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**Crisis, Restructuring and Growth:  
A Macroeconomic Perspective**

**by**

**Ingvild Almås  
Gernot Doppelhofer  
Jens Christian Haatvedt  
Jan Tore Klovland  
Krisztina Molnar  
Øystein Thøgersen**

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“Crisis, Restructuring and Growth”

**CRISIS, RESTRUCTURING AND GROWTH**

This report is one of a series of papers and reports published by the Institute for Research in Economics and Business Administration (SNF) as part of its research programme “Crisis, Restructuring and Growth”. The aim of the programme is to map the causes of the crisis and the subsequent real economic downturn, and to identify and analyze the consequences for restructuring needs and ability as well as the consequences for the long-term economic growth in Norway and other western countries. The programme is part of a major initiative by the NHH environment and is conducted in collaboration with the Norwegian Ministry of Trade and Industry and the Research Council of Norway.

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# Part I: Macroeconomic Lessons and Policy Implications of Financial Crises

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This report provides a broad presentation of research topics related to the development of financial crises

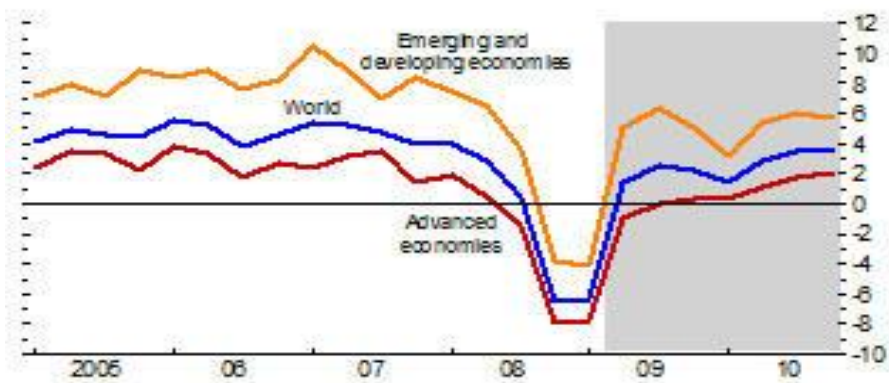
## **Chapter 1: Macroeconomics Aspects of the Financial crisis – an Introduction**

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The global financial crisis of 2008 and 2009 has its background in both micro- and macroeconomic developments. Too little and/or inefficient supervision of financial institutions, myopic agents, herd behavior and a big dose of irrational exuberance have interacted with macroeconomic features like global financial imbalances, the associated global savings glut and lax monetary and fiscal policies in most parts of the world. Currently, in the fourth quarter of 2009, the crisis has reached a stage where it is possible, with reasonable precision, to describe its roots and causes. The depth and persistence of the crisis are still uncertain, however. While the financial markets have been stabilized, and seem in most segments to approach normalized functioning, the effects on the real economy are still developing. So far, it is clear that the global business cycle is experiencing the deepest and most persistent recession since the Second World War.

The dating of the business cycle trough remains uncertain, see Figures 1.1 and 1.2. Available national account data (which include the second quarter of 2009) and the developments of the range of more high-frequency macroeconomic indicators suggest that the global recession bottomed out during the summer of 2009. The crucial question is whether the observed macroeconomic “green shoots” reflect a robust rebound – or just more short-lived effects of massive monetary and fiscal stimulations. Even more uncertain are the effects on the underlying, long run trend growth (potential output). We conjecture that both the short run business cycle dynamics as well as the effects on trend growth will vary significantly between economies, depending on both the design of economic policies and other characteristics. The challenges and trade-offs facing governments and central banks have hardly ever been as complex as today.

**Figure 1. Global GDP Growth**  
(Percent; quarter-over-quarter, annualized)



Source: IMF staff estimates.

Figure 1.1: Crisis and Global Recovery

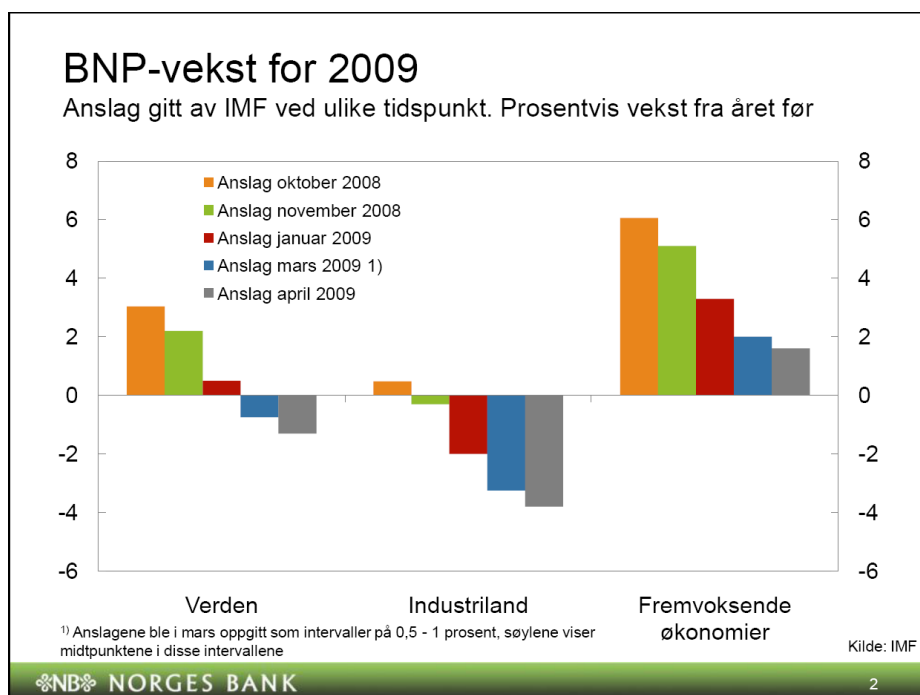


Figure 1.2: Revisions of IMF forecasts for 2009

Below, we discuss some of the most crucial issues in the macroeconomic policy debate. The point of departure is an assessment of the potential for corrections of the global financial imbalances. Such corrections will hinge on the choices made in the design of monetary and

fiscal policy. For the time being, we observe extremely expansionary policies, providing relief for the business cycle conditions, but partly offsetting the effects on the corrections of the financial imbalances. This raises questions about the adverse long run effects of the short run gains of stimulating aggregate demand.

Both the ability to stimulate aggregate demand and the long run effects will vary across economies. The vulnerability of each single economy towards the global developments will depend on characteristics such as industry structure and the initial anchoring of monetary and fiscal policy strategies. A particularly interesting issue with respect to cross country heterogeneity is the relationship between the established, industrialized countries and the emerging markets, recall the discussion over the validity of the decoupling hypothesis.

### **Corrections of financial imbalances**

The existence of global financial imbalances mainly refers to the – until recently – growing current account deficits of the U.S., which, by definition, have their counterpart in current account surpluses in other countries, most notably China and some other emerging markets, Japan, Germany and the group of petroleum exporting countries (see Figure 1.3). These imbalances can – paradoxically – be regarded as an equilibrium where the U.S, due to an excess global savings surplus, manage to implement a preferred high consumption level, whereas China and the other surplus-countries manage to implement their preferred growth strategies based on strong export growth.



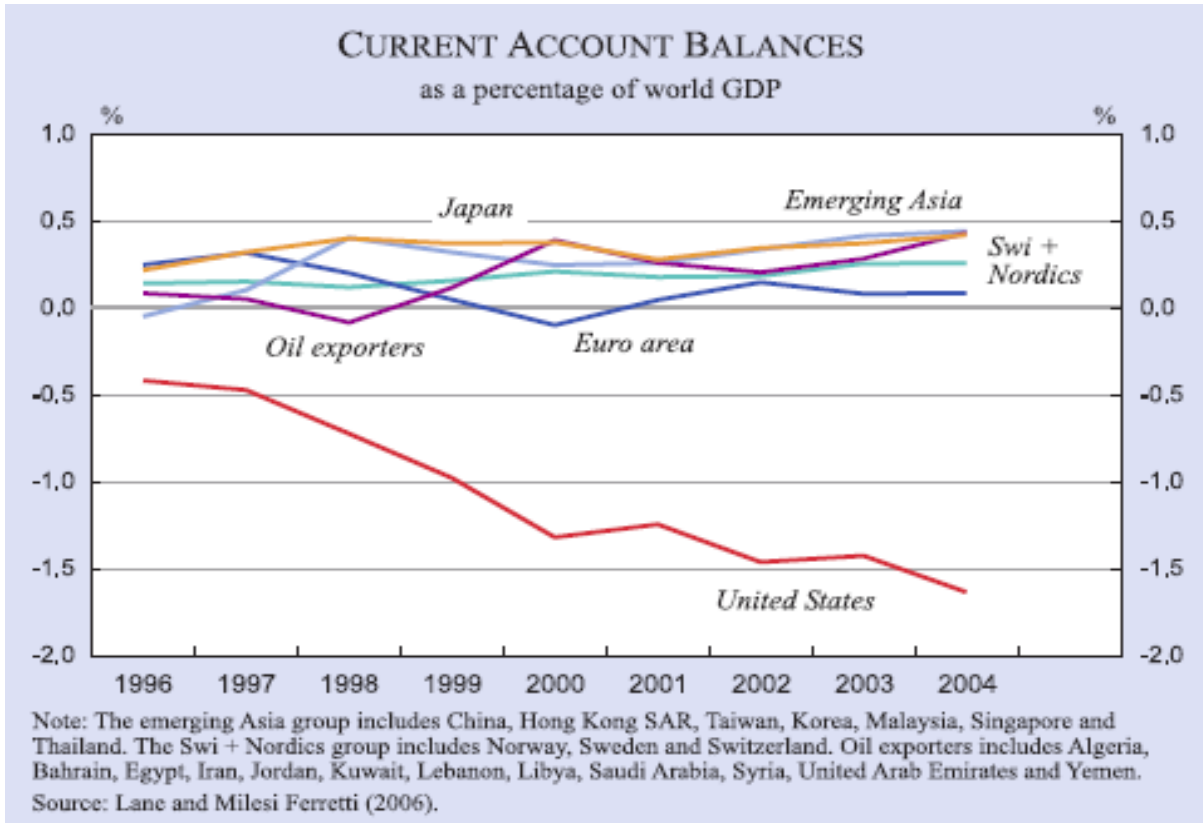


Figure 1.3: Global Imbalances 1996-2004

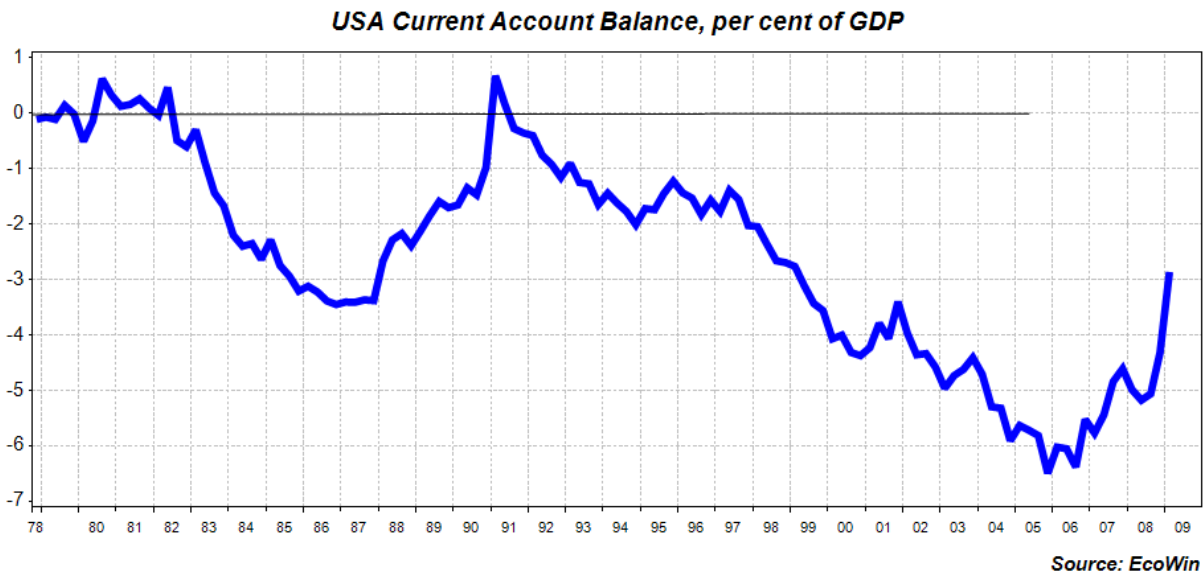
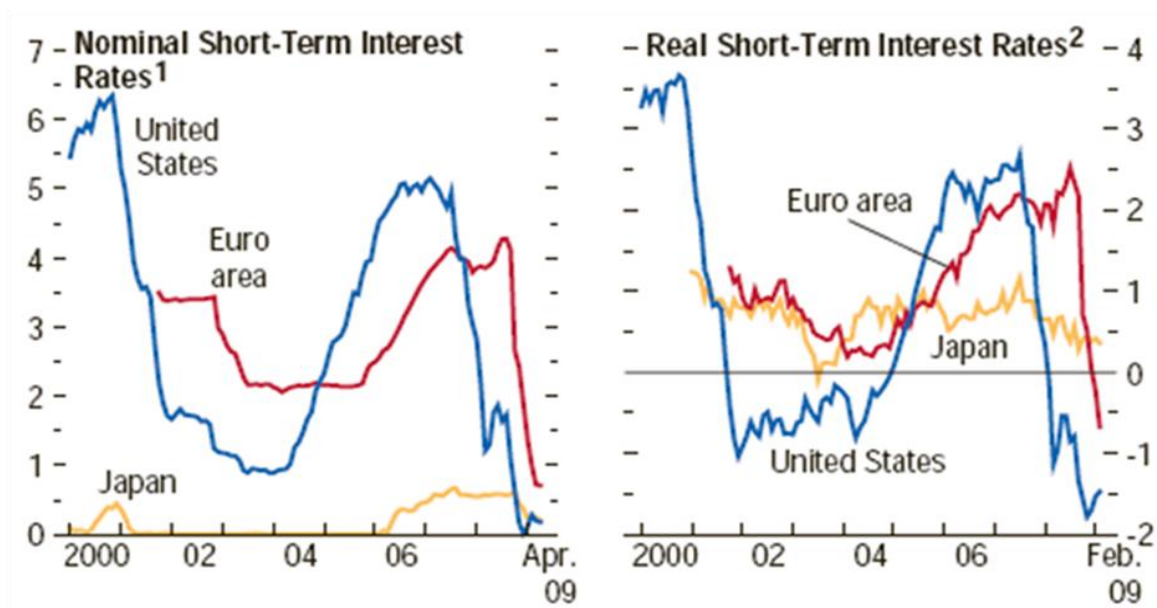


