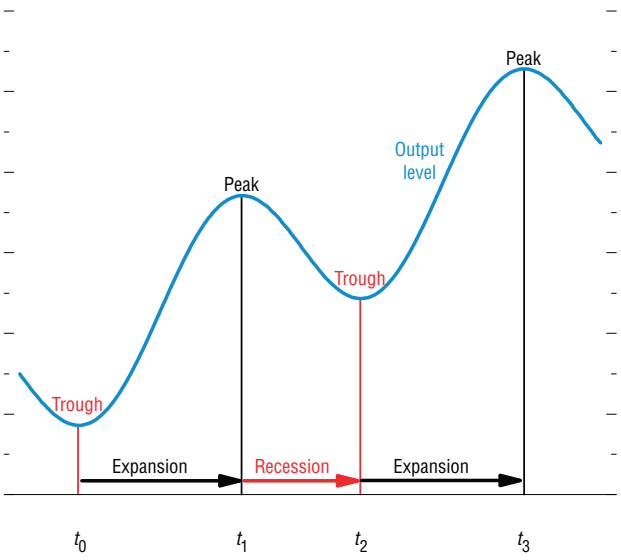
- Amplitude: the percent change in real GDP, from peak to trough in a recession, or from trough to the next peak in an expansion.

We also examine the slope of a recession (or expansion), that is, the ratio of amplitude to duration, which indicates the steepness of each cyclical phase.

[5]The procedure used to date business cycles in this chapter has been referred to as BBQ (Bry-Boschen procedure for quarterly data; see Harding and Pagan, 2002). It identifies local maximums and minimums of a given series, here the logarithm of real GDP, that meet the conditions for a minimal duration of a cycle and of each phase (in this chapter, these are set at five and two quarters, respectively). Alternative dating algorithms, such as those developed by Chauvet and Hamilton (2005) and Leamer (2008), are more difficult to implement for a large sample of countries. The National Bureau of Economic Research (NBER), which dates business cycles in the United States, uses several measures of economic activity to determine peaks and troughs. These measures include—in addition to real GDP—employment, real income, industrial production, and sales. NBER dating is, however, subjective and not replicable internationally.

Figure 1. Business Cycle Peaks and Troughs

Each cycle has two phases: a recession phase (from peak to trough) and an expansion phase (from trough to the next peak).



Source: IMF staff calculations.

II. 1. Recessions and Expansions: Some Basic Facts

On average, advanced economies have experienced six complete cycles of recession and expansion since 1960.[6] The number of recessions, however, varies significantly across countries, with some (Canada, Ireland, Japan, Norway, and Sweden) experiencing only three recessions and others (Italy, New Zealand, and Switzerland) experiencing nine or more.

Recessions are distinctly shallower, briefer, and less frequent than expansions. In a typical recession, GDP falls by about 2¾ percent (Table 1).[7] In contrast, during an expansion, GDP tends to rise by almost 20 percent. This illustrates mainly the importance of trend growth; the higher the long-run growth rate of an economy, the shallower the recession and the greater the amplitude of expansions. Some recessions, however, are severe, with peak-to-trough declines in output exceeding 10 percent. These episodes are often called depressions (April 2002 *World Economic Outlook*). Since 1960, there have been six depression episodes in the advanced economies; the latest was observed in Finland in the early 1990s. In contrast, some expansions witness trough-to-peak output increases larger than 50 percent—the "Irish Miracle" being a recent example.

A typical recession persists for about a year, whereas an expansion often lasts more than five years. As a result, advanced economies are in a recession phase of the cycle only 10 percent of the time. The longest episodes of recessions and expansions in these countries lasted more than 3 years and 15 years, respectively. Finland and Sweden experienced two of the longest recessions and Ireland and Sweden experienced two of the longest expansions.

Since the mid-1980s, recessions in advanced economies have become less frequent and milder, while expansions have become longer lasting, a development associated with the Great Moderation (Figure 2).[8] A host of factors may explain this, including global integration, improvements in financial markets, changes in the composition of aggregate output toward the service sector and away from manufacturing, and better macroeconomic policies (see Blanchard and Simon, 2001; and Romer, 1999). Another possibility is that the Great Moderation is the result of good luck, primarily reflecting the absence of large shocks to the world economy.

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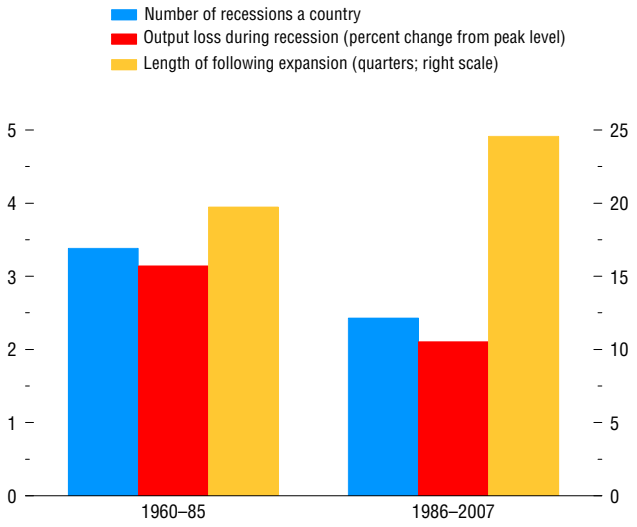
[6]In the sample period, there are 122 completed and [13] ongoing recessions.

[7]Related findings are reported in the April 2002 *World Economic Outlook*.

[8]This phenomenon has been documented in several papers, including McConnell and Perez-Quiros (2000) and Blanchard and Simon (2001). During this period the average slope of a recession—a proxy for how steep or abruptly output contracts—is about –0.6 percent, which is lower in absolute value than the average –1 percent for other recession periods.

Figure 2. Business Cycles Have Moderated over Time

Recessions have become less frequent and milder, whereas expansions have become longer.



Source: IMF staff calculations.

Table 1. Business Cycles in the Industrial Countries: Summary Statistics

	Duration[1]			Amplitude[2]		
	Recession	Recovery[3]	Expansion	Recession	Recovery[4]	Expansion
All						
Mean (1)	3.64	3.22	21.75	-2.71	4.05	19.56
Standard deviation (2)	2.07	2.72	17.89	2.93	3.12	17.50
Coefficient of variation (2)/(1)	0.57	0.84	0.82	1.08	0.77	0.89
Number of events	122	109	122	122	112	122
By Driver of Recession						
Financial crises						
Mean (1)	5.67**	5.64**	26.40**	-3.39	2.21***	19.47
Standard deviation (2)	3.15	3.32	24.74	3.25	1.18	20.46
Coefficient of variation (2)/(1)	0.56	0.59	0.94	0.96	0.53	1.05
Number of events	15	11	15	15	13	15
Other[5]						
Mean (1)	3.36**	2.95**	21.09**	-2.61	4.29***	19.58
Standard deviation (2)	1.71	2.52	16.77	2.89	3.22	17.15
Coefficient of variation (2)/(1)	0.51	0.85	0.79	1.11	0.75	0.88
Number of events	107	98	107	107	99	107
By Extent of Synchronization						
Highly synchronized						
Mean (1)	4.54***	4.19*	19.97***	-3.45*	3.66**	16.24*
Standard deviation (2)	2.50	3.59	15.32	2.96	1.72	11.85
Coefficient of variation (2)/(1)	0.55	0.86	0.77	0.86	0.47	0.73
Number of events	37	32	37	37	34	37
Other[6]						
Mean (1)	3.25***	2.82*	22.52***	-2.39*	4.21**	21.01*
Standard deviation (2)	1.73	2.16	18.94	2.88	3.56	19.33
Coefficient of variation (2)/(1)	0.53	0.77	0.84	1.21	0.85	0.92
Number of events	85	77	85	85	78	85
Memo Item:						
Recessions associated with financial crisis which are highly synchronized						
Mean	7.33	6.75	24.33	-4.82	2.82	18.83

Note: The symbols *, **, and *** indicate statistical significance at the 10, 5, and 1 percent levels, respectively. Statistical significance for recessions associated with financial crises (highly synchronized recessions) calculated versus other recessions.

[1]Number of quarters.

[2]Percent change in real GDP.

[3]Number of quarters after trough and before recovery to the level of previous peak.

[4]Percent increase in real GDP after one year.

[5]Recessions not associated with a financial crisis.

[6]Recessions that are not highly synchronized.

The recovery phase of the cycle has been an object of constant interest in policy circles.[9] An economy typically recovers to its previous peak output in less than a year (see Table 1). Perhaps more important, recoveries are typically steeper than recessions—the average growth per quarter during a recovery exceeds the rate of contraction during a recession by more than 25 percent. In fact, there is evidence of a bounce-back effect: output growth during the first year of recovery is significantly and positively related to the severity of the preceding recession. A number of factors can drive an economy to bounce back, including fiscal and monetary policies (this possibility is explored later in the paper), technological progress, and population growth.[10]

III. Does the Cause of a Downturn Affect the Shape of the Cycle?

This section associates recessions and their recoveries with different types of shocks: financial, external, fiscal policy, monetary policy, and oil price shocks.[11] The objective of this exercise is to determine whether there have been important differences between the recessions associated with financial crises and those associated with other shocks. In addition, this section examines whether there is a difference between highly synchronized and nonsynchronized recessions.

We find that different shocks are associated with different patterns of macroeconomic and financial variables during recessions and recoveries. In particular, recessions associated with financial crises have typically been severe and protracted, whereas recoveries from recessions associated with financial crises have typically been slower, held back by weak private demand and credit. In addition, highly synchronized recession episodes are longer and deeper than other recessions, and recoveries from these recessions are typically weak. Moreover, developments in the United States play a pivotal role both in the severity and duration of these highly synchronized recessions.

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[9]There is no common definition of recovery. Whereas some define it as the time it takes for the economy to return to the peak level before the recession, others measure it by the cumulative growth achieved after a certain time period, say a year, following the trough. In this chapter, both definitions are used. These two definitions are complementary and display a sort of duality—the first one determines the time it takes to achieve a given amplitude, and the second one determines the amplitude observed after a given time.

[10]Sichel (1994) and Wynne and Balke (1993) provide evidence of a bounce-back effect in U.S. business cycles. Romer and Romer (1994) report that monetary policy has been instrumental in ending U.S. recessions and helping recoveries during the postwar period.

[11]Term spreads, which have often been used as an indicator of monetary policy stance and as a predictor of short-run output growth—see, for example, Estrella and Mishkin (1996)—were also analyzed and found to give results very similar to those for monetary policy shocks.

III 1. Categorizing Recessions and Recoveries

We begin categorizing recessions and recoveries by first defining financial crises as episodes during which there is widespread disruption to financial institutions and the functioning of financial markets. Financial crises are identified using the narrative analysis of Reinhart and Rogoff (2008a, 2008b, 2009),[12] which in turn draws on the work of Kaminsky and Reinhart (1999).[13] Next, a recession is said to be associated with a financial crises if the recession episode starts at the same time or after the beginning of the financial crisis.[14] Of the 122 recessions in the sample, 15 are associated with financial crises (Table 2).[15] The other disturbances are identified using simple statistical rules of thumb (see the appendix).[16] More than half of the 122 recessions in the sample are associated with one or more of these shocks.[17] Oil shocks are the most widespread type, affecting 17 economies in the sample. Monetary and fiscal policy shocks are less common, and external demand shocks are the least common of all, affecting only a handful of the smaller and more open economies (see Table 5 in the appendix). Although recessions have become less common overall during the Great Moderation, those associated with financial crises have become more common (Figure 3).

Summaries of the stylized facts of these different categories of recessions and recoveries are presented in Table 1 and Figure 4. With the notable exception of oil shocks, the amplitude of a recession is closely related to its duration.[18] Recessions associated with financial crises are

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[12]An alternative method of defining financial crises is to use a time series or some combination of series as an indicator, based on some threshold (the method used for the other shocks). An advantage of using a narrative-based method is that it avoids having to define episodes according to characteristics in the very things one is interested in—for example, a financial crisis could be defined as an episode in which there is a large reduction in credit, but that would preclude assessing the behavior of credit during and following financial crises.

[13]We are particularly interested in banking crises, which are defined by Kaminsky and Reinhart (1999, p. 476) as episodes leading to bank runs or large-scale government assistance to financial institutions.

[14]On these grounds, we omit Reinhart-Rogoff episodes not immediately associated with recessions—for example, the savings and loan crisis of the early 1980s in the United States.

[15]In principle, there is a potential endogeneity problem here, since the financial crisis could lead to a recession and vice versa. To address this issue, the dating of crises and cyclical turning points has been done using two different methods, as explained in the chapter.

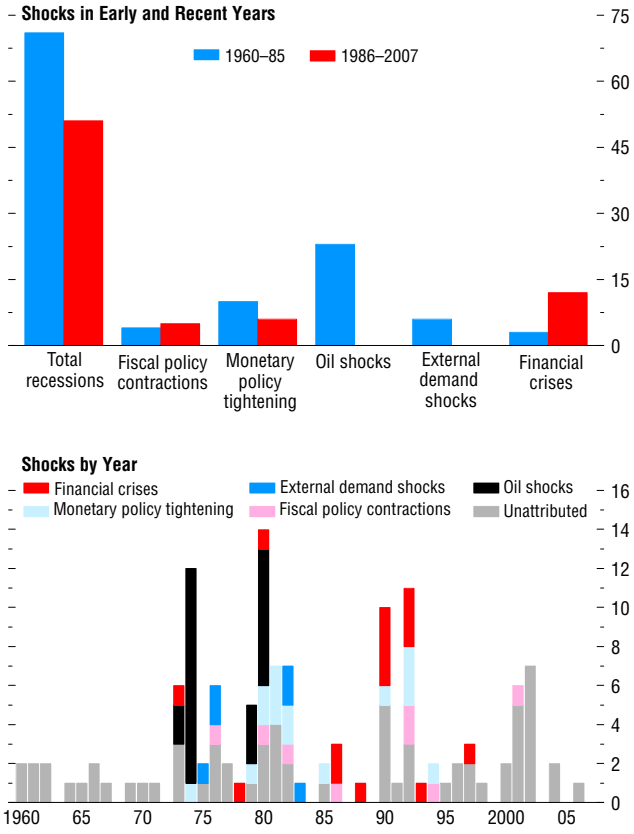
[16]These rules have the advantage that they are transparent and can easily and consistently be applied to the GDP series for the 21 countries in the sample. There will always be cases that are not well identified by simple rules. However, a more thorough analysis of the nonfinancial shocks for each country is outside the scope of this chapter.

[17]The scores often coincide, with 105 scores for the 65 recessions that are associated with these shocks, which indicates how misleading it can be to talk about a recession as a result of a single "cause."

[18]Overall, oil shocks typically lead to recessions that are very costly but relatively short lived. This is particularly true of the 1973–74 oil shocks, after which GDP growth bounced back relatively quickly.

Figure 3. Temporal Evolution of Recessions by Shock

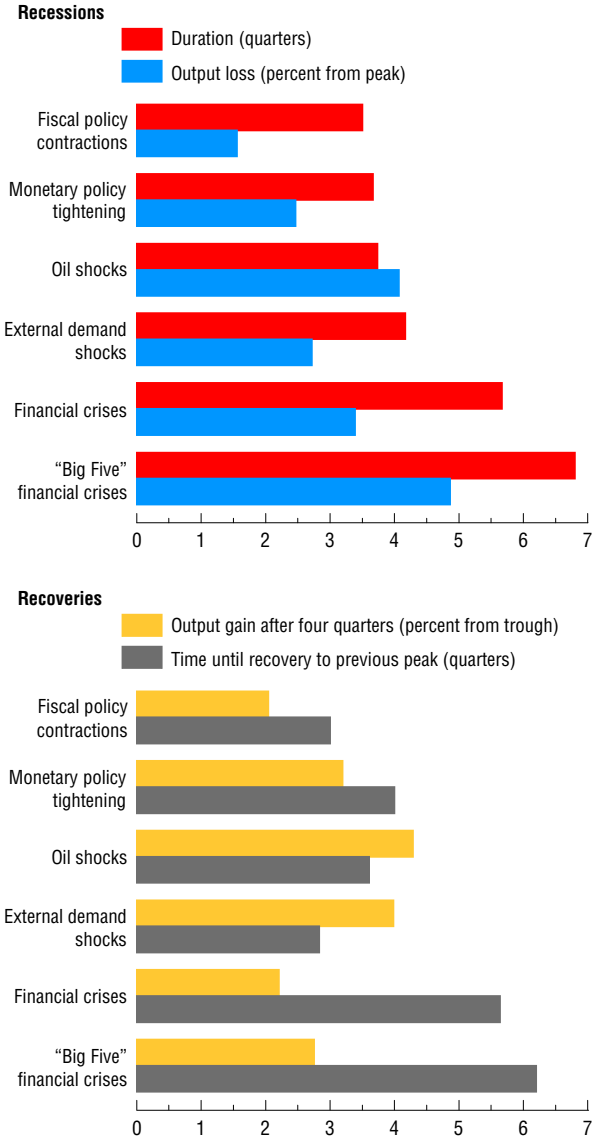
Recessions have become less common in recent years. But recessions associated with financial crises have become more common.



Source: IMF staff calculations.

Figure 4. Average Statistics for Recessions and Recoveries

The severity of most recessions is closely related to their duration. Recessions following financial crises are longer than average. Recessions following oil shocks are relatively severe but not very long. The bounce-back from financial crises is weaker than average. The time for output to recover to the level of the previous peak is longer.



Source: IMF staff calculations.

longer and generally more costly than others; those associated with the "Big Five" financial crises identified by Reinhart and Rogoff (2008a) were particularly costly (Figure 4, upper

Table 2. Financial Crises and Associated Recessions

Australia	1990q2–1991q2
Denmark	1987q1–1988q2
Finland	1990q2–1993q2*
France	1992q2–1993q3
Germany	1980q2–1980q4
Greece	1992q2–1993q1
Italy	1992q2–1993q3
Japan	1993q2–1993q4*
Japan	1997q2–1999q1
New Zealand	1986q4–1987q4
Norway	1988q2–1988q4*
Spain	1978q3–1979q1*
Sweden	1990q2–1993q1*
United Kingdom	1973q3–1974q1
United Kingdom	1990q3–1991q3

Note: * denotes the "Big Five" financial crises (Reinhart and Rogoff, 2008a).

panel).[19] Financial crises are also followed by weak recoveries: the time taken to recover to the level of activity reached in the previous peak is as long as the recession itself, whereas cumulative GDP growth in the four quarters after the trough is typically lower than following other types of recessions (Figure 4, lower panel).[20] Note that the cumulative growth one year after the trough for a financial crisis is 2½ percentage points lower than in other cases, after controlling for the severity and duration of the previous recession.

III. 2. Why are Financial Crises Different?

What are the mechanisms that differentiate recessions and recoveries associated with financial crises? An answer to this question needs to take into account the nature of the expansions that preceded these recessions. Narrative evidence indicates that these episodes have often been associated with credit booms involving overheated goods and labor markets,

[19]The Big Five financial crises episodes include Finland (1990–93), Japan (1993), Norway (1988), Spain (1978–79), and Sweden (1990–93).

[20]Recessions and recoveries are clearly different in terms of their severity depending on the type of shock associated with them. But, for the same shock, they are also roughly symmetric—the slope of the recession phase is closely matched by the slope of the recovery phase.

house price booms, and, frequently, a loss of external competitiveness.[21] This can be seen in Figure 5, which shows median values of macroeconomic variables during the eight quarters before the peak in GDP. Credit growth during the expansions preceding financial crises is higher than during other expansions, and this is associated with higher-than-usual consumption as a share of GDP leading up to the peak. Relative to other expansions, labor market participation is high, nominal wage growth is high, and unemployment is low. Price increases—for example, the GDP deflator, house prices, and equity prices—are all noticeably higher than usual. Credit booms have frequently followed financial deregulation.[22] There is some evidence of asset price bubbles: in the period leading up to financial crisis episodes, the ratio of house prices to housing rental rates rises above that during other recession episodes, starting from levels well below (Figure 6).