Figure 1.4: US Current Account 1978-2009

We have persistently witnessed rather low global real rates of interest (which contributed to the observed bubbles in many economies' housing and property markets). This indicates that the excess supply of global savings has been the main trigger of the observed imbalances, recall the well-known "savings-glut" perspective advocated by Bernanke (2005)



Source: IMF, WEO April 2009

Figure 1.5: Nominal and Real Interest rates 2000-2009

Despite the equilibrium characteristics mentioned above, the global imbalances were obviously not sustainable. The financial crisis and the related business cycle downturn triggered a sharp drop in aggregated demand. This removed most of the basis for the export-led growth strategies of the emerging markets. At the same time oil and commodity prices, which are particularly sensitive to the growth in emerging markets, plummeted. These developments illustrate how the accumulation of global financial imbalances created a very high inter-dependency between growth in surplus countries and growth in deficit countries.

Corrections of the financial imbalances will, by definition, be a consequence of changes in the gap between savings and investments in the different countries and regions, and such developments are sensitive to adjustments in (real) exchange rates. The magnitude of the current, ongoing corrections has, of course, not yet been revealed. This raises several

interesting research questions. One issue is related to the modeling of uncertainty related to the corrections. It seems reasonable to argue that the most pronounced risks are related to the timing of the corrections – and, accordingly, how sharp the corrections will be.<sup>1</sup> Delayed corrections will increase the future burdens related to necessary adjustments of consumption and industrial structure.

The obvious way to implement corrections is to let savings-investment gaps increase in deficit countries and decrease in surplus countries. To some extent this can now be observed. U.S. private savings have increased during the last quarters. We also observe fiscal and monetary stimulus packages aimed at aggregate demand in several emerging economies. China, in particular, has implemented a highly expansionary fiscal strategy geared mainly to a boost of public investments. Still, it remains unclear whether China and other surplus countries will implement efficient structural policies that will more permanently reduce the extremely high savings level of their households, implying that growth will be more closely related to domestic demand rather than net exports. This is a particularly crucial question for China, where the high savings level of the households reflects structural characteristics such as a lack of a public social security system. Strong incentives towards both savings for old age as well as precautionary savings in general, make it hard to stimulate private consumption in the short run. This is illustrated by the gradual decline in the Chinese consumption share of GDP down to barely 40 per cent of GDP – as compared to nearly 70 per cent in the U.S. An interesting research question is how an introduction of social security (old age pensions and/or other transfer programs) will impact Chinese consumption and saving – and in turn the current account position.

### **Short run gains – long run pains**

Expansionary fiscal policy that increases public debt per worker, redistributes tax burdens into the future, thereby reducing the welfare of young and unborn generations. In several

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<sup>1</sup> Formalized, model-based macroeconomic analyses have traditionally not focused much on this “timing uncertainty”. An exception is the analysis of Bertola and Drazen (1993) who consider the effects of an uncertain timing of a fiscal restraint .

OECD economies where tax rates are already high at the outset, and ageing leads to escalating fiscal changes in the years to come, this motivates social security reforms intending to both reduce the magnitude of future pension expenditures and stimulate labor supply and growth.

When economies with significant fiscal challenges currently run significant fiscal deficits, future tax burdens increase to even higher levels. In deficit economies, like notably the US and the UK, this implies that the room to maneuver for the potential implementation of new welfare programs or other political projects declines, recall, as an example, the plans of the Obama administration to present a major health care reform in the US.

These developments raise interesting research questions about fiscal policy trade-offs in the years to come. Is it wise that economies, which have contributed to the current crises by saving way too little, in effect attempt to offset the initiated corrections by fiscal policies that increase the public debt? The objective of the implemented fiscal policies is exactly this, namely to offset the effects of increased private saving in a way which keeps aggregated domestic demand growth afloat.

The observed expansionary policy measures express, explicitly or implicitly, that the short run business cycle problems and the related systemic problems in major segments of the financial markets are assessed as extremely severe. Policy-makers may, for example, refer to the fear of social tension and problems that might spin out of control if the unemployment rates hit the highest levels since the great depression. Thus, the view of most policy-makers seems to be that the long-run price of the huge keynesian stimulus packages is justified.

It is in any case relevant to assess the consequences of fiscal policies that counteract intuitive, and, in the long run, unavoidable corrections of the global financial imbalances. It is worth noting that aggressive fiscal policies that contribute to private consumption growth in the US and other deficit-economies, may well be popular along several dimensions. They will reduce the fall in China's (and other surplus economies') export, and will, of course, provide short run stimulation of aggregate demand.

The issue is whether this will contribute to new – and potentially even bigger – future crises. The analogy to US economic policy in 1998 is striking.<sup>2</sup> In 1998 the US Central Bank, the Federal Reserve, implemented a series of so-called “emergency interest rate cuts” in order to stimulate aggregate demand and provide relief to the financial markets in response to external shocks including crises in Asia and Russia and financial market unease (recall the collapse of the big hedge fund, LTCM). The expansionary policies were very successful in the short run. Private consumption increased significantly. In turn, this paved the way for a continued expansion of Asian exports, and consequently inflated the global imbalances. The long run price of these policies was – as assessed from the current stage – high. The effects include high private debt accumulation, housing bubbles, and a persistent global surplus-supply of liquidity that acted as a catalyst for bad incentives and practices within many of the worlds’ major financial institutions. An obvious issue is whether today’s tremendous monetary and fiscal stimulus will cement the global financial imbalances and increase the exposure to more asset price bubbles and boom-bust cycles in the real economy.

### **Stabilization policies**

The financial crisis has triggered a big debate about the role and design of stabilization policies, particularly the monetary policy framework and the conduct of interest rate setting. The widespread (flexible) inflation targeting paradigm has received a lot of criticism, both in economies with explicit inflation targets and in economies, like the US, with more implicit inflation targets. A common argument is that interest rates were set at very low levels for far too long, reflecting the fact that cheap imports from China and other emerging markets contributed to low consumer price inflation everywhere. This was a main explanation for asset price inflation and associated bubbles. Because asset price developments are generally not reflected by the standard inflation indexes targeted by central banks, many observers argue that these developments were more or less neglected by central banks in their interest rate decisions.

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<sup>2</sup> See the op-ed piece of Stephen Roach, Chairman of Board in Morgan Stanley Asia, in Financial Times 10.03.09, entitled “Grow now, ask questions later – formula will end in tears”.

Former US central bank governor, Alan Greenspan, was well-known for his asymmetric view on how central banks should react to asset prices.<sup>3</sup> He argued that asset prices should not influence interest rates during the boom-phase of an asset price cycle. However, the central bank should come to the rescue, cutting interest rates aggressively when the asset price bubble eventually burst. Naturally, this view, in its crude form, has been discredited during the last couple of years.

Additional research questions are partly related to the effects and interpretation of credit growth and asset prices within today's "best international practice" flexible inflation targeting framework, and partly to the coordination between monetary policy and other policy measures. The basic principle of flexible inflation targeting is that interest rates should be set in order to obtain an optimal trade-off between the prospects for inflation (i.e. the expected path of actual inflation vs. the inflation target) and the prospects for real economic activity, typically specified as the expected developments of the output gap (i.e. the expected path of actual output vs. the estimated trend output). According to the consensus view over the last decades, asset prices are valuable indicators for these objective variables. It is also widely accepted that asset price movements (particularly sharp drops associated with the burst of bubbles) impact future output gaps. A relevant question is whether central banks throughout the world underestimated the strength of the link between asset prices and other key variables, a link that might be highly non-linear for sharp drops in asset prices. Before the focus is directed to potential reforms of the inflation targeting paradigm per se, attention should be directed to central banks' modeling of the transmission mechanism related to the interaction between asset prices, interest rates and other key variables.

The observed magnitude of the global recession caused by the financial crises, and the evidence provided by Reinhart and Rogoff (2009a), which shows that recessions associated with asset price bubbles and banking crises are particularly deep and prolonged, does also call for attention towards other policy measures than monetary policy alone. This obviously includes macro-prudential policies. A main issue is better supervision and regulation of the

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<sup>3</sup> See Blinder and Reis (2005).

banking sector in order to avoid the observed strong tendency in many countries to a pro-cyclical lending practice due to the flawed design of banks' capital requirements.

### **Macroeconomic prospects and "de-coupling"**

The global recession of 2008 – 2009 has been highly synchronized between countries and regions. This is, intuitively, consistent with a severe drop in global trade. The depth of the recession, its persistence, and, particularly, the prospects for the structural, long run trend growth, are likely to vary widely, however.

Long run variations in the trend growth of an economy are well known. The US, for example, experienced a trend real growth rate close to 3.5 per cent annually during the period from 1950 to the beginning of the 1970s. Then the trend growth rate decreased to approximately 2.5 per cent for the next two decades, until it again increased during the last part of the 1990s. An important issue is whether a return to an anemic trend growth trajectory is likely in the same way as in the early 1970s. Potential triggers include:

- *Escalation of protectionistic measures:* The observed drop in world trade is so far – to a first approximation – fully caused by the drop in aggregate demand associated with the downturn of the business cycle. This effect is temporary. We have, however, witnessed a number of suggested, and to a minor extent implemented, policy measures with protectionistic elements. This includes the transfers to the US car industry and Chinese tax and tariff policies supporting China's own export industry. At the current stage, the risks of devastating trade wars and big scale protectionism seem small, however.
- *Credit rationing:* A main ingredient of the financial crisis is the malfunctioning of the banking sector. While the many significant measures implemented by central banks and other authorities have clearly stabilized the situation in most economies, in several countries it is still not the case that the working of the banking sector and the financial markets is normalized. This implies that there is a risk of a prolonged period with credit rationing in such countries, particularly hurting investments, and, ultimately, growth.

- *Higher and/or more volatile inflation, stagflation:* We have witnessed aggressive monetary policies in most economies, pushing key interest rates down to very low levels and including various types of quantitative easing on a grand scale. This has contributed to a sharp increase in money supply. As a consequence, inflation expectations have increased and much attention is now directed to the risk of higher inflation over, say, a two to five year horizon. In particular deficit countries where deleveraging and higher tax burdens put a drag on private demand may face a stagflationary climate.
- *Regulation and efficiency:* The financial crisis is a crisis of the market-based economic system. Not surprisingly, the political debate now focuses on the potential implementation of stricter regulations and closer supervision of many financial institutions. The design, scale and efficiency effects of the innovations in this area may well impact trend growth.

While the issues discussed above are important for the global economy as a whole, there are also a series of more idiosyncratic issues which are crucial for individual countries. These include: the individual economy's dependency on trade; the characteristics of the export sector, i.e. the type and income elasticity of the export products; the terms of trade implications; the initial anchoring of the individual economy's monetary and fiscal policy strategies; the initial situation with respect to foreign financial assets, current account balance, public debt and budget balance.

A highly interesting issue is the relationship between the industrialized economies and the emerging market economies. During the last decades, significant and fairly persistent differences in growth and also financial market performance suggested the "decoupling hypothesis". In its simplest (and maybe naive) form, decoupling was interpreted to imply that the growth rates of China and other emerging markets were immune against declining growth in the US and other industrialized countries. The developments over the last couple of years clearly show that this interpretation of decoupling was false, see the discussion above regarding the interdependency caused by global financial imbalances.



The lack of support to the simplest form of the decoupling hypothesis does not, however, rule out the existence of significant differences in growth dynamics. The main underlying drivers for strong growth in China and several other emerging markets are urbanization, industrialization and human capital accumulation. These mechanisms are intact despite the business cycle downturn we have witnessed. Thus, the growth prospects for the emerging markets and the interdependence between these countries and the established industrialized economies are center-stage for the understanding of the global economic prospects.