Rapid credit growth has typically been associated with shifts in household saving rates and a deterioration of the quality of balance sheets.[23] The upper panel of Figure 7 shows that household saving rates out of disposable income have been noticeably lower in expansions before financial crises. However, after a financial crisis strikes, saving rates increase substantially, especially during recessions. In the Big Five episodes, the turnaround in household saving rates was larger still. Data for net lending paint a complementary picture (Figure 7, lower panel). Although these data cover only a few of the financial crisis episodes under consideration here, patterns from some of the most relevant episodes—Denmark (1985–89), Finland (1988–92), Norway (1986-90), and the United Kingdom (1988–92)—show that households' net lending balances increased substantially during recessions.

Taken together, the behavior of these variables suggests that expansions associated with financial crises may be driven by overly optimistic expectations for growth in income and wealth.[24] The result is overvalued goods, services, and, in particular, asset prices. For a period, this overheating appears to confirm the optimistic expectations, but when expectations are eventually disappointed, restoring household balance sheets and adjusting

[21]For a comprehensive analysis of credit booms in the advanced and emerging economies, see for instance Mendoza and Terrones (2008).

[22]For example, Table 6 in the appendix shows that almost all of the 15 financial crises considered here followed deregulation in the mortgage market.

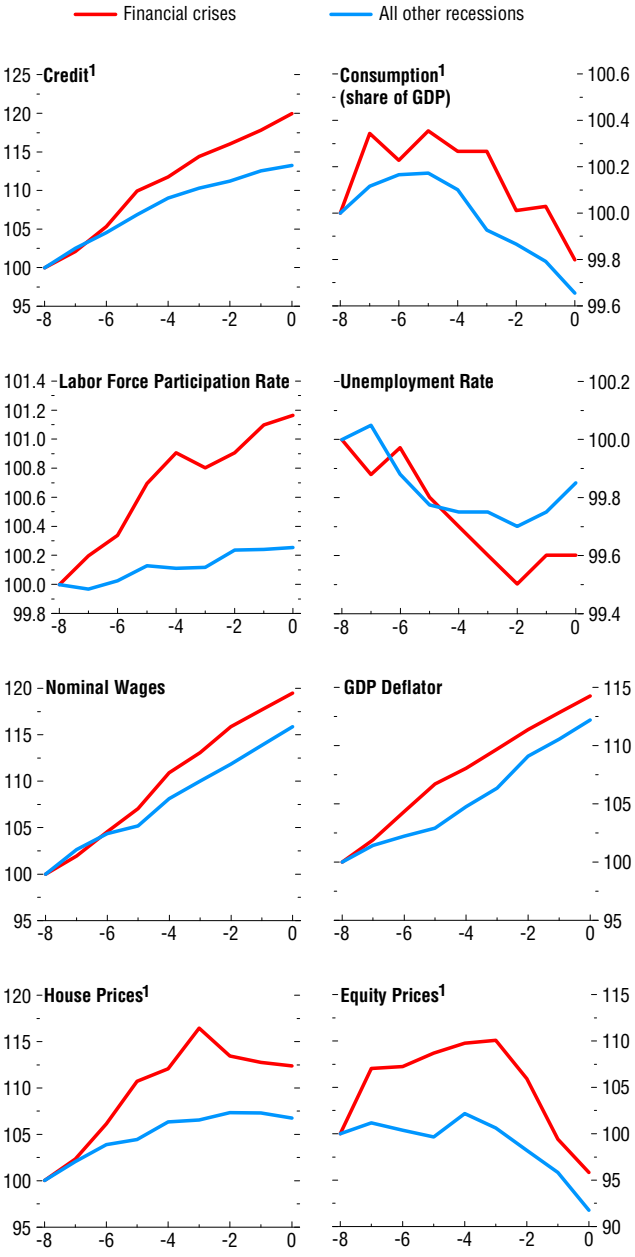
[23]Unfortunately, comprehensive balance sheet data are not available for most of the financial crisis episodes. But, as an example, analysis of data for the United Kingdom shows a pronounced deterioration in the ratio of total household liabilities to liquid assets in the years before the recession of 1990–91, with a gradual recovery in the quality of household balance sheets during and after the recession.

[24]In fact, real GDP growth rates before recessions associated with financial crises have not been exceptionally high compared with those before other recessions. Similarly, the relationship between the average level of the output gap in the four quarters before the peak and the output loss in the ensuing recession is positive, but financial crises do not stand out.

Figure 5. Expansions in the Run-Up to Recessions Associated with Financial Crises and Other Shocks

(Median = 100 at t = –8; peak in output at t = 0; quarters on the x-axis)

Expansions associated with financial crises show overheating in goods, labor, and asset markets.



Source: IMF staff calculations.
[1]Data in real terms.

Figure 6. House Price-to-Rental Ratios for Recessions Associated with Financial Crises and Other Shocks

(Peak in output at t *= 0; quarters on the x-axis)*

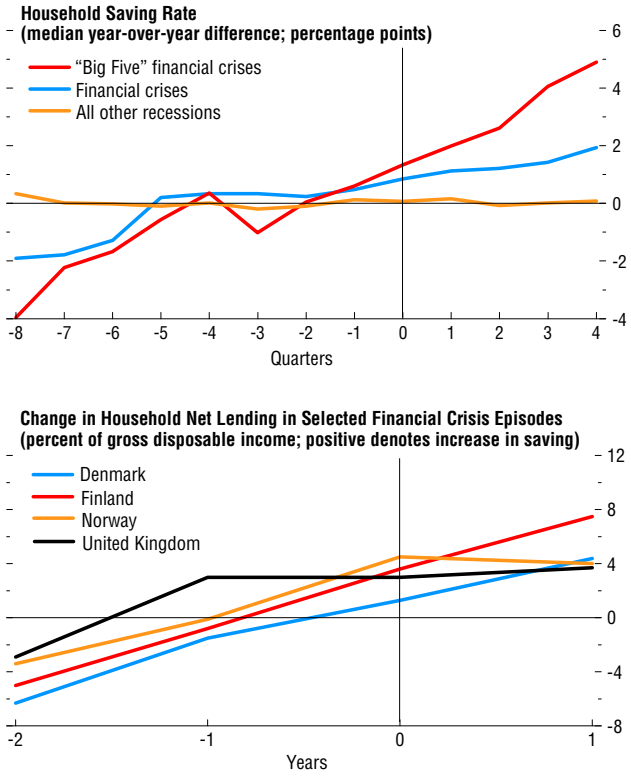
Expansions before recessions associated with financial crises show rapid rises in house price-to-rental ratios. The ratio declines steeply in recessions.

Source: Organization for Economic Cooperation and Development.

Figure 7. Household Saving Rate and Net Lending before and after Business Cycle Peaks

(Peak in output at t = 0)

In episodes of financial crisis, households dissave during expansions and restore balance sheets during recessions.



Source: IMF staff calculations.

prices downward toward something approaching fair value require sharp adjustments in private behavior. Not surprisingly, a key reason recessions associated with financial crises are so much worse is the decline in private consumption.

Turning to the recovery phase, the weakness in private demand tends to persist in upswings that follow recessions associated with financial crises (Figure 8). Private consumption typically grows more slowly than during other recoveries. Private investment continues to decline after the recession trough; in particular, residential investment typically takes two years merely to stop declining. Thus, output growth is sluggish, and the unemployment rate continues to rise by more than usual. Credit growth is faltering, whereas in other recoveries it is steady and strong. Asset prices are generally weaker; in particular, house prices follow a prolonged decline. On the other hand, although the recovery of domestic private demand from financial crises is weaker than usual, economies hit by financial crises have typically benefited from relatively strong demand in the rest of the world, which has helped them export their way out of recession.

What do these observations tell us about the dynamics of recovery after a financial crisis? First, households and firms either perceive a stronger need to restore their balance sheets after a period of overleveraging or are constrained to do so by sharp reductions in credit supply. Private consumption growth is likely to be weak until households are comfortable that they are more financially secure. It would be a mistake to think of recovery from such episodes as a process in which an economy simply reverts to its previous state.

Second, expenditures with long planning horizons—notably real estate and capital investment—suffer particularly from the after-effects of financial crises. This appears to be strongly associated with weak credit growth. The nature of these financial crises and the lack of credit growth during recovery indicate that this is a supply issue. Further, as elaborated in Appendix 2, industries that conventionally rely heavily on external credit recover much more slowly after these recessions.

Third, given the below-average trajectory of private demand, an important issue is how much public and external demand can contribute to growth. In many of the recoveries following financial crises examined in this section, an important condition was robust world growth. This raises the question of what happens when world growth is weak or nonexistent.

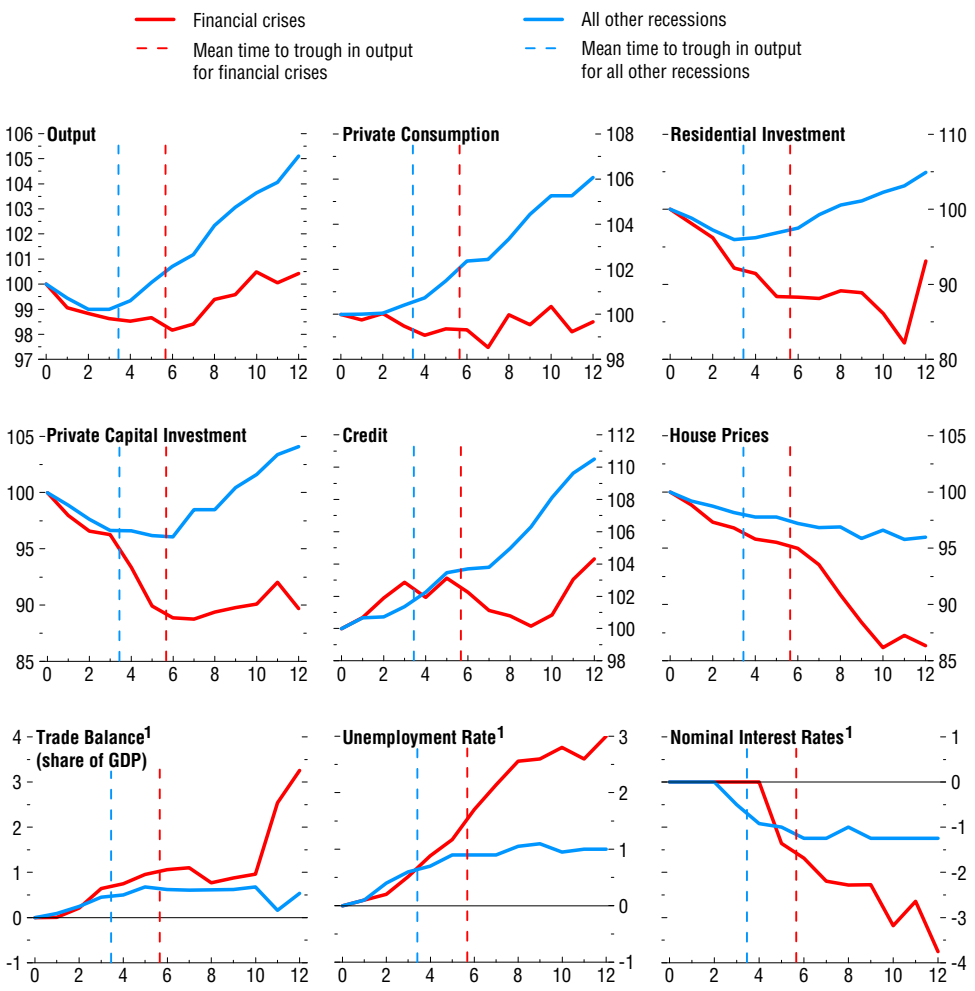
III. 3 Are Highly Synchronized Recessions And Their Recoveries Different?

The current downturn is global, implying that the recovery cannot in the aggregate be driven by a turnaround in net exports (although this could be true for individual economies). An examination of the features of synchronized recessions may therefore help in gauging the evolution of the current recession and prospective recovery.

Figure 8. Recessions and Recoveries Associated with Financial Crises and Other Shocks

(Median = 100 at t = 0; peak in output at t = 0; data in real terms unless otherwise noted; quarters on the x-axis)

Recessions associated with financial crises are longer and more severe than other recessions. During recoveries, private demand, credit growth, and asset prices are particularly weak. Historically, net exports have led the recovery.



Source: IMF staff calculations.
[1]Difference from level at $t = 0$, in percentage points.

To address this issue, highly synchronized recessions are defined as those during which 10 or more of the 21 advanced economies in the sample were in recession at the same time.[25] In addition to the current cycle, there were three other episodes of highly synchronized recessions: 1975, 1980, and 1992 (Figure 9).[26] As seen in Table 1, highly synchronized recessions are longer and deeper than others: the average duration (amplitude) of a synchronous recession is 40 (45) percent greater than that of other recessions.

What are the distinctive features of highly synchronized recessions? The most obvious is that they are severe, as seen in Figure 10. Moreover, recoveries from synchronous recessions are, on average, very slow, with output taking 50 percent longer on average to recover its previous peak than after other recessions. Credit growth is also weak, in contrast to recoveries from nonsynchronous recessions, during which credit and investment recover rapidly. As with financial crises, investment and asset prices continue to decline after the trough in GDP. However, a key difference from the recoveries following localized financial crises is that net trade is much weaker. When compared with nonsynchronous recessions, exports are typically more sluggish in synchronous recessions.

The United States typically has often been at the center of synchronous recessions. Three of the four synchronous recessions (including the current cycle) were preceded by, or coincided with, a recession in the United States. During both the 1975 and 1980 recessions, sharp falls in U.S. imports caused a significant contraction in world trade.[27] In addition to strong trade linkages, downward movements in U.S. credit and equity prices are likely to be transmitted to other economies.

III. 4 Does Bad Plus Bad Equal Worse?

Recessions that are associated with both financial crises and global downturns have been unusually severe and long-lasting. Since 1960, there have been only 6 recessions out of the 122 in the sample that fit this description: Finland (1990), France (1992), Germany (1980), Greece (1992), Italy (1992), and Sweden (1990). On average, these recessions lasted almost two years (Table 1, final row). Moreover, during these recessions GDP fell by more than 4¾ percent. Reflecting in part the severity of these recessions, recoveries from synchronized recessions are weak.

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[25]Alternatively, synchronized recessions could be defined as recession events whose peaks coincide within a given time window, say a year. The results reported in the text are robust to this definition.

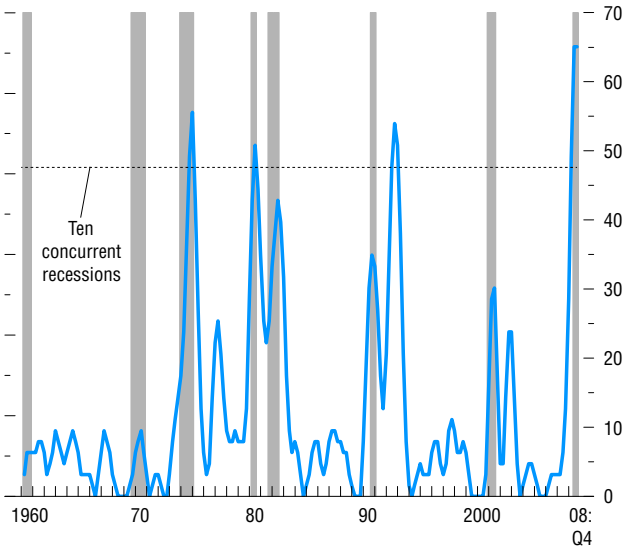
[26]Note that the current recessions are excluded from this analysis. Almost one-third of all recessions were highly synchronized.

[27] In these two recessions, U.S. imports fell by 11 percent and 14 percent, respectively. In the other five U.S. recessions, imports contracted by 3 percent, on average. These cases are picked up as recessions associated with external demand shocks for some countries, but not all, owing to the threshold that the identification imposes (see the appendix).

Figure 9. Highly Synchronized Recessions

(Percent of countries in recession; shaded areas denote U.S. recession)

Highly synchronized recessions are rare events that often are preceded by or coincide with a U.S. recession.

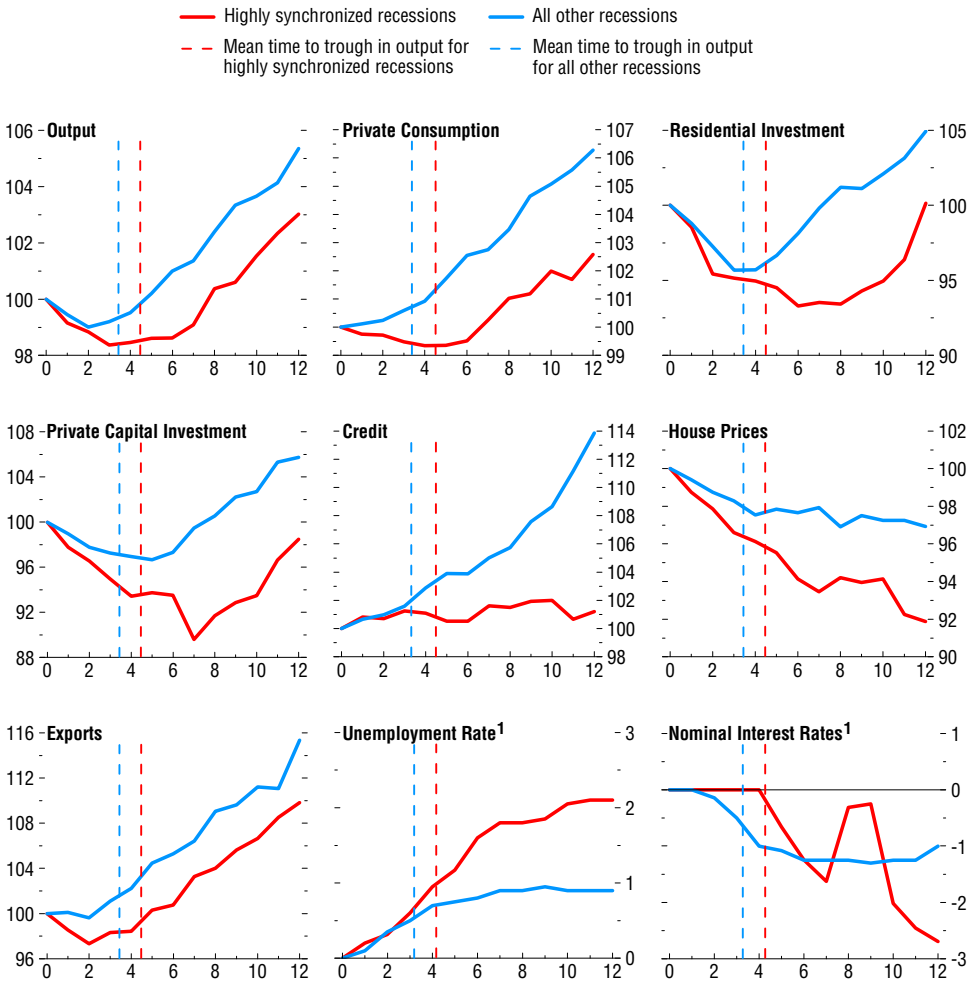


Source: IMF staff calculations.

Figure 10. Are Highly Synchronized Recessions Different?

(Median = 100 at t = 0; peak in output at t = 0; data in real terms unless otherwise noted; quarters on the x-axis)

Highly synchronized recessions are more protracted and severe than other recessions. Recoveries from these recessions are typically weak.



Source: IMF staff calculations.
[1]Difference from level at $t = 0$, in percentage points.

IV. Can Policies Play a Useful Countercyclical Role?

Up to this point, this chapter has examined the dynamics of recessions and recoveries, without accounting for economic policy responses. Policymakers, however, generally try to reduce fluctuations in output. Narrative studies of the policy decision-making process, such as Romer and Romer (1989 and 2007), show that concerns about the state of the economy are a key input to the formulation of policy.