## Chapter 2: The financial crisis: Lessons from the interwar period

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### Introduction

We develop three major themes in this chapter: (A) What can we learn from the Great Depression of 1929-1933 in the United States with respect to the causes of the cyclical downturn and the behavior of the economy during the contraction phase of the cycle? (b) Does the historical experience during the recovery phase, i.e. from 1933 onwards, present any lessons that are relevant for today's policy response? (C) How did financial crises in Norway during the interwar period affect the behavior of the real economy in terms of business cycles and economic growth?

In the first two sections the focus is thus on the interaction between monetary policy, the financial sector and real output in the United States, mainly in the 1930s. In the third section the focus is shifted towards Norway – trying to understand how Norway differed from other countries, particularly the United States. Here the time period from which our policy lessons are extracted is extended to the whole interwar period.

### The business cycle – chronology and severity: a comparison of the 1929-1933 cycle with the present downturn

The Great Depression (or Contraction, as it is sometimes called) – the business cycle depression starting in August 1929, and lasting until March 1933 - was the longest and by far the most severe of all business cycles ever recorded in the United States.<sup>4</sup> In terms of business cycle history this cycle occupies a unique role. As the present financial crisis developed into a major economic contraction period the Great Depression was used as a benchmark of a 'worst case scenario'.

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<sup>4</sup> The authoritative business cycle chronology of the United States, originally developed by Burns and Mitchell (1946) and maintained by the National Bureau of Economic Research, goes back to 1854. The list is available at <http://www.nber.org/cycles/cyclesmain.html>.

A useful summary measure of the severity of business cycles is the concept of *output loss* as defined by Christina Romer (1994). Looking at the graph of a time series representing the business cycle during a contraction period, a horizontal line can be drawn from the most recent peak of the business cycle (point A). When the economy is starting to recover again the line will intersect the data series at a point B when the previous peak level of output has been reached once again. The output loss is then measured as the area below the waterline and the bottom of the lake as defined by the time series, typically represented by industrial production or similar series. This measure thus comprises two important aspects of a cycle: its duration and its depth.

Using this measure it turns out that the 1929-1933 cycle is 4.7 times as bad as the next worst cycle, the famous restocking cycle in the immediate aftermath of World War I, which was a short but particularly steep cycle during 1919-1921. It also turns out that the top three cycles in terms of severity on this list all belong to the interwar period. The third cycle was a less spectacular, but quite severe, downturn in the United States in 1937.

Figure 2.1 graphs the level of the industrial production index in the interwar period, with the contraction periods, as defined by the National Bureau of Economic Research (NBER), being shaded.<sup>5</sup> The three major recessions stand out clearly in this graph. There were, in addition, two minor cycles, in 1923-1924 and in 1926-1927.<sup>6</sup>

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<sup>5</sup> Because the NBER looks at several business cycle indicators in addition to industrial output the peaks and troughs shown in the graph will not always coincide exactly with those of output.

<sup>6</sup> The data on industrial production are taken from the database of the Federal Reserve Bank of St Louis (FRED), available at <http://research.stlouisfed.org/fred2/>.

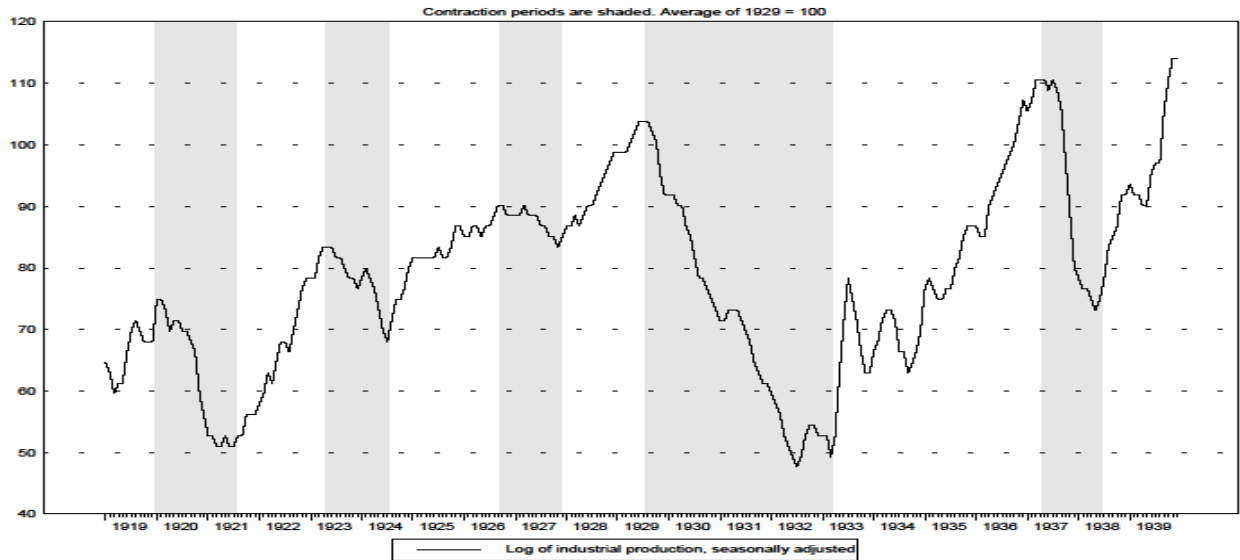


Figure 2.1. Industrial production in the United States 1919 - 1939

From the perspective of understanding the present financial crisis there are lessons to be learnt from each of the interwar cycles. The Great Depression 1929-1933 is, as already noted, the one most often referred to. However, the next cycle, the much steeper but significantly shorter cycle of 1937-1938 is also of particular interest in this connection, because some researchers have claimed that this cycle largely came about as a mismanaged attempt at reversing the expansionary policy measures belatedly taken in 1933 to end the Great Depression.<sup>7</sup> As such the lessons to be learnt from this episode may be considered as potentially very useful at the present stage of the cycle (October 2009).

The estimates of the output loss in manufacturing production presented by Romer (1994) show that there is a marked difference between the interwar period on the one hand and both the pre-WWI and the post-WWII periods (up to the early 1990s) on the other hand. According to this measure the severity of cycles was at about the same levels in the two latter periods, whereas the output loss during the interwar cycles (including the minor ones) was six times as great.

Figure 2.2 shows the index of industrial production in the United States since 1990. In addition to the minor cycle in 1990-1991, there are only two major cycles here, the dotcom

<sup>7</sup> Friedman and Schwartz (1963), Wheelock (2009).

cycle of 2001 and the present contraction period, which began in December 2007. After a sluggish start the 1990s stand out as a long and uninterrupted period of solid economic growth. The economy recovered well after the 2001 cycle, and sustained growth continued until late in 2007. No estimate has been made of the output loss during the 2001 cycle, so that an exact comparison with previous cycles cannot be made, but it appears from Figure 2.2 that the output loss during this cycle was not insignificant. It took a fairly long time for industrial output to regain the peak level of September 2000; in fact, it did not do so until October 2004. According to the NBER classification this cycle only lasted from March 2001 to November 2001, so it appears that the manufacturing sector was particularly hard hit in this case.

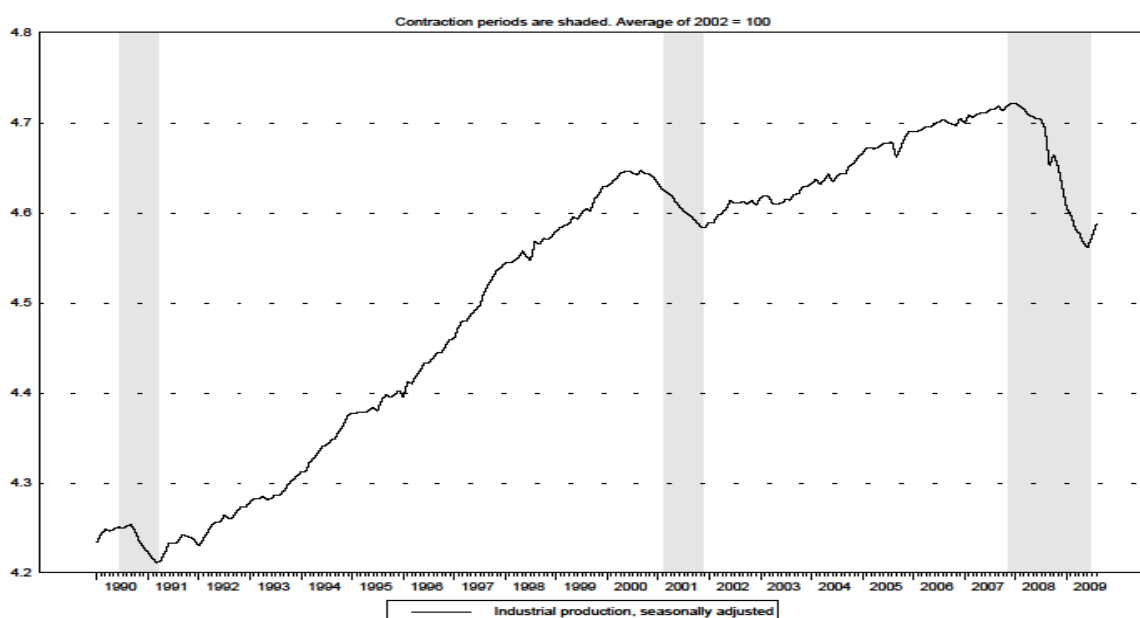


Figure 2.2. Industrial production in the United States 1990 - 2009

The last cycle shows a rapid decline in output from the end of 2007. If the faint recovery starting in the summer of 2009 is sustained, the level of output would have fallen by 15 per cent from the peak of December 2007 to the provisional trough in June 2009.

Figure 2.3 is presented with a view to comparing the cycles of the interwar period with those of the past twelve years. The interwar industrial output index is set equal to 100 in August 1929, when the Great Depression started. The curve showing the recent period is adjusted in time so that the peak of December 2007 matches with the 1929 peak, also showing a

maximum value of 100. The time scale and the dating of the cycles refer to the interwar period only.

Superimposing the most recent output record on the interwar curve makes it clear that industrial production was in general far more volatile in the interwar period. In the 2001 cycle, which corresponds to 1922 in the graph, output fell by only about 6 per cent, which is much less than the fairly mild 1923-1924 cycle, when output at the trough was 18.4 per cent lower than at the peak.

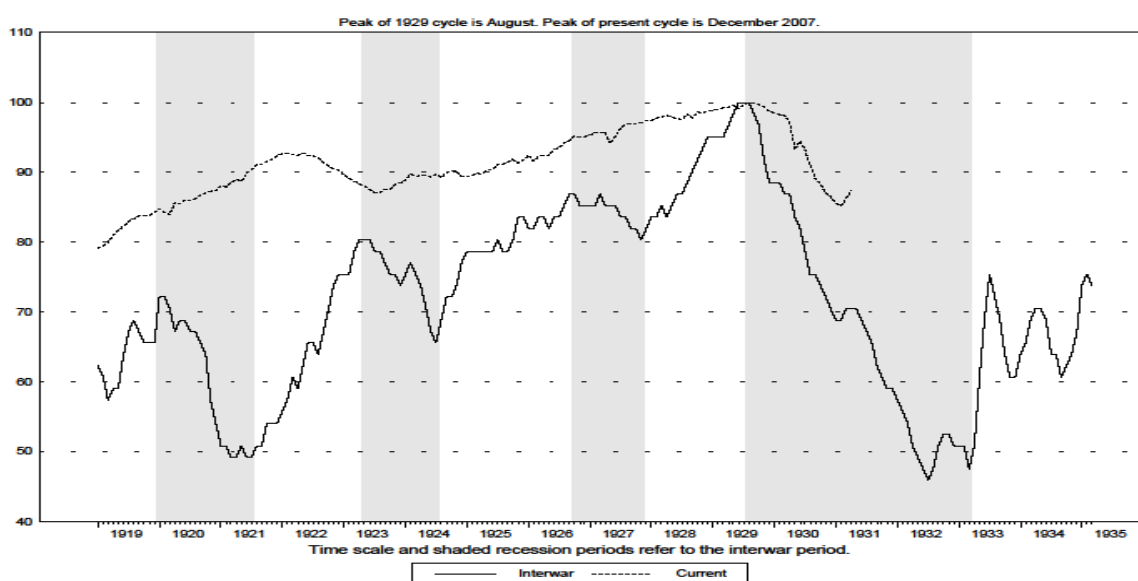


Figure 2.3. US Industrial production in two periods: 1919 – 1935 and 1997 - 2009

Once the recessionary impact had begun to be filtered through the economy in the first half of 2008, the rate of decline of output during the present cycle nearly matches that experienced during the Great Depression. What makes the latter episode so unique, however, is that output went on falling at a steep rate for an extended time period. If, as it now seems (October 2009), output is beginning to recover again, maybe with some minor setbacks, the output loss of the two episodes will not be of the same order of magnitude at all.