This section examines how monetary and fiscal policies have been used as a countercyclical tool during business cycle downturns. The effectiveness of policy interventions in smoothing the business cycle is a topic of long debate in the academic literature. Much of the debate centers on the impact of active, or discretionary, policies that automatically rather than the component of policies that automatically responds to the business cycle. The debate over the role of fiscal policy has been particularly intense, and estimates of how output responds to discretionary changes in policy vary dramatically depending on the methodology employed, the sample of countries, and the time period examined. Indeed, there is evidence that the multipliers can at times be negative. The consensus, however, is that discretionary fiscal policy does have a positive impact on growth, though the magnitude is fairly small.[28]

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A common challenge faced in empirical research on macroeconomic policies is the appropriate measurement of discretionary policy. In general, any measure of macroeconomic policy is interrelated with output, making any causal inference difficult. To address this problem, this section distinguishes the automatic response of policy (which depends on economic activity) from the discretionary one by using a simple regression framework. The discretionary component of fiscal policy is proxied by the cyclically adjusted primary fiscal balance as well as by cyclically adjusted real government consumption.[29] Similarly, the

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[28] See chapter 5 of the October 2008 *World Economic Outlook* for a summary. See also Blanchard and Perotti (2002), Ramey (2008), and Romer and Romer (2007) for recent attempts at identifying the impact of discretionary fiscal policy.

[29] To check for the robustness of these results, an alternative measure of fiscal policy is also used. This measure—the percentage change in non-cyclically-adjusted real government consumption—is based on the premise that changes in real government expenditures are largely independent of the cyclical fluctuations in

(continued)

discretionary component of monetary policy is proxied by the nominal interest rate and real interest rate deviations from a Taylor rule, which attempts to capture how the central bank responds to fluctuations in the output gap and deviations from an explicit, or implicit, inflation target. For each recession phase, the baseline measure of policy response is the peak-to-trough change, a cumulative measure of the degree of loosening or tightening of policy over the whole recession.[30]

Discretionary fiscal and monetary policies have typically been expansionary during recessions (Figure 11).[31] The mean increase in the discretionary component of government consumption during a recession is about 1.1 percent a quarter, while the average decline in real interest rates, beyond that implied by a Taylor rule, is about 0.2 percentage point a quarter. [32]The G7 economies have historically responded more aggressively with regard to monetary policy than other countries.[33] Some European economies, on the other hand, are unable to lower interest rates independently during recessions, because of their commitment to the European Exchange Rate Mechanism and membership in the euro area.

IV.1 Do Policies Help Mitigate the Duration of Recessions?

The impact of discretionary monetary and fiscal policies on the duration of recessions is examined by looking at the cross-country experience across various recession episodes using duration analysis. Duration analysis seeks to model the probability that an event will occur, such as the end of a recession. Previous studies have used these models to address the question of whether recessions are more likely or less likely to end as they grow older.[34] The

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output. As discussed in the appendix, most of the results are preserved. Public investment spending would have been another option. However, its size is much smaller than that of government consumption, and its association with economic recovery is often limited, owing to significant implementation lags (see Spilimbergo and others, 2008).

[30]Details are presented in the appendix to this chapter. For the measures of monetary policy, we compute the policy stimulus as the sum of the deviations in each quarter that the economy is in recession. Most empirical studies, including those cited previously, do not discriminate among the various phases of the business cycle. Exceptions include Peersman and Smets (2001) and Tagkalakis (2008), who show respectively that monetary policy and fiscal policy tend to have larger effects during recessions than during expansions

[31] Lane (2003) finds that current government spending, excluding interest payments, is countercyclical for a sample of Organication for Economic Cooperation and Development (OECD) countries, though he claims that automatic stabilizers are the main driving force behind the countercyclicality.

[32]Note that these figures show our measures of the discretionary component of policy. Direct measures of policy, such as changes in interest rates or the primary balance, show more marked reductions during recessions.

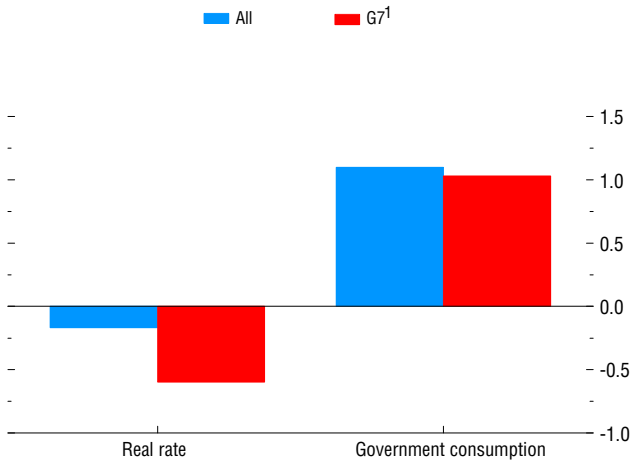
[33] The G7 comprises Canada, France, Germany, Italy, Japan, United Kingdom, and United States.

[34]Previous studies find that postwar recessions in the United States are more likely to end the longer they progress (see Diebold and Rudebusch, 1990; and Diebold, Rudebusch, and Sichel, 1993).

Figure 11. Average Policy Response during a Recession

(Real rate in percentage points; government consumption in percent)

Discretionary monetary and fiscal policies are typically expansionary during recessions.



Source: IMF staff calculations.

[1]G7 includes Canada, France, Germany, Italy, Japan, United Kingdom, and United States.

paper adds to this analysis by looking at the impact of policies on the likelihood that an economy exits a recession.

Across all types of recessions, there is evidence that expansionary monetary policy is typically associated with shorter recessions, whereas expansionary fiscal policy is not. A 1 percent reduction in the real interest rate beyond that implied by the Taylor rule increases the probability of exiting a recession in a given quarter by about 6 percent. On the other hand, fiscal policy, measured either by changes in the primary balance or in government consumption, is not found to have a significant impact on the duration of recessions when examined across all recessions.

However, during recessions associated with financial crises, both expansionary fiscal and monetary policies tend to shorten the duration of recessions, although the effect of monetary policy is not statistically significant (Table 3). During these episodes, a 1 percent increase in government consumption is associated with an increase in the probability of exiting a recession of about 16 percent. The stronger impact of fiscal policy in these events is consistent with evidence that fiscal policy is more effective when economic agents face tighter liquidity constraints.[35] The lack of a statistically significant effect from monetary policy could be a result of the stress experienced by the financial sector during financial crises, which hampers the effectiveness of the interest-rate and bank-lending channels of the transmission mechanism of monetary policy.[36]

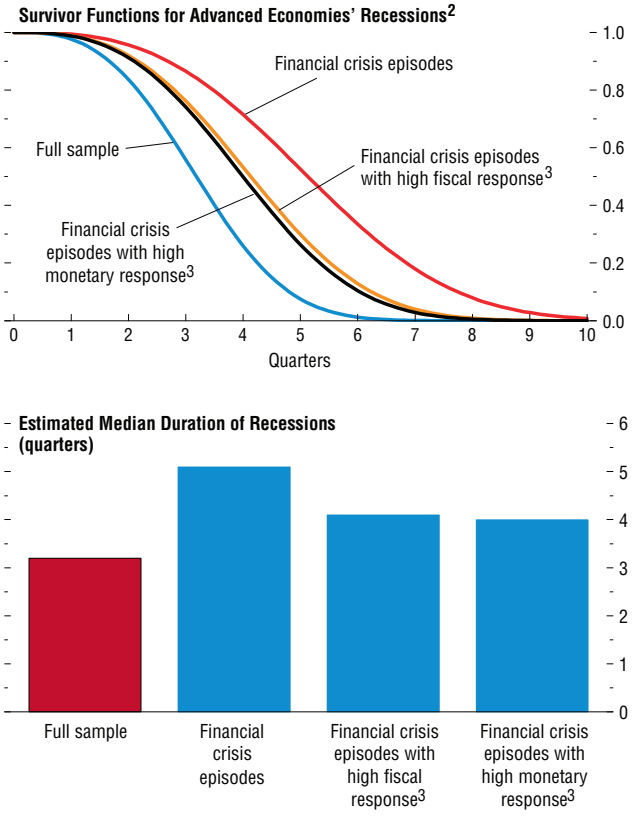
A useful way of visualizing the impact of monetary and fiscal policies on the duration of recessions is to look at estimates of the probability that an economy will stay in a recession beyond a certain number of quarters (Figure 12, upper panel). The estimated probabilities are significantly higher for recessions associated with financial crises relative to the average recession, indicating that the former type lasts longer than the latter. The implementation of expansionary policies clearly helps reduce the median duration of the recession (Figure 12, lower panel). For instance, a one-standard-deviation increase in government consumption reduces the median duration of a recession associated with financial crisis from 5.1 quarters to 4.1 quarters. In contrast, the effect of monetary policy, while still helping to reduce the duration of a recession associated with financial crisis, is insignificant.

[35]See Tagkalakis (2008). Bernanke and Gertler (1989) suggest that liquidity constraints are more prevalent in recessions than expansions.

[36]See Bernanke and Gertler (1995) for a detailed discussion on the credit channel of the monetary transmission mechanism.

Figure 12. Impact of Policies during Financial Crisis Episodes[1]

Recessions associated with financial crises tend to be more protracted. The duration of these recessions, however, can be mitigated by expansionary fiscal and monetary policies.



Source: IMF staff calculations.

[1]Recessions associated with financial crises, as described in the text.

[2]Survivor functions show the probability of remaining in a recession beyond a certain number of quarters.

[3]Refers to a one-standard-deviation increase in government consumption or decrease in real interest rates, respectively.

Table 3. Impact of Policies on the Probability of Exiting a Recession

	(1)	(2)	(3)	(4)
Recession Associated with Financial Crisis[1]	–1.275*** (0.381)	–2.238*** (0.602)	–0.454 (0.612)	–1.391** (0.763)
Government Consumption[2]		–0.110*** (0.027)		–0.131*** (0.029)
Government Consumption × financial crisis		0.278** (0.143)		0.284** (0.139)
Real Rate			–0.024*** (0.008)	–0.033*** (0.009)
Real rate × Financial Crisis			–0.028 (0.031)	–0.024 (0.031)
Constant	–3.224*** (0.449)	–3.269*** (0.459)	–3.571*** (0.499)	–3.742*** (0.514)
Ln p[4]	0.900*** (0.069)	0.983*** (0.069)	0.960*** (0.072)	1.070*** (0.072)
Fixed Effects	Yes	Yes	Yes	Yes
N	121	120	117	117

Notes: The baseline hazard function is assumed to follow a Weibull distribution. Coefficient values of the individual covariates in the hazard function are reported. Standard errors are reported in parentheses. ***, **, and * indicate significance at the 1, 5, and 10 percent level, respectively.
[1]Recession Associated with Financial Crisis is an indicator variable that takes on a value of 1 when the recession is identified as one related to a financial crisis as described in the text.
[2]Government Consumption refers to the change in discretionary government consumption during a recession.
[3]Real Rate refers to the cumulative deviations of real interest rates from a Taylor rule during a recession.
[4]Ln p reports the value of the (logged) Weibull parameter that governs the shape of the hazard function.