Two interesting issues arise from this observation. First, what made the economy fall so steeply during the recent contraction that the most natural benchmark soon became the Great Depression? Secondly, why did the rolling snowball lose its pace on its way down the hill this time, in stark contrast to the Great Depression? In order to shed some light on these

issues we need to focus on some features that were similar and some that were quite different in the two episodes. The focus will mainly be on financial market conditions and monetary policy. Many other factors, such as fiscal policy, social policy, labor market institutions and demographic trends, are obviously of relevance as well in this connection, but a discussion of these are beyond the scope of the present chapter.

### **Financial market events: important similar features of the two cycles**

We present some brief comparative remarks on the following aspects of the financial crises now and then: (1) asset markets (2) money markets (3) bank failures and banking legislation (4) the credit crunch (5) monetary policy.<sup>8</sup>

#### **Asset markets**

The *housing market* has played a key role in the present financial crisis. The sub-prime market only collapsed after house prices started to fall late in 2006. This is widely believed to be the spark that ignited the financial crisis. In contrast, falling house prices are not usually cited as a prominent factor in the Great Depression in the United States. Taking a closer look at the housing market in the 1920s, however, reveals that there was indeed a real estate bubble in the 1920s, which burst in 1926.<sup>9</sup> The consequences were less severe than in the most recent crisis, but viewed together with the subsequent stock market crash, it weakened the balance sheets of households and financial institutions prior to the turmoil of the Great Depression. When the value of their mortgage debt increased significantly relative to the market value of their tangible wealth, the financial fragility of households increased, leaving them more vulnerable to even more severe financial shocks that were to come a few years later.

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<sup>8</sup> Bordo and Haubrich (2009) review the role of credit crises as a cause of all business cycle contractions from 1875 to the present.

<sup>9</sup> White (2009)

White (2009) presents some interesting arguments why house price bubbles create greater dangers to financial stability now than in the 1920s. Ever since Roosevelt's New Deal measures to expand home ownership have been an important item on the political agenda. Federal institutions like Fannie Mae and Freddie Mac have been set up with a view to channeling mortgage loans to new groups of homeowners. This has drawn higher risk families into the home buying market, which has led to increasing foreclosure rates in turbulent periods. In addition, federal deposit insurance, financial innovations and more liberal banking regulation have induced banks to take more risks. Because the banking system is now more integrated than in the 1920s, locally generated shocks have the potential of causing much more serious nationwide problems.

On the other hand, the behavior of *financial markets* exhibits some strikingly similar features. The most well known feature of financial market behavior is the collapse of the *stock market* in September 1929. Stock prices on the New York Stock Exchange, as measured by the Dow Jones Industrial Average, fell continuously over a period of 34 months, from September 1929 to July 1932. At the trough in July 1932 the value of the index was only 10.8 per cent of the maximum that prevailed in September 1929. In the present crisis the period of falling stock prices only extends to less than one and a half years, and the lowest index value recorded is slightly less than 50 per cent of the peak value in October 2007. As we saw in the case of industrial output the basic similarity between the two episodes lies with the *speed of the initial fall* (in output and stock prices); the crucial difference is the length of the contraction period.

The *security markets* provide interesting material for a comparison between the two episodes. In both cases we see a major deterioration in the financing conditions of private business firms. The market prices of bonds issued by the corporate sector fell significantly, in particular those with a low credit rating. This made it more costly to raise capital on the security markets; in some cases this option became closed to borrowers. On the other hand, the prices of government bills and bonds soared, bringing down the yield on such papers to very low levels. These observations all reflect the general scramble for safety on the part of the investors, often referred to as a flight to quality.



These features can be neatly summarized in the yield spread between long-term corporate bonds and government bonds shown in Figure 2.4. The corporate bond category chosen here comprises companies with a BAA rating, which represent fairly well performing firms of good average solidity, although a little below the very best of the large multinational companies.

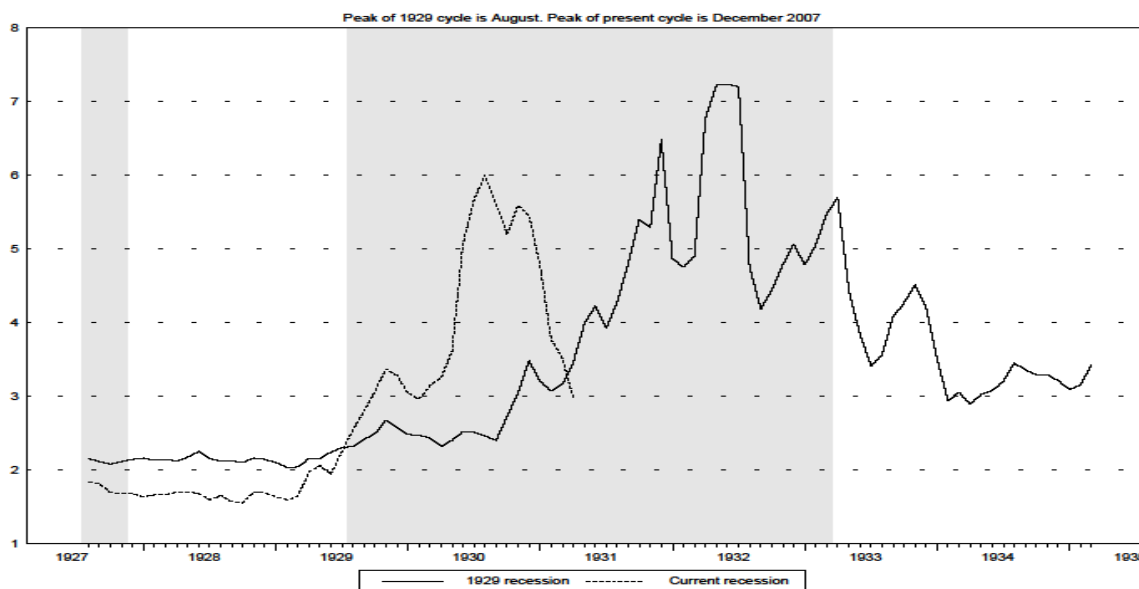


Figure 2.4. Yield spreads: Corporate Baa – US Government in two recessions

Figure 2.4 is constructed the same way as Figure 2.3, showing the development of the yield spread for some years before, during and after the Great Depression – from 1927 to 1935. Superimposed on this curve is the same yield spread measure for the most recent cycle, shifted backwards in time so that the peak of the present cycle, December 2007, corresponds to the peak of the Great Depression (August 1929). The last observation is for August 2009. At this stage of the cycle the Great Depression had run about one half of its course, corresponding to April 1931.

Prior to the outbreak of the two crises the yield spread hovered around 2 percentage points in both cases – a little less than 2 in the current period, slightly above 2 in the former period. The yield spread has been higher in the current cycle until quite recently, signaling that the breakdown of credit intermediation in the corporate bond markets was more serious this time. A key feature of this graph is thus that the security market deterioration was quicker to manifest itself in the current cycle. The rise in the yield spread gathered momentum about

nine months into the present cycle, no doubt as a result of the aggravation of financial market conditions following the collapse of the investment bank Lehman Brothers in the middle of September 2008. The speedy reversal of the yield spread after the autumn of 2008 is remarkable, even though confidence in this market is still not at the same level as in the pre-crisis period. The massive intervention in the securities markets by the Federal Reserve has no doubt been a major factor behind the rapid improvement of the bond market in 2009.<sup>10</sup>

Eventually, yield spreads in the early 1930s reached the same crisis levels as in the present cycle, and even went beyond that level, but that was not until the contraction had lasted about two years. The timing is thus crucially different from the present episode, and the driving forces are partly different as well.

But let us first look at the basic similarities of the market reactions in the two periods. One of the most prominent features of a financial crisis is the 'flight to quality', which translates into a marked higher demand for government bonds relative to the more risky corporate bonds.<sup>11</sup> This puts a forceful downward pressure on government bond yields. As earning prospects deteriorate after the business cycle peak has been reached and the economy is heading for a recession period, the prices of corporate bonds will tend to fall, giving rise to increasing yields on corporate bonds. In consequence, the yield differential will rise due to opposite movements in the government and corporate bond yield series.

It may appear that it took a longer time for the market to realize that the business cycle downturn had seriously impaired the earning power of the bond-issuing private companies in the 1929-1933 cycle than in the present one. This may be one feature that turns out to distinguish the two cycles, but perhaps not the most important one. The history of corporate bond yields in that episode is also heavily influenced by the portfolio behavior of commercial banks, and here there is a crucial difference. As discussed in more detail below,

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<sup>10</sup> See Gavin (2009) for a survey of the various government programs for buying securities on the markets implemented by the Federal Reserve.

<sup>11</sup> An additional factor that led to an increased demand for government bonds during the early 1930s was that these securities could be used as collateral for loans from Federal Reserve Banks.

a salient feature of the 1929-1933 cycle is the repeated waves of malignant banking crises that occurred then. As banks struggled more and more to obtain sufficient liquidity to stem their depositors' enhanced demand for cash, the banks dumped their holdings of marketable securities. The heavy pressure on banks to liquidate their financial assets during the various waves of banking crises led to a significant fall in corporate bond prices. At one stage, during the period of the most severe financial crisis in late 1931 and early 1932, this liquidation process even depressed the prices of government bonds, although to a lesser extent than corporate bonds.<sup>12</sup>

So far the general banking legislation, in particular deposit insurance, as well as a liberal provision of liquidity to the banking system from the Federal Reserve (and other central banks, too), has prevented any epidemics of widespread bank runs related to ordinary commercial banks in the recent years. Until 1933 there was no deposit insurance in the United States, which is of course a crucial factor in explaining why the course of events turned out differently this time. Consequently, as far as the security markets are concerned, what initially looked like a more critical situation with respect to the breakdown of the credit intermediation process, the worst of the crisis was overcome relatively soon. The resilience of the banking system (with the strong helping hand of the Federal Reserve) may have prevented a similarly bad or even worse situation developing in the present crisis.

### **Money markets**

In the present crisis one of the most acute problem areas has been the funding side of banks' activities. Particularly following the Lehman collapse interbank trading broke down due to a major increase in perceived counterparty risk. Although the Federal Reserve provided short term funding to the banks at an unprecedented level, the increased liquidity preference on the part of the banking sector probably outstripped the amounts provided. It was also the case that the money markets functioned badly in distributing this increased liquidity to all participants.

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<sup>12</sup> See Friedman and Schwartz (1963, pp. 318-319) for a discussion of this episode.

There are two well-known indicators of the functioning of the money market. One is the TED spread, the difference between the 3-month eurodollar rate of interest quoted in London and the yield on Treasury Bills of the same maturity in the second hand markets (see Figure 4.1 in chapter 4). Another measure is the Libor-OIS spread, which is the difference between the same 3-month eurodollar rate and the rate of interest on overnight index swap instruments. The latter is a newly developed instrument linked to the overnight interest rate on Federal Funds (the key interbank interest rate). If a bank enters into an OIS contract, it is entitled to receive a fixed rate of interest on a notional amount equal to the market price of OIS; in exchange the bank agrees to pay interest on the same notional amount determined by the geometric average of the effective federal funds rate over a period of, say, three months. Note that this instrument does not involve any initial cash flows. It is therefore considered as an accurate measure of investor expectations of the effective federal funds rate over the next three months. In contrast to the eurodollar interest rate it does not contain any substantial credit and liquidity risk. The difference between the eurodollar rate and the OIS rate is therefore considered as a good summary indicator of the risk premiums observed in the money markets.

Before the onset of the turmoil in financial markets in August 2007 the Libor-OIS spread was very small, about 10 basis points (0.1 percent). After the crisis began it increased to a much higher level, around 70 – 100 basis points. When Lehman Brothers failed in September 2008 – the days when the money markets nearly died - it reached the astronomical level of 365 points. During 2009 the Libor-OIS spread has been considerably reduced; although the spread has not reverted to the very low levels prevailing before August 2007, this indicator nevertheless signals that money markets once again function reasonably well. The development of the TED spread gives much the same impression (see Figure 4.1 in chapter 4 below); in this case the spread is almost back at pre-crisis levels.

We cannot make a direct comparison with the conditions prevailing in the money market during the Great Depression, because the money markets were not organized in the way they are now. Total bank reserves did not fluctuate much during the 1929-1933 cycle<sup>13</sup>, but

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<sup>13</sup> Cagan (1965, Appendix Table F-8).

the money market was nevertheless very tight, basically for two reasons: (1) The enhanced uncertainty about the solidity of banks made the depositors nervous, which resulted in an increased desire to withdraw deposits for cash. This prompted a shift in the liquidity preferences of the banks as well, which resulted in a scramble for liquidity among banks. (2) Although *total* bank reserves may have been adequate to meet the daily needs for liquidity, the mechanisms for redistributing reserves among banks may have functioned poorly. Friedman and Schwartz (1963, p. 318) describe the situation in 1931 thus: '[T]he banks found their reserves being drained from two directions – by export of gold and by internal demands for currency. They had only two recourses: to borrow from the Reserve System and to dump their assets on the market. They did both, though neither was a satisfactory solution.'

These features are not unique to the Great Depression, both aspects of the banks' liquidity behavior were prominent in the present financial crisis, especially during the autumn of 2008. The great difference was the response of the authorities: in the 1929-1933 period the Fed's provision of liquidity to the banks was limited and intermittent, and banks were also somewhat reluctant to reveal that their discount business with the Fed involved large amounts; in the present crisis central bank liquidity injections were huge and banks borrowed freely.