IV. 2. Do Policies Help Boost Recoveries?

As noted in previous sections, recessions are typically followed by a swift recovery. Although factors such as technological progress and population growth help the economy eventually recover, as discussed earlier, this section investigates whether fiscal and monetary policies undertaken during the recession also contribute to the strength of the economic recovery, using an event study to exploit the cross-country variation in the data. The variable

of interest in this case is the cumulative output growth one year after the cyclical trough, which is used as a proxy for the strength of the recovery. An economy emerging from recession has typically surpassed its previous peak output by this time. The measures of policy used are the same as in the duration analysis, which were measured as cumulative changes during the recession phase. In addition to the policy variables, both the duration and amplitude of the preceding recession are included as controls.

The results suggest that both fiscal and monetary expansions undertaken during the recession are associated with stronger recoveries (Table 4). In particular, increases in government consumption, and reductions in both nominal and real interest rates beyond that implied by the Taylor rule, have a positive effect on the strength of economic recovery (Figure 13).[37] Table 4 shows the quantitative impact of each policy measure separately and in combination. The coefficient on the government consumption variable, which is about 0.2, implies that a one-standard-deviation increase in government consumption during a recession is associated with an increase in the cumulative growth rate during the recovery phase of about 0.7 percent. The response to a one-standard-deviation reduction in real interest rates, beyond that implied by the Taylor rule, is about 0.4 percent. Changes in the cyclically adjusted primary balance during a recession, on the other hand, are not significantly associated with output growth during recovery.[38]

The aggressive use of discretionary fiscal policy raises concerns about the sustainability of public finances. For instance, Perotti (1999), using a sample of 19 OECD countries, finds that a fiscal stimulus reduces private consumption in periods during which the level of government debt is particularly high.[39] Do concerns about fiscal sustainability detract from the effectiveness of fiscal stimulus during recoveries? To address this question, the levels of public debt relative to GDP that were prevalent at the beginning of the recession are introduced into the benchmark regression framework interacted with the proxy of fiscal policy. The results, shown in Table 4, suggest that the degree of public indebtedness reduces the effectiveness of fiscal policy.

To show the nature of this relationship more clearly, Figure 14 plots the marginal relationship between the impact of fiscal policy on the strength of recovery and the debt-to-GDP ratio. The downward-sloping line indicates that fiscal stimulus in economies that have

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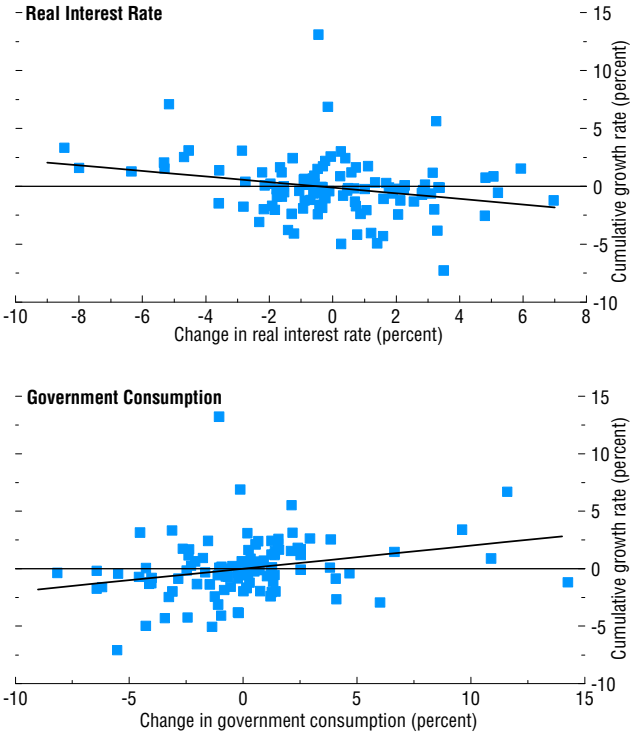
[37]This positive impact of policy continues to remain statistically significant even after we include policies that were undertaken in the early stages of recovery.

[38]It should be noted that no systematic relationship was found linking monetary or fiscal policy with the strength of recoveries associated with financial crises.

[39]The procyclicality of fiscal policy in emerging markets is also largely attributable to the fact that constraints on the financing of government debt are usually tighter during recessions (see Gavin and Perotti, 1997, for a discussion on Latin America).

Figure 13. Effect of Policy Variables on the Strength of Recovery[1]

After controlling for the amplitude and duration of the preceding recession as well as fixed country characteristics, expansionary policies are associated positively with the strength of recovery.

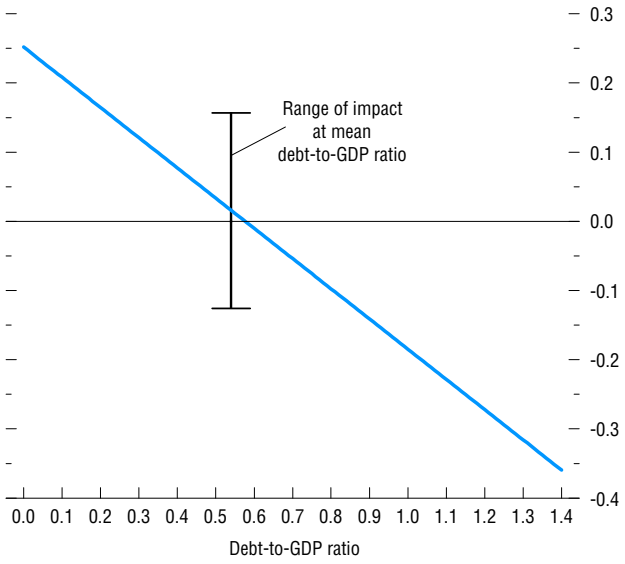


Source: IMF staff calculations.

[1]Scatter plots shown here are conditional plots that take into account the effect of several other controlling variables, as noted in the appendix.

Figure 14. Relationship between the Impact of Fiscal Policy on the Strength of Recovery and the Debt-to-GDP Ratio

The impact of fiscal policy on the strength of recovery is weaker for economies that have higher levels of public debt relative to GDP.



Source: IMF staff calculations.

Table 4. Impact of Policies on the Strength of Recoveries

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Recession Duration	–0.044 (0.121)	0.111 (0.126)	–0.248 (0.156)	–0.208 (0.211)	–0.201* (0.110)	–0.056 (0.144)	–0.406 (0.251)	–0.342 (0.286)
Recession Amplitude	0.155 (0.116)	0.092 (0.102)	0.446*** (0.082)	0.426*** (0.103)	0.415*** (0.069)	0.353*** (0.082)	0.358*** (0.117)	0.323** (0.137)
Government Consumption[1]	0.201** (0.080)	0.173** (0.082)	0.252** (0.119)	0.236* (0.131)				
Government Consumption × Debt			–0.437** (0.186)	–0.415* (0.209)				
Primary Balance[2]					–0.040 (0.070)	–0.041 (0.071)	–0.567** (0.247)	–0.575** (0.236)
Primary Balance × Debt							1.029*** (0.354)	1.056*** (0.340)
Real Rate[3]		–0.035*** (0.011)		–0.010 (0.025)		–0.028* (0.016)		–0.015 (0.025)
Public Debt[4]			–1.505** (0.647)	–1.468** (0.670)			–3.890*** (0.797)	–3.755*** (0.885)
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	112	109	75	75	96	93	72	72
R^2	0.10	0.13	0.34	0.34	0.12	0.16	0.46	0.46

Notes: Dependent variable is the cumulative growth one year into the recovery phase. Robust standard errors clustered by country are reported in parentheses. ***, **, and * indicate significance at the 1, 5, and 10 percent level, respectively.

[1]Government Consumption refers to the change in discretionary government consumption during the preceding recession.

[2]Primary Balance refers to the change in the cyclically adjusted primary balance during the preceding recession.

[3]Real Rate refers to the cumulative deviations of real interest rates from a Taylor rule during a recession.

low levels of public debt has a higher impact on the strength of the recovery relative to economies that have higher levels of public debt. The point estimate for the impact becomes

negative for debt levels that exceed about 60 percent of GDP. However, as suggested by the 90 percent confidence interval bands, there is high uncertainty in the estimation of the threshold debt levels.[40]

These findings point to the need for a commitment to medium-term fiscal sustainability to accompany any short-term fiscal stimulus. Doubts about debt sustainability can slow the recovery process through lower consumer spending and higher long-term real interest rates. It is crucial that the implementation of temporary stimulus measures occur in a framework that guarantees fiscal sustainability in order to ensure policy effectiveness.[41]

This section has focused on fiscal and monetary policy; however, previous experiences of recessions associated with financial crises strongly suggest that the effectiveness of monetary and fiscal policies is substantially reduced without the implementation of prompt and well-targeted financial policies. Many observers consider the policies undertaken by Sweden in the early 1990s to have been highly effective in restoring the health of the financial sector, paving the way for strong recovery.[42] A key component of those measures was the establishment of independent asset management companies, which removed bad assets from the balance sheets of banks so that the latter could resume normal lending activities. In Japan, slow recognition to the slow recovery from the financial crises of the 1990s (see, for instance, Hoshi and Kashyap, 2008).