### **Bank failures and banking legislation**

The present crisis has been associated with spectacular failures or liquidations of some large investment banks (Bear Stearns, Lehman Brothers), but few ordinary commercial and savings banks have failed until quite recently. During 2009 the failure rate has increased significantly, however, as shown in Figure 2.5.

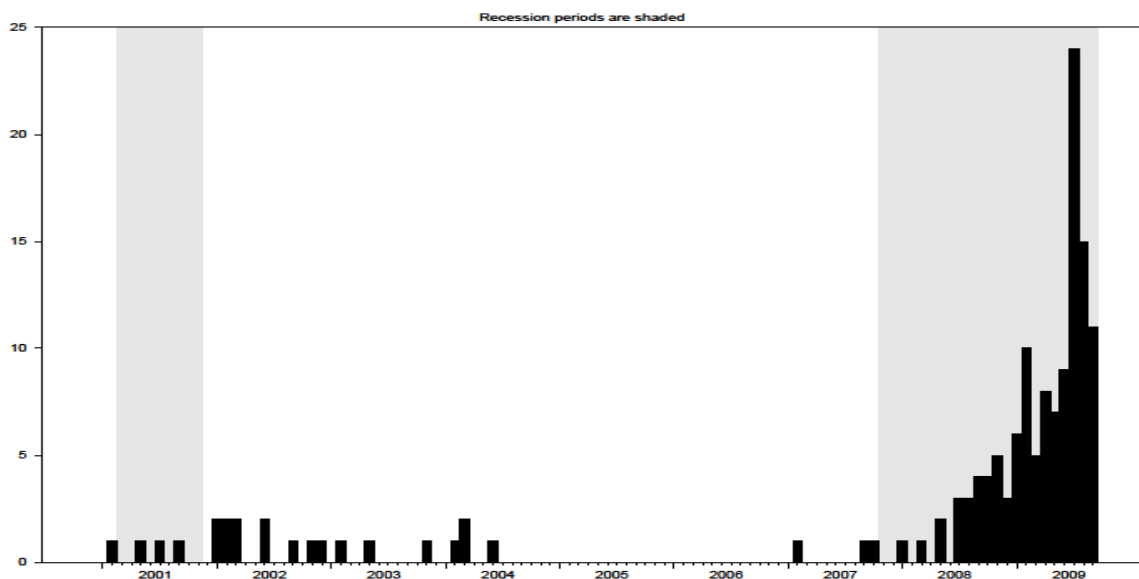


Figure 2.5. Number of bank failures in the United States 2001 - 2009

So far in 2009 (October), including data through September 2009, 95 banks have failed in the United States. If the present rate of failure is maintained throughout the year the total number may turn out to be between 120 and 150.

These numbers may cause some concern on the part of the authorities, particularly because more funds will be needed to carry out the liquidation process (deposit insurance) in an orderly way. Still, they are tiny in comparison with the Great Depression. In the prosperous 1920s the number of commercial bank suspensions in the United States ranged between 366 in 1922 and 975 in 1926. In the years 1930 to 1932 the number increased to 1350, 2293 and 1453, respectively. The banking crisis culminated in 1933 with 4000 bank suspensions.<sup>14</sup> After the new banking legislation took effect in 1934 the number never exceeded one hundred.

The New Deal program launched by president Roosevelt comprised significant changes to banking regulation and the creation of new institutions that have come to play a vital role in promoting financial stability. On March 6, 1933, a bank holiday was declared; after March 12 sound banks could reopen for normal business after applying for a license. Certain

<sup>14</sup> Friedman and Schwartz (1963, p. 438).

national banks with impaired assets were later allowed to open for business on a restricted basis subject to approval from the authorities. Such banks could receive new deposits, which were segregated from other liabilities of the bank; these were available for immediate withdrawal without restrictions. These measures, in conjunction with a far more expansive monetary policy stance, seem to have brought about financial stability again. Soon after this the economy turned upward.

The Glass-Steagall Act set up the Federal Deposit Insurance Corporation (FDIC), which provided insurance on deposits. After this scheme came into operation at the beginning of 1934, the problem of virulent bank runs disappeared. Another important piece of legislation concerned cross ownership in the banking sector. The activities of the investment bank arms were seen to be involved in highly risky operations, often of a speculative character, which was not compatible with sound banking funded by ordinary bank deposits. The investment banks were accordingly segregated from the commercial banks.

There is much agreement about the crucial role played by the banking crises during the Great Depression. This is perhaps the most unique feature of this episode. If we were to single out one factor that could explain why this cycle was so severe – which is probably a too gross simplification to be taken seriously, though – it is certainly the bank failures.

The bank crises occupy a prominent place in Friedman and Schwartz' (1963, pp. 299-419) authoritative historical narrative of the Great Contraction. They describe three successive waves of bank failures in 1930, 1931 and 1933, each more severe than the preceding one. The Federal Reserve System did show some concern about the wave of bank failures towards the end of 1930, in particular the failure of the Bank of the United States in December 1930, the largest bank ever to have failed up to that time. But in general few significant measures were taken by the Federal Reserve to stem the tide of bank failures until the Emergency Banking Act of March 1933 was launched by the newly elected president Roosevelt as part of the New Deal program. The reasons for this ineptitude on the part of the monetary authorities are believed to be rooted in the fact that most failed banks were small, and many were not members of the Federal Reserve System. Many cases of bankruptcy were also regarded as a consequence of bad management and bad banking practices, and, for moral reasons, therefore not to be assisted by central bank action.

In retrospect, there is no doubt that the lack of intervention on the part of the Federal Reserve System to alleviate the banking problems prior to March 1933 was a major policy failure. In the view of Friedman and Schwartz (1963, p. 358): 'The major reason the System was so belated in showing concern about bank failures and so inactive in responding to them was undoubtedly limited understanding of the connection between bank failures, runs on banks, contractions of deposits, and weakness of the bond markets.'

### **The credit crunch**

Ben Bernanke is one of the leading academic experts on the causes and effects of the financial crisis of the interwar period. In a famous paper Bernanke (1983) attaches a crucial role to the behavior of the banks during the Great Contraction. He defines the concept of the Cost of Credit Intermediation (CCI) as being the cost of channeling funds from ultimate savers (and thus lenders) into the hands of good borrowers. The CCI will typically include screening, monitoring, and accounting costs in addition to expected losses from the banks' failing borrowers. Banks occupy a key role in the credit intermediation process; because of asymmetric information problems households and many small businesses are excluded from raising capital from the securities markets. Only banks possess the necessary resources to screen and monitor the borrowers' economic situation. As a consequence these borrowers are dependent on bank credit for spending beyond their cash flow. The amounts of credit extended to such borrowers are determined by the banks' ability and willingness to lend as well as the assessment of the borrowers' future earnings and the value of the collateral that can be provided.

In any major economic downturn the price of collateral will decline, earning prospects will deteriorate and the number of bankruptcies will increase. Expected losses are thus likely to increase. All these features of a major recession tend to increase the cost of credit intermediation to the banks. The more severe and protracted the recession period is, the more CCI will increase.

The banks' response to this situation entails a potentially important repercussion on the business cycle. To the extent that banks increase the rate of interest they charge borrowers relative to their funding costs, less credit will be the result (the supply curve shifts upwards



and to the left in the market for bank credit). During a recession a normal response for banks is to tighten their credit standards, so that loans may be refused to borrowers who were previously granted loans. If conditions become sufficiently bad the banks may curtail their lending significantly, in particular to applicants about which the bank has little or no prior information. When many banks fail, as was the case in the years 1930-1933, a significant number of potential borrowers may have been affected by these mechanisms.

Bernanke (1983, p. 257) believes that it was this type of *credit crunch* that was the distinguishing feature of the Great Contraction: 'As the real costs of intermediation increased, some borrowers (especially households, farmers, and small firms) found credit to be expensive and difficult to obtain. The effects of this credit squeeze on aggregate demand helped convert the severe, but not unprecedented, downturn of 1929-30 into a protracted depression.'

Whereas Friedman and Schwartz (1963) emphasized the money supply as the crucial link between the bank failures and the downward spiraling economy, Bernanke (1983) focuses more explicitly on the credit intermediation process. These approaches may be seen as complementary rather than conflicting, although the latter transmission mechanism seems to provide a deeper understanding of the banks' special role in this case. Both contributions add significantly to our understanding of the crucial role of money and credit as to their effects on the real economy in any major financial crisis.

The credit crunch mechanism described above is also believed to be a major feature of the transmission of contractionary impulses in the present financial crisis. In late 2007, and certainly in early 2008, it became evident that banks responded to the financial market turmoil by tightening credit standards and raising their lending rates relative to funding costs. This is shown in Figure 2.6, which is an updated graph of the results of the bank credit survey conducted by the Federal Reserve Board, that has been freely available on their home page throughout the crisis (and earlier).

## Measures of Supply and Demand for Commercial and Industrial Loans, by Size of Firm Seeking Loan

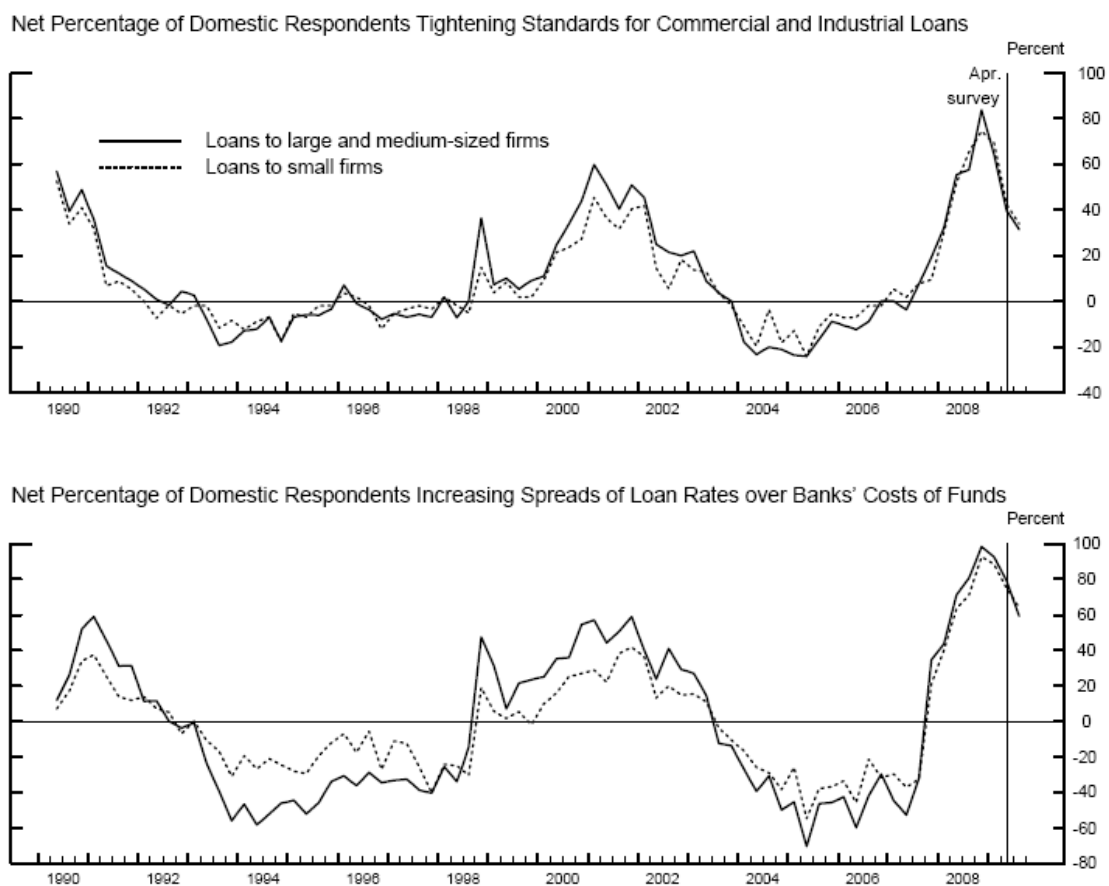


Figure 2.6. Credit standards and loan rate spreads in the United States 1990 – 2009. Source: *Senior Loan Officer Opinion Survey on Bank Lending Practices*, Board of Governors of the Federal Reserve System, July 2009, available at <http://www.federalreserve.gov/boarddocs/snloansurvey/>

This chart may have been one of the first significant and reliable signals that the economy would be facing a recession; after some time it was also evident that the recession would be a major one. Beginning in the middle of 2007 credit standards were tightened and loan rate premiums were increased. By early 2008 these graphs bore all the hallmarks of a forceful credit squeeze. With the benefit of hindsight it may be surmised why it took so long for some economic analysts to realize that a major economic downturn was imminent. Their arguments often rested on the ‘this time is different’ basis – the economy now was so ‘strong’ that the financial market turmoil would pass without major repercussions on the business cycle. With respect to the international propagation of the crisis, some people also

referred on the decoupling hypothesis, arguing that the strong underlying growth rates of Asian economies would prevent the crisis from affecting the rest of the world. This turned out to be wrong, not least because the same tendencies of a credit crunch hit many countries throughout the world.

With respect to policy directed towards troubled banks and the importance of deposit insurance the crucial lessons from the Great Depression have been learnt and implemented a long time ago. The swift and forceful actions taken by the Fed during the present crisis demonstrate this point fully. Other lessons seem to have to be relearned over and over again, however. One such issue is cross ownership in the banking world. The Gramm-Leach-Bliley Act of 1999, which repealed the Glass-Steagall Act, removed the restrictions on the affiliation of investment banks and commercial banks. Some observers have pointed to the liberalization of these ties as a source of financial instability during the present financial crisis.<sup>15</sup>

### Monetary policy

Two key indicators of the stance of monetary policy are the discount rate (or more generally, the rate of interest at which banks can borrow from the Fed) and the amount of base money that the central bank supplies to the banking sector through open market operations and various lending facilities. On the basis of such indicators monetary policy during the Great Contraction is perhaps best described as rather inconsistent and mis-managed.

The traditional cyclical pattern of interest policy is an increase in discount rates prior to the peak, often with a view to deflate asset prices, which tend to rise markedly in the late stages of a boom period. The increase in the discount rate from 5 to 6 percent early in 1929 may have been just such a move. The stock market crash of October 1929 is strong evidence that this aim was thoroughly achieved. The side effect is of course that it probably triggered the downturn of the economy as well – but this outcome is not exceptional. Discount rates were

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<sup>15</sup> The five largest investment banks, including Bear Stearns, submitted to voluntary supervision by the Securities and Exchange Commission (SEC). However, they nevertheless managed to take huge risks while under the oversight of the SEC. See Mizen (2008).

reduced in many steps during 1930, reaching a low of 1.5 per cent at the end of the year. But as a response to the international financial market turmoil in the autumn of 1931, when Britain and Scandinavian countries left gold, the discount rate was raised abruptly to 3.25 per cent and it hovered around 3 per cent during the rest of the contraction period. Because the general price level had been falling for a long time, price expectations were surely negative, which made expected real interest rates very high.

Regarding the other indicator of monetary policy, the monetary base, the policy was roughly neutral until the end of 1931. Some attempts were periodically made to provide the banking sector with more liquidity, but this was partially reversed during other periods. It was only in 1932, when the crisis had lasted almost three years, that a more systematic injection of liquidity was undertaken.

According to Friedman and Schwartz (1963) there are two main reasons why monetary policy stands out as so half-hearted and inept during this period. The first reason is the lack of understanding in the Federal Reserve System of the need for a forceful monetary expansion during the exceptional circumstances. There were strongly conflicting views on this issue within the Federal Reserve System at the time, which led to an inconsistent policy. The second reason is the constraints on monetary policy that the gold standard entailed.

Our understanding of the proper conduct of monetary policy has gained a lot from the Great Contraction episode. The mistakes made then have surely influenced the actions taken in the present crisis. This time all available guns were fired in a swift and decisive action: interest rates were pushed to the extreme lower bound and huge amounts of liquidity were injected into the money markets.

### **The recovery phase: what are the lessons from the Great Contraction?**

Here we focus briefly on some issues related to the conduct of monetary policy in the aftermath of the 1929-1933 recession, which have some striking parallels in the current cycle. The lessons learnt from the handling of these issues in the 1930s clearly warrant further attention in the coming years. At present there are, of course, many other aspects of the unwinding of the massive countercyclical policy measures that were taken in 2008-2009,

in particular the huge accumulation of government debt following from the financial market rescue operations and fiscal policy stimulus, but a discussion of this is beyond the scope of this chapter.

### **What led out of the recession?**

It seems to be well established by now that the recovery in the United States after the trough of the cycle was reached in 1933 was mainly due to monetary expansion. According to Christina Romer (1992, 2009) fiscal policy was of some importance, but not the key engine of growth in the following years. Although Roosevelt's spending programs implied large federal budget deficits, state and local governments were running surpluses. The net effect was a deficit of one and a half percent of gross domestic product in 1934 (compared to a fiscal stimulus of about 3 percent now). The fiscal expansion was not unimportant, as it signaled a break with the balanced budget of previous years, but it was not sustained, however. Therefore monetary policy stands out as the most persistent and forceful expansive factor behind the strong revival that lasted until 1937.

The expansionary monetary policy does not stem primarily from the fact that interest rates were kept low – as they were already at a low level in 1933 they could not get much lower – but rather from an early example of quantitative easing. After the suspension of gold payments in March 1933 a significant devaluation of the dollar in terms of gold took place in the markets. A new official price of USD 35 per ounce gold was set in February 1934. As capital started to flow from Europe to the United States the Treasury decided not to sterilize the gold inflow. By issuing gold certificates, which were interchangeable with Federal Reserve notes, the Treasury was able to increase the money supply at a rate of 17 per cent per year between 1933 and 1936, without involving the central bank.

### Monetary policy in the aftermath of the recession – coping with changes in risk attitude, liquidity preference and lending behavior of the banks

The huge monetary expansion in the mid-1930s resulted in mounting bank reserves. Whereas depositor runs on banks and gold outflows caused bank reserves to contract sharply during the 1929-33 cycle, this situation was radically reversed when the economic policy change introduced by Roosevelt came into effect. Federal deposit insurance increased the depositors' confidence in the solidity of banks and gold inflows were allowed to affect the money supply, as explained above.

As a result the banks' excess reserves, i.e. total bank reserves less the amount required by law, increased to an unprecedentedly high level in the mid-1930s. This is shown in Figure 2.7, which is taken from Wheelock (2009).

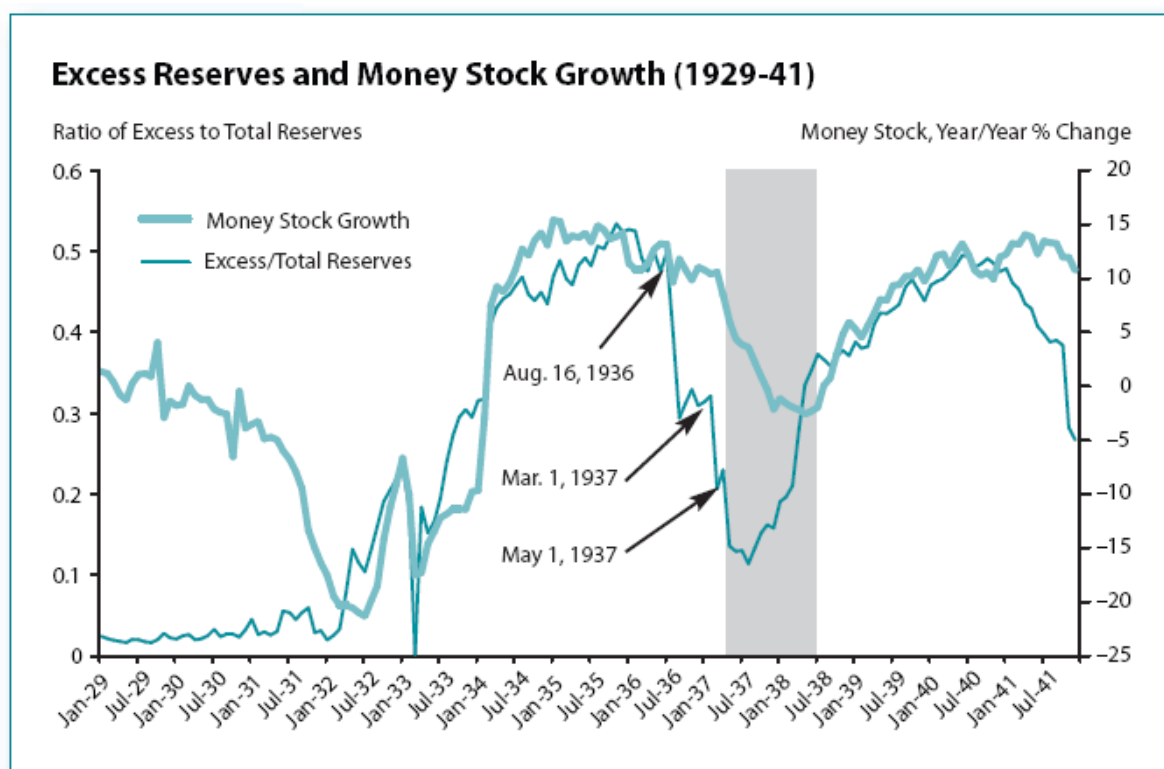


Figure 2.7. Excess reserves and money stock growth 1929 – 1941.

The thin line is excess reserves as a fraction of total reserves. As can be seen from this graph the turnaround in the banks' liquidity position in 1933 was accompanied by monetary expansion. When banks got their funding under control, they could start lending again.

This situation has a striking parallel with the present, even though the scale of the countercyclical monetary injections dwarfs the experience of the 1930 by a large margin. Figure 2.8, taken from Keister and McAndrews (2009), shows how the excess reserve position has been dramatically changed as a result of the crisis measures taken in 2008. Excess reserves have increased from an average of less than 5 percent of total reserves to more than 90 percent since late in 2008.

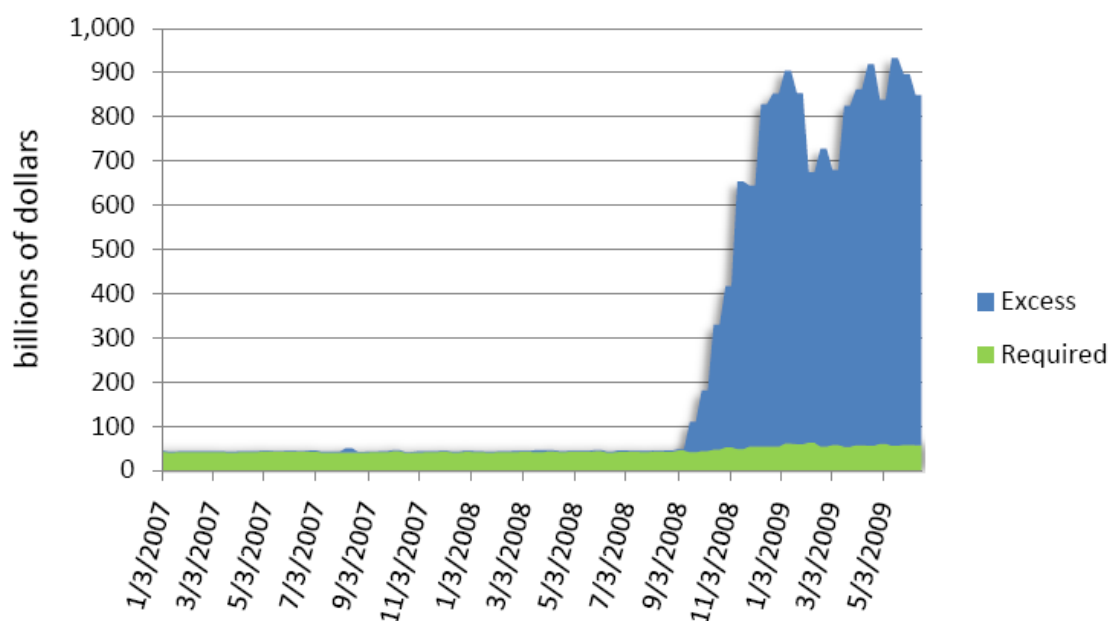


Figure 2.8. Aggregate reserves of depository institutions in the United States 2007-2009.

What is even more striking is that the present discussion of the potential problems associated with this situation also has its parallels in the 1930s. Then, as now, some analysts were very concerned about the potential inflationary dangers that could arise from the large excess reserve holdings of the banks. Such large reserves can easily fund a significant increase in bank lending in the recovery phase, which is a potential source of inflation. Several prominent economists have recently proposed to take measures against the holding

of such large excess reserves by imposing taxes on reserve holdings or enforcing more direct regulatory measures.<sup>16</sup>

Responding to just such concerns the Federal Reserve decided in 1936 to reduce excess reserves by increasing reserve requirements in three steps between August 1936 and May 1937. This made it more costly for the banks to grant new loans, encouraging banks to reduce lending. As is evident from Figure 2.8, this resulted in a marked contraction of the growth rate of the money stock. If we refer back to Figure 2.1, it is seen that the economy entered an unusually steep economic downturn just as this contractionary monetary policy was taking effect in the middle of 1937. It is thoroughly documented in Friedman and Schwartz (1963) and Romer (1992) that a main cause of this cycle was the severe monetary contraction, although there was also a fairly strong fiscal contraction at the same time.

The lesson from this episode is clear. During, and perhaps for a considerable time after a crisis, banks change their behavior as a precautionary measure. They definitely want to increase their reserve holdings, both because they have experienced that liquidity may be difficult to obtain if the financial turmoil returns and because they are reluctant to lend to other banks due to increased perceived counterparty risk. They also tighten credit standards and are more reluctant to engage in lending to customers because the assessment of borrowers' earning prospects has deteriorated. The behavior of banks is often heavily criticized on this account, in particular from representatives of the business community who have not been able to obtain the loans they had been used to in the boom period. The response of the banks is probably to a large extent rational, reflecting the increased cost of credit intermediation. In any case, it is a response on the part of the banking sector that students of interwar banking history are familiar with.