Financial sector support typically entails fiscal costs. However, a substantial part of the upfront gross cost is usually recovered, through asset sales, over the medium term. For example, in the case of the Scandinavian countries and Japan, the gross cost of recapitalization averaged some 5 percent of GDP, whereas the average recovery rate in the first five years was about 30 percent.[43] The speed of the economic recovery and associated improvement in financial conditions are important factors in determining the recovery rate. In the case of Sweden, for example, more than 90 percent of the initial outlay was recovered

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[40] Similar results are obtained when fiscal policy is proxied using discretionary primary balance. In this case, however, the confidence bands are tighter, separating more clearly the threshold debt levels.

[41] See Spilimbergo and others (2008) for further details on the design of appropriate policies that address sustainability concerns. Reinhart and Rogoff (2008b) find that financial crisis episodes are often associated with sharp increases in the level of public debt, potentially raising concerns about medium-term debt sustainability. However, they do not examine the behavior of long-term interest rates following such crises.

[42] See Jackson (2008) and references therein.

[43] This rate is relatively low compared with the 55 percent recovery rate that advanced economies typically experience from the sale of assets acquired through interventions. Detailed data on financial policy responses for several of the financial crisis episodes studied in this chapter are available in Laeven and Valencia (2008).

within the first five years. The equivalent rate for the Japanese recession in the late 1990s, however, was just about 10 percent; it reached almost 90 percent by 2008.

V. Lessons for the Current Recession and Prospects for Recovery

Data through the fourth quarter of 2008 indicate that 15 of the 21 advanced economies considered in this chapter are already in recession. Based on output turning points, Ireland has been in decline for seven quarters; Denmark for five, Finland, New Zealand, and Sweden for four; Austria, Germany, Italy, Japan, the Netherlands, and the United Kingdom for three, and Portugal, Spain, Switzerland, and the United States for two (although the U.S. recession is already four quarters old using NBER dating).[44] This section looks at the prospects for recovery from these recessions in light of the findings of this chapter.

Many of the economies currently in recession saw expansions that closely resemble those preceding previous episodes of financial stress, as discussed in the chapter, exhibiting similarly overheated asset prices and rapid expansions in credit.[45] There are clear signs that, consistent with previous experiences of financial stress (October 2008 *World Economic Outlook*), these recessions are already more severe and longer than usual. Figure 15 plots median growth rates of key macroeconomic variables for all 122 previous recessions, along with upper and lower quartile bands. Overlaid on each are data for the current U.S. recession and the median for all other current recessions.[46] GDP data indicate that these economies have been deteriorating at a relatively rapid pace. In particular, declines in goods, labor, and asset markets in the United States have been steep. Three aspects of these developments are especially notable.

First, there is evidence of negative feedback between asset prices, credit, and investment, which, as seen in the previous sections, is common in severe recessions associated with financial crises. The most recent evidence shows exceptional reductions in credit. The deterioration in financial wealth, as represented by equity prices, has been sharp. The decline in U.S. house prices is as steep as those in the Big Five episodes discussed previously. Residential investment clearly shows exceptional declines compared with previous recessions.

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[44]The NBER has declared that the most recent peak in U.S. output was in December 2007.

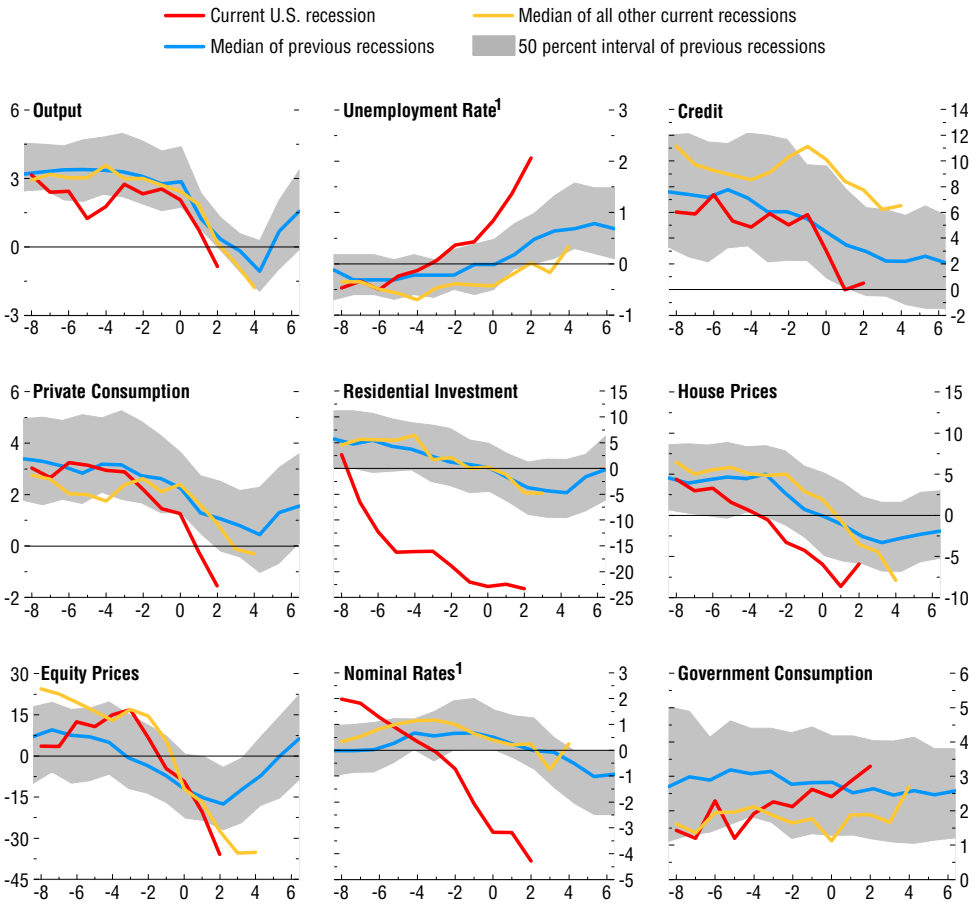
[45]Notable exceptions include Germany and Japan, as discussed in Chapter 2, although their economies are also experiencing financial stress.

[46]The calculation of the median is limited to at least [4] observations, which is why the series for recent recessions does not extend to six quarters.

Figure 15. Economic Indicators around Peaks of Current and Previous Recessions

(Median log differences from one year earlier unless otherwise noted; peak in output at t = 0; data in real terms unless otherwise noted; quarters on the x-axis)

Compared with previous recessions, the current U.S. recession is already severe. Sharp falls in wealth, restrictions in credit, and the extent of the downturn imply that quick recoveries in private demand are unlikely.



Source: IMF staff calculations.
[1]Median percentage point difference from one year earlier.

Second, the evidence from the paper indicates that the sharp falls in household wealth seen in several economies and the need to rebuild household balance sheets will result in larger-than-usual declines in private consumption. Indeed, the reduction in U.S. consumption in the most recent quarters is clearly atypical. Consumer confidence in all economies has been steadily weakening, suggesting that declines in private demand and confidence will make for a protracted recovery.

Finally, the current recessions are also highly synchronized, further dampening prospects of a normal recovery. In particular, the rapid drop in consumption in the United States represents a large decline in external demand for many other economies.

Hence, it is unlikely that overleveraged economies will be able to bounce back quickly via strong growth in domestic private demand—fundamentally, a prolonged period of above-average saving is required. In many previous cases of banking system stress, net exports led the recovery, facilitated by robust demand from the United States and by exchange rate depreciations or devaluations. But that option will not be available in this episode, given the unique stress at the heart of the world's largest economy.

Given the likely shortfalls in both domestic private demand and external demand, policy must be used to arrest the cycle of falling demand, asset prices, and credit. Monetary policy has been loosened quickly in most advanced economies, much more so than in previous recessions, and extraordinary measures have been taken to provide liquidity to markets. Further effective easing is possible, even as nominal interest rates approach zero. However, evidence from the chapter indicates that interest rate cuts are likely to have less of an impact during a financial crisis. In view of the continued distress in the financial sector, authorities should not rely solely on standard policy measures.

The evidence in this paper shows that fiscal policy can make a significant contribution to reducing the duration of recessions associated with financial crises. In effect, governments can break the negative feedback between the real economy and financial conditions by acting as "spender of last resort." But this presupposes that public stimulus can be delivered quickly. Moreover, as the chapter shows, the sustainability of the eventual debt burden constrains the scope of expansionary fiscal policy, and it will not be possible to support demand for an extended period in economies that have entered recession with weak fiscal balances and large levels of public debt. In the event of severe and prolonged recessions during which deflation is an important risk, fiscal and monetary policies should be tightly coordinated to contain downward demand pressures. Furthermore, given the globally synchronized nature of the current recession, fiscal stimulus should be provided by a broad range of countries with fiscal room to do so, so as to maximize the short-term impact on global economic activity.

Restoring the health of the financial sector is an essential component of any policy package.[47] Experiences with previous financial crises—especially those involving deleveraging, such as in Japan in the 1990s—strongly signal that coherent and comprehensive action to restore financial institutions' balance sheets, and to remove uncertainty about funding, is required before a recovery will be feasible. Even then, recovery is likely to be slow and relatively weak.

APPENDIX 1. DATA SOURCES AND METHODOLOGIES

This appendix provides details on the data and briefly reviews the methodologies utilized to identify "large shocks" and discretionary fiscal and monetary policies. The appendix also reports robustness exercises on the measure of fiscal policy.

Data Sources

The main data source for this chapter is Claessens, Kose, and Terrones (2008), from here denoted as CKT.

Variable	Source
Output	CKT, Haver Analytics
Real private consumption	CKT, Haver Analytics
Real government consumption	CKT, Haver Analytics
Real private capital investment	CKT
Real residential investment	CKT, Haver Analytics
Real exports	CKT
Real net exports	Organization for Economic Cooperation and Development (OECD) Analytical Database

[47]See, for instance, Decressin and Laxton (2009) for a discussion of unconventional monetary policy options, fiscal policy, synergies with financial sector policy, and lessons from the experience of Japan.

GDP deflator	OECD Analytical Database
Consumer price index (CPI)	CKT, International Financial Statistics (IFS) database
Oil prices	IMF Primary Commodity Prices database
Real house prices	CKT, Bank for International Settlements (BIS), OECD
Stock prices	CKT, IFS database
Credit	CKT, IFS database
Nominal interest rate	CKT, IFS database, Thomson Datastream
Unemployment rate	CKT, Haver Analytics
Labor force participation rate	OECD Analytical Database
Nominal wages	IFS database, OECD Analytical Database
House price-to-rental ratio	OECD
Household saving rate	OECD Analytical Database
Household net lending	OECD Analytical Database
Public debt	International Monetary Fund

Note: Nominal house prices from BIS; stock prices, credit, and interest rates are deflated using consumer price indices

Methodology Used to Categorize Recessions and Recoveries

The statistical rules for the nonfinancial shocks pick out large changes in macroeconomic variables, as follows:

- Oil shocks: An indicator of oil price movements records, at a given date and for each country, the maximum change in nominal local oil prices in the preceding 12 quarters.[48] Oil shocks are defined as those in which the indicator is greater than the mean plus 1.75 standard deviations of this index.

[48]This is a version of Hamilton's (2003) proposed filter for identifying oil shocks in the United States. The local price is defined as the world average U.S. dollar spot price times the nominal exchange rate for the country in question. In addition, results using year-over-year changes in real and nominal local currency oil prices and vector-autoregression-based identifications of oil supply shocks were also examined (see Kilian, 2006).

- External demand shocks: The indicator of external demand is constructed as percentage deviations from trend of the trade-weighted GDP for each economy.[49] External demand shocks are defined as those in which the indicator is less than the mean minus 1.75 standard deviations of the indicator.

- Fiscal policy shocks: For the indicator of discretionary fiscal policy, a measure of the cyclically adjusted primary balance is constructed.[50] Fiscal contractions are those in which the year-over-year difference of the cyclically adjusted primary balance is greater than the mean plus 1.75 standard deviations of the cyclically adjusted primary balance.[51]

- Monetary policy shocks: For the indicator of discretionary monetary policy, the residuals from estimated Taylor rules are employed. Monetary policy contractions are those in which the residual is greater than 1.75 standard deviations. We also examine term spreads (the difference between yields on 3-month government bills and 10-year government bonds), recording as contractionary those instances where the spread is greater than 1.75 standard deviations above trend.

- The next step is to associate recessions with these shocks. A shock in the four quarters preceding a peak in GDP is attributed one point for correctly calling the downturn ahead. This leads to the results in Table 5. Finally, Table 6 provides some evidence on the association between financial crises and the deregulation of mortgage markets.

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[49]The trend is implemented using the Hodrick-Prescott (H-P) filter with λ set to 1600. Two key assumptions are, first, that domestic absorption is well approximated by GDP, and, second, that the trade weights are of the other advanced economies alone. Some economies have significant trade relationships with nonadvanced economies that have suffered sharp declines in demand (e.g. New Zealand exports to east Asia during 1997–98). Robustness to using terms of trade and world GDP has been explored.

[50]This follows standard IMF methodology (see Heller, Haas, and Mansur, 1986). The H-P(1600) filter is used to estimate potential. OECD estimates of income elasticities for revenues and expenditures are used to construct measures of discretionary changes in the fiscal stance and to filter out passive changes from preset targets and automatic stabilizers. There are a number of important assumptions, notably that the H-P filter estimates potential output well; that the income elasticities of expenditures and revenues are constant; that revenue shares (used to construct aggregate income elasticity of revenues) are constant; and that the GDP deflator (used to deflate nominal government expenditures) is a good proxy for the true government expenditures deflator.

[51]A positive value corresponds to fiscal tightening because the primary balance is defined as tax revenues minus expenditures.

Table 5. Results from Categorizing Recessions

	Number	Percent
Episodes with Positive Overall "Pre-Peak" Scores (total of all indicators) (at least one indicator is > 0 during pre-peak period)	56	46
Episodes with Scores Greater than Zero (by indicator)		
Oil	23	19
External demand	6	5
Fiscal policy	8	7
Monetary policy	15	12
Financial crisis	15	12

		Number of Recessions with Positive "Pre-Peak" Score by Country and Indicator				
	Number of Recessions	Oil	External demand	Fiscal policy	Monetary policy	Financial crisis
Australia	6	0	1	0	1	1
Austria	6	1	1	0	1	0
Belgium	7	1	0	1	2	0
Canada	3	1	0	0	1	0
Denmark	7	1	0	1	1	1
Finland	5	0	0	2	0	1
France	4	2	0	1	0	1
Germany	8	2	0	0	2	1
Greece	8	2	0	2	1	1
Ireland	3	0	0	0	0	0
Italy	9	1	0	0	0	1
Japan	3	0	0	0	0	2
Netherlands	5	2	1	0	2	0
New Zealand	12	1	1	0	1	1
Norway	3	1	0	0	1	1
Portugal	4	1	1	1	1	0
Spain	4	1	0	0	0	1
Sweden	3	1	1	0	0	1
Switzerland	9	1	0	0	0	0
United Kingdom	5	2	0	0	0	2
United States	6	2	0	0	1	0

Table 6. Financial Crises and Deregulation in the Mortgage Market

Country	Year	Measure
Australia	1986	Removal of ceiling on mortgage interest rates
Denmark	1982	Liberalization of mortgage contract terms; deregulation of interest rates
Finland	1986–87	Deregulation of interest rates; removal of guidelines on mortgage lending
France	1987	Elimination of credit controls
Germany	1967	Deregulation of interest rates
Italy	1983–87	Deregulation of interest rates; elimination of credit ceilings
Japan	1993–94	Reduction of bank specialization requirements; deregulation of interest rates
New Zealand	1984	Removal of credit allocation guidelines; deregulation of interest rates
Norway	1984–85	Abolition of lending controls; deregulation of interest rates
Sweden	1985	Abolition of lending controls for banks; deregulation of interest rates
United Kingdom	1980–86	Credit controls eliminated; banks allowed to compete with building societies for housing finance; building societies allowed to expand lending activities; guidelines on mortgage lending removed

Source: Debelle (2004)

Methodology Used to Identify Fiscal and Monetary Policies

Two measures of fiscal policy are used: cyclically adjusted government consumption and cyclically adjusted primary balances. In instances where only one measure is discussed or presented, it is cyclically adjusted government consumption. In all cases, changes in policy are measured as changes in the respective variable from the peak of a particular cycle to the trough.

The cyclically adjusted primary balance is computed using OECD elasticities on the different tax and expenditure components. For government consumption, however, such elasticities are not readily available and thus have to be estimated. The elasticity of government consumption with respect to the business cycle is computed as follows:

$$\ln gc_t = \beta_0 + \beta_1 \times gap_t + \beta_2 \times trend + \varepsilon_t ,$$

where gc_t is government consumption at time *t, gap_t* is a measure of the output gap at time *t,* where "potential output" is measured using the Hodrick-Prescott (H-P) filter and *trend* is a time trend. In estimating the equation above, the lagged value of the output gap is used as an instrument. Cyclically adjusted government consumption ($cagc_t$) is then computed as

$$cagc_t = gc_t \left(1 - \beta_1 \times gap_t\right).$$

Two measures of monetary policy are used: nominal and real interest rates. Both of these variables are measured as deviations from a "policy rule." When only one measure is used, it is the real rate. The policy response over the course of a recession is measured as the sum of the impulse relative to the policy rule for each quarter over the recession period. A policy rule of the following form is estimated:

$$i_t = \beta_2 + \beta_3 \times dummy_85 + \beta_4 \times \pi_t + \beta_5 \times gap_t + \upsilon_t ,$$

where i_t is the nominal interest rate, *dummy*_85 is a dummy for periods after 1985 (to allow for a shift in the equilibrium real rate), π_t is the inflation rate, and gap_t is a measure of the output gap (where "potential GDP" is measured using the H-P filter). The measure of monetary policy that is used in the analysis is

$$i^{MP} = i - \hat{i} ,$$

where $\hat{i}$ is the fitted value of the regression.

We measure real rates simply as $i_t - \pi_t$, and the steps taken to get the measure of monetary policy are the same as above.

Robustness Test Using Government Consumption as a Proxy for Fiscal Policy

Apart from the two measures of fiscal policy presented in the chapter, the same set of regressions were also run using changes in real government consumption during the preceding recession, without any cyclical adjustment. Table 7 contains the results of regressions using the alternative measure of fiscal policy. While most of the main results in the chapter are preserved, the interaction term with public debt is statistically significant only at the two- and three-quarter horizon during the recovery phase. The limitations of the data may be one possible cause.

Table 7. Impact of Policies on the Strength of Recoveries Using an Alternative Measure of Fiscal Policy

Dependent Variable	Cumulative Growth Four Quarters into Recovery Phase				Cumulative Growth Three Quarters into Recovery Phase			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Recession Duration	–0.027	-0.209	-0.179	0.090	-0.076	-0.040	0.015	0.009
	(0.110)	(0.194)	(0.217)	(0.123)	(0.092)	(0.145)	(0.174)	(0.107)
Recession Amplitude	0.203**	0.439***	0.421***	0.154*	0.217*	0.283***	0.254**	0.176**
	(0.083)	(0.080)	(0.096)	(0.086)	(0.085)	(0.093)	(0.103)	(0.077)
Government Consumption[1]	0.289***	0.203	0.177	0.269**	0.261***	0.489***	0.414***	0.229***
	(0.088)	(0.157)	(0.178)	(0.098)	(0.042)	(0.129)	(0.117)	(0.050)
Public Debt[2]		-2.066**	-2.047**			-0.801	-0.807	
		(0.829)	(0.851)			(0.672)	(0.694)	
Government Consumption × Debt		-0.224	-0.200			-0.714***	-0.638***	
		(0.285)	(0.302)			(0.180)	(0.175)	
Real Rate[3]			-0.009	-0.026*			-0.022	-0.022*
			(0.026)	(0.013)			(0.018)	(0.012)
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	112	75	75	109	117	80	80	114
R^2	0.12	0.33	0.33	0.14	0.14	0.40	0.42	0.15

Notes: Robust standard errors clustered by country are reported in parentheses. ***, **, and * indicate significance at the 1, 5, and 10 percent level, respectively.

[1]Government Consumption refers to the change in government consumption during the preceding recession.

[2]Public Debt refers to the ratio of public debt to GDP at the start of the recession.

[3]Real Rate refers to the cumulative deviations of real interest rates from a Taylor rule during a recession.

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