### **Financial crises and the economy of Norway in the interwar period**

The brief survey of the lessons from the effects of the financial crisis on the economy of the United States in the 1930s has shown that important policy lessons have already been learnt

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<sup>16</sup> See Keister and McAndrews (2009) for references.



from this episode. More research efforts on these issues are obviously needed, and are likely to be of great interest to policy makers. Although further lessons from the U.S. economy may be welcome, it can also be argued that it would be fruitful to shift the focus to other countries as well.

We present a brief, tentative outline of some of the issues that would be particularly relevant to the Norwegian case.

### **The banking crises and their effects on business cycles and exchange rates**

In Norway the most severe banking crisis was not associated with the Great Contraction period but occurred in the first part of the 1920s. Recently, there has been an important revision of the timing of the losses incurred by the commercial banks in the 1920s. Knutsen (2007) has shown that the old estimates made by Statistics Norway give a misleading picture, see Figure 2.9. His new estimates shift the losses considerably forward in time, peaking in 1922 rather than in 1925, as indicated by the Statistics Norway data. One implication of this finding is that the banking crisis was not primarily due to the strong appreciation of the krone starting in the summer of 1924; rather, the attention is cast backwards towards the reckless fiscal and monetary policy during the First World War and its immediate aftermath.

Norway (and Denmark) was rather unique in experiencing a severe economic downturn in 1925-1926. This was a cycle which was hardly noticeable in other countries, such as for example Sweden. The econometric results in Klovland (1998) are consistent with the conventional view that this cycle was largely driven by exchange rate appreciation and domestic monetary policy. The role played by the banking crisis is less established, however, but well worth looking into more closely.

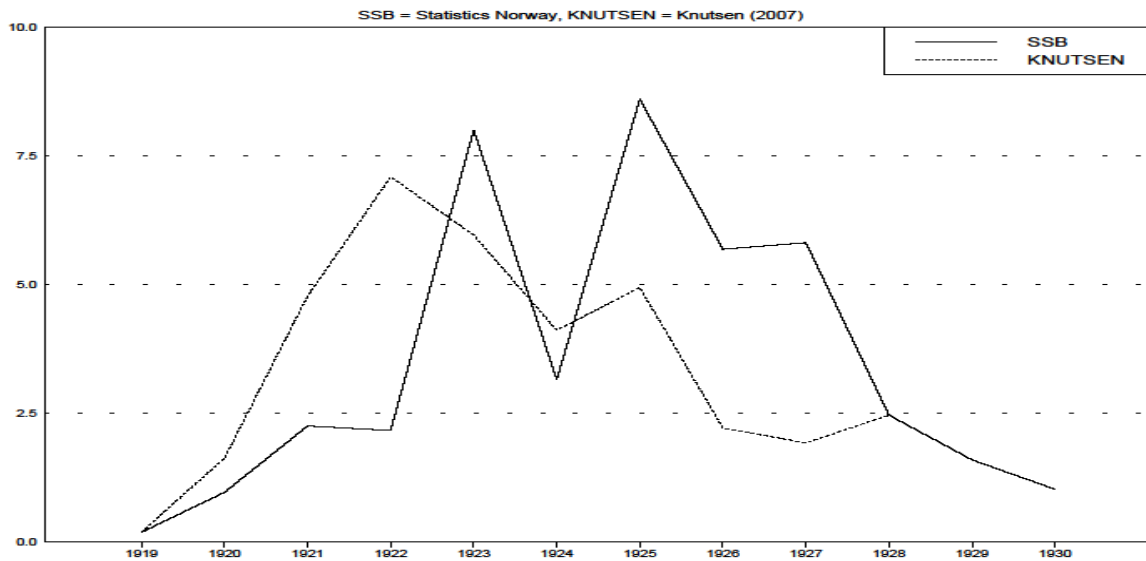


Figure 2.9. Norwegian commercial banks: losses in percent of total assets (SSB = Statistics Norway, Knutsen (2007))

### Bank behavior during and after the crisis

We do not have much systematic knowledge about how banks behaved during and after the crisis. How did they respond to the demands of their loan customers? How severe was the credit crunch? What happened after the crisis with respect to reserve behavior and the provision of credit?

On the background of the experience in the 1930s in the United States, and in both Norway and other countries during the present cycle, it would not be surprising if there was a tendency for banks to hoard liquid assets and tighten their credit standards.

### The choice of monetary regime and the international propagation of business cycle impulses

In relative terms Norway escaped lightly from the international business cycle depression starting in 1929. The departure from gold in September 1931 may have been a key factor here. This is consistent with the results in Eichengreen and Sachs (1985), who showed that the single most important factor in explaining the performance of the European economies in the 1930s was the point in time when the country in question abandoned the gold standard. A closer look at this episode from a Norwegian perspective may shed some light on the properties of fixed exchange rate regimes during a financial crisis.

### Financial crises and economic growth in the interwar years

No other period has been so thoroughly marked by economic crises as the interwar years: bank crises, unprecedented exchange rate shocks (the krone doubling its international value over a period of two to three years) as well as international financial crises and deflationary impulses. Yet the economic growth record of Norway during these years is remarkably good.

Figure 2.10 shows 5-year end-of-period growth rates for gross domestic product in Norway for a period of nearly 140 years. It will be seen that, once the difficult years at the end of World War I and the international business cycle downturn thereafter had passed, the growth of the Norwegian economy was fairly strong during the rest of the interwar period.

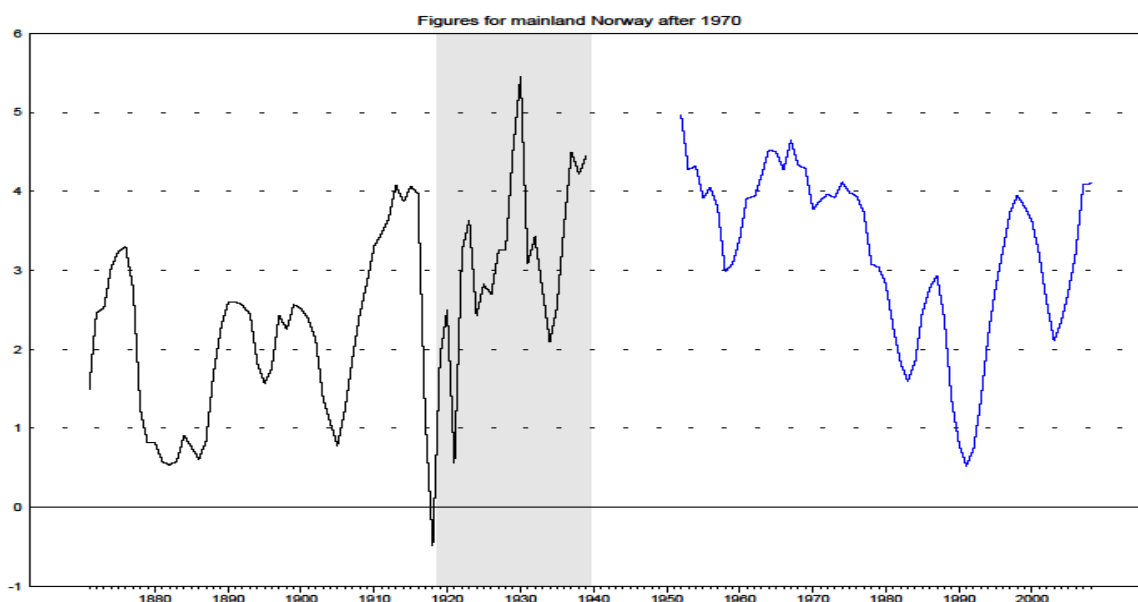


Figure 2.10. 5-year end-of-period growth rates in GDP 1871 - 2008

It is indeed somewhat puzzling to note that the growth record of the interwar years was almost comparable to the first decades of the post-WWII era, and significantly better than in the decades prior to about 1910 as well as in the 1970s and 1980s. Some differences may be due to demographic trends, which are not accounted for here, but the resilience of the Norwegian economy is still remarkable during the decades plagued by financial market turmoil. A tentative, but probably too imprecise hypothesis, may be that financial crises cause business cycle fluctuations but that they are not particularly important for long-run economic growth.

## Chapter 3: Determinants of Financial Crises

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This chapter reviews the literature on the following types of financial crises: (1) banking, (2) currency, (3) combinations of these two, so-called twin crises, and (4) debt crises. The chapter discusses empirical determinants of financial crises for a number of emerging market and developed economies. We discuss typical paths of recovery and growth after financial crises and contrast this pattern with experience in Nordic countries in the 1990s. The chapter concludes with lessons for economic policy.

### Typical financial crises

An illustrative model of financial crises was developed by Hyman Minsky (1982). Following Minsky, the typical timing of events leading to financial crises can be decomposed into different stages which are illustrated in Figure 3.1. Kindleberger and Aliber (2005) describe timing of events of “typical” financial crises that have repeatedly occurred in the past 400 years.<sup>17</sup>

At the onset of many crises one can observe an initial shock, such as financial liberalization or exogenous increases in the supply or demand of credit. In the context of the recent financial crises that started in 2007, the increase in global savings or “savings glut” (cf. Bernanke, 2005), low interest rates and financial deregulation in the 1990s have been suggested in the literature. Following the initial shock, one can observe a strong *expansion of credit*, which can be explained by increased demand by firms due to rising expected profitability and also the boost in supply fueled by reduced risk awareness. The increased availability of credit leads to a boom in the economy reinforcing the initial shock.

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<sup>17</sup> See Kindleberger and Aliber (2005, pp. 256-265) for a stylized outline of financial crises from 1618 to 1998. For an even longer perspective see Reinhart and Rogoff (2009a), documenting 800 years of financial folly.

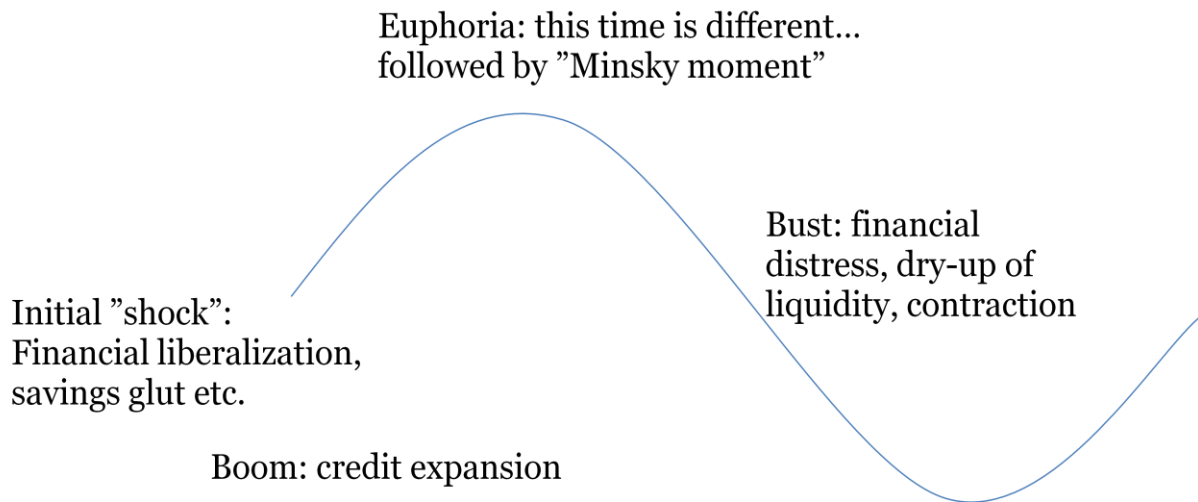


Figure 3.1: Timing of "Typical" Financial Crises

The *boom* phase can lead to euphoria and bubbles in financial markets can develop. Bubbles<sup>18</sup> occur when prices of financial assets and commodities exceed their "fundamental value". Investors are willing to continue to bid up prices because they expect prices to rise even more. Even though some investors and policymakers might recognize signs of a bubble, phrases such as "this time is different" start appearing that explain the supposed uniqueness of *this* particular boom. Some participants in financial and commodity markets may even try to "ride the bubble", and exit just before prices start falling. Eventually, expectations of further price increases run out of steam and prices peak, sometimes referred to as "Minsky moment".

The *bust* phase of the cycle is characterized by an unwinding of the bubble process. Market participants want to sell the underlying assets and this can lead to sharp corrections in assets. The use of leverage in the boom phase can exacerbate the financial distress that firms and individuals are experiencing. This may lead to fire sales and bankruptcies reinforcing the downward dynamic of asset prices. The associated drying up of liquidity can create problems for the entire financial sector and lead to a contraction of investment and the real economy. The recent global financial crises showed how quickly problems in particular markets, for example the market for subprime loans in the United States, spill over

<sup>18</sup> See Brunnermeier (2008) for a recent survey of bubbles.

to other sectors and countries. Provided the financial crisis is big enough and threatens the stability of the entire economy, central banks and governments come under intense pressure to stabilize the financial sector.

Bordo et al (2001) define **financial crises** as *episodes of financial-market volatility marked by significant problems of illiquidity and insolvency among financial-market participants and/or by official intervention to contain such consequences*. Figure 3.2 illustrates that financial crises occurred in all periods starting in 1880, with noticeable increases in the frequency of financial crises in the interwar period (1919-1939) and in the post Bretton-Woods area (after 1973).

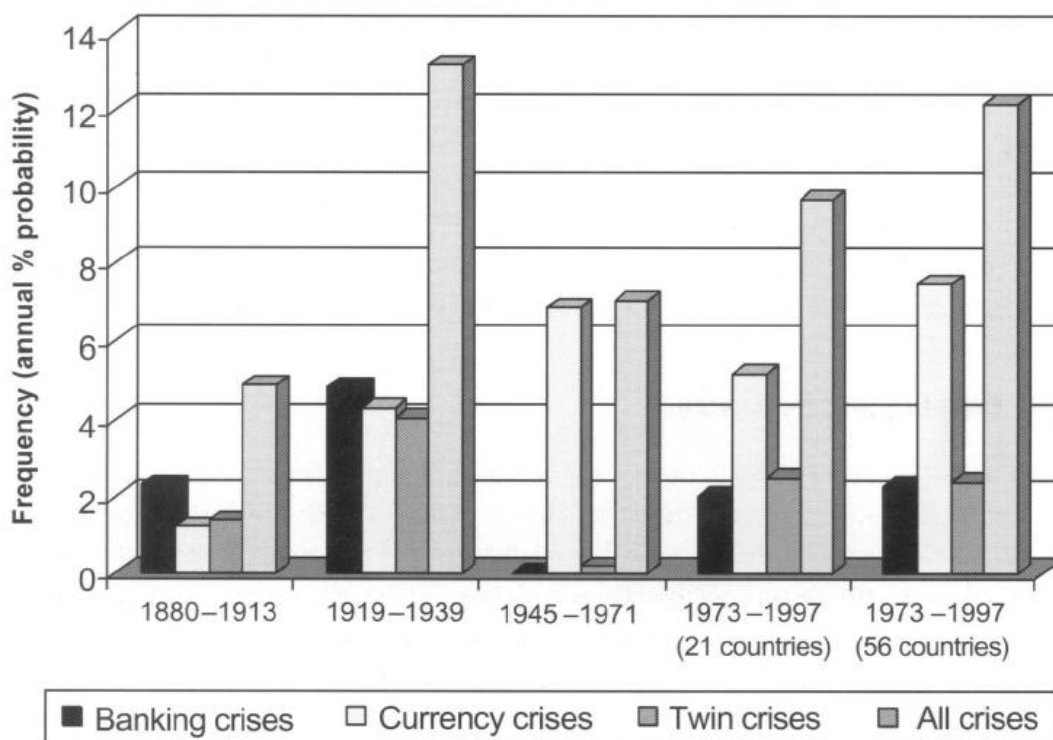


Figure 3.2: Crises Frequency 1880-1997 (Bordo et al 2001)

## Banking crises

A **banking crisis** can be defined as an *episode of financial distress resulting in erosion of most or all of aggregate banking system capital* (cf. Bordo *et al*, 2001). Calomiris (2008) argues that banking crises greatly differ in their severity and source of the crisis, originating either within or outside the banking system. Calomiris also observes that all major US banking panics occurred at business cycle peaks and were preceded by spikes in liabilities of failed businesses. Figure 3.3 shows incidence of banking crises.

Reinhart and Rogoff (2008a) make the following observations about the incidence of banking crises: historically, global banking crises were associated with sovereign defaults of external debt; waves of global financial distress occurred in earlier periods (for example, the Panic of 1907 or the outbreak of the First World War); the relative calm during the late 1940s to the early 1970s can be partly explained by repression of domestic markets and capital controls; since the 1970s, financial and capital account liberalization has taken place, but we also observe the recurrence of banking crises; both advanced and emerging economies are affected, and one can often observe serial incidence of banking crises.

Reinhart and Rogoff (2009) argue that the same relationship that occurred between the resurgence of financial crises following the liberalization in the 1970s can also be found historically. Figure 3.4 shows the relationship between an index of capital mobility, calculated by Obstfeld and Taylor (2004), and a three-year moving average of the share of countries experiencing a banking crises. Observe the rise in capital mobility in the late 19<sup>th</sup> century up until World War I, and the U-shaped pattern in the 20<sup>th</sup> century, and a similar timing of incidences of banking crises. Kaminsky and Reinhart (1999) document that 18 out of 26 banking crises after the 1970s follow financial liberalization in the preceding five years.

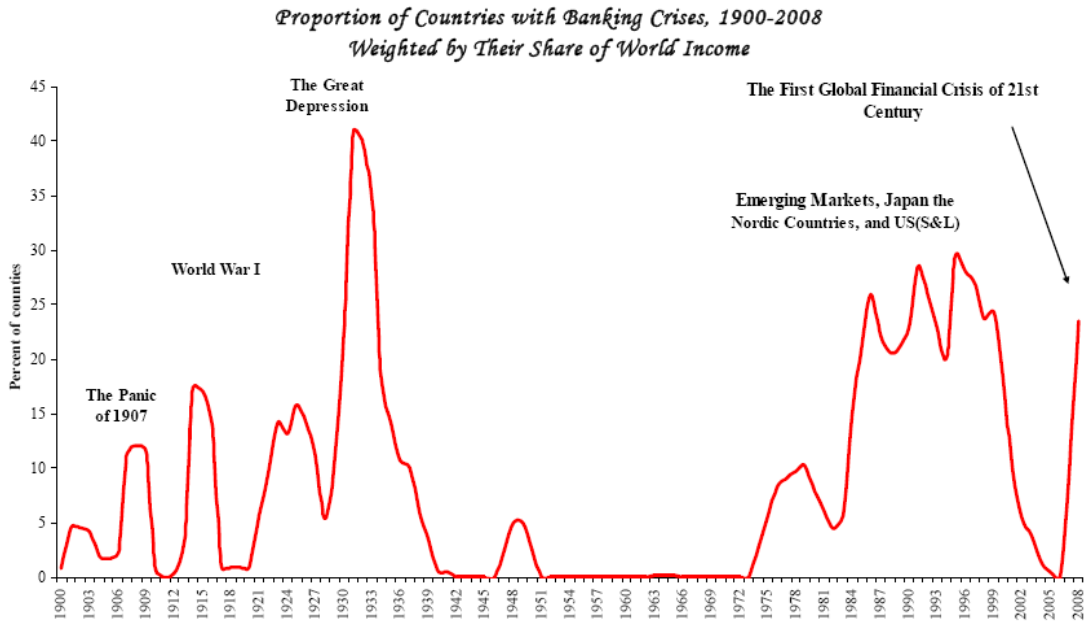


Figure 3.3: Incidence of Banking Crises (Reinhart and Rogoff 2008b)

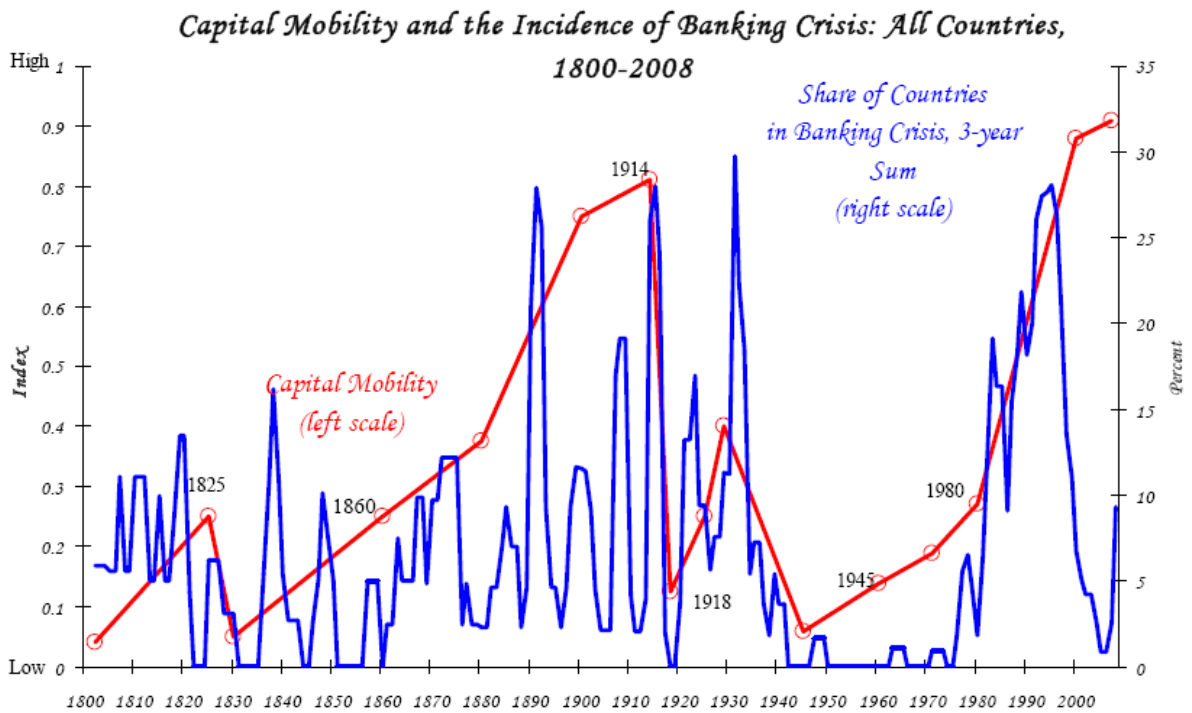


Figure 3.4: Global Capital Mobility Index and Incidence of Financial Crises (Reinhart and Rogoff, 2009)



Reinhart and Rogoff (2008b) relate the 2007 sub-prime crisis to earlier financial crises:

- the “Big 5” Crises: Spain (1977), Norway (1987), Finland (1991), Sweden (1991), and Japan (1992), with starting years in parenthesis;
- other banking and financial crises in OECD countries starting in the 1970s and lasting until the 1990s.

The “Big 5” crises were all protracted and led to deep declines in output (recessions). Figures 3.5 and 3.6 contrast the development of equity and housing prices for the US, with average for the “Big 5” and the other financial crises in OECD countries. In the figures, time  $T$  represents the first year of the crises. For the US subprime example, equity and housing prices are measured from 2003 onwards. The sharp rise in equity and housing prices leading up to the 2007 crisis is followed by a bust, similar to other banking crises. Figure 3.5 shows that equity prices typically fall sharply when the crisis erupts, followed by relatively swift recovery. In contrast, housing prices show a much more persistent decline in Figure 3.6. Housing prices around the US subprime crisis in 2007 follow a pattern similar to that of the “Big 5” major banking crises.

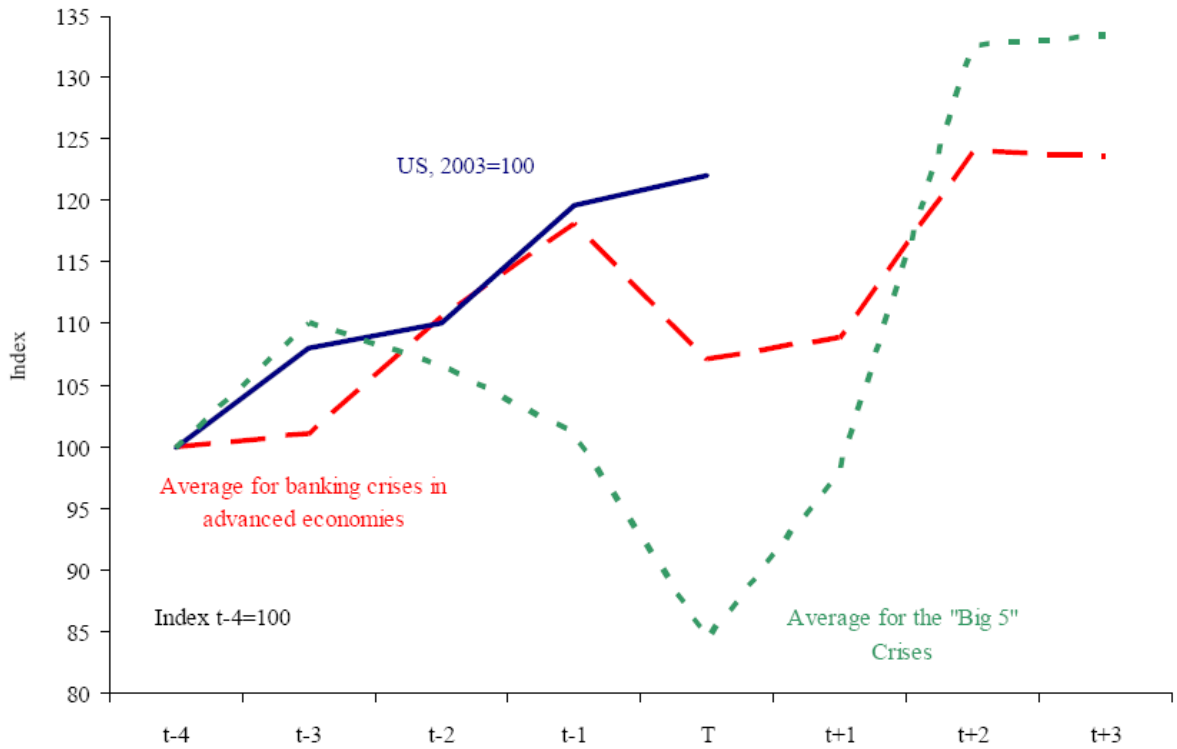


Figure 3.5: Equity Prices and Banking Crises (Reinhart and Rogoff, 2008b)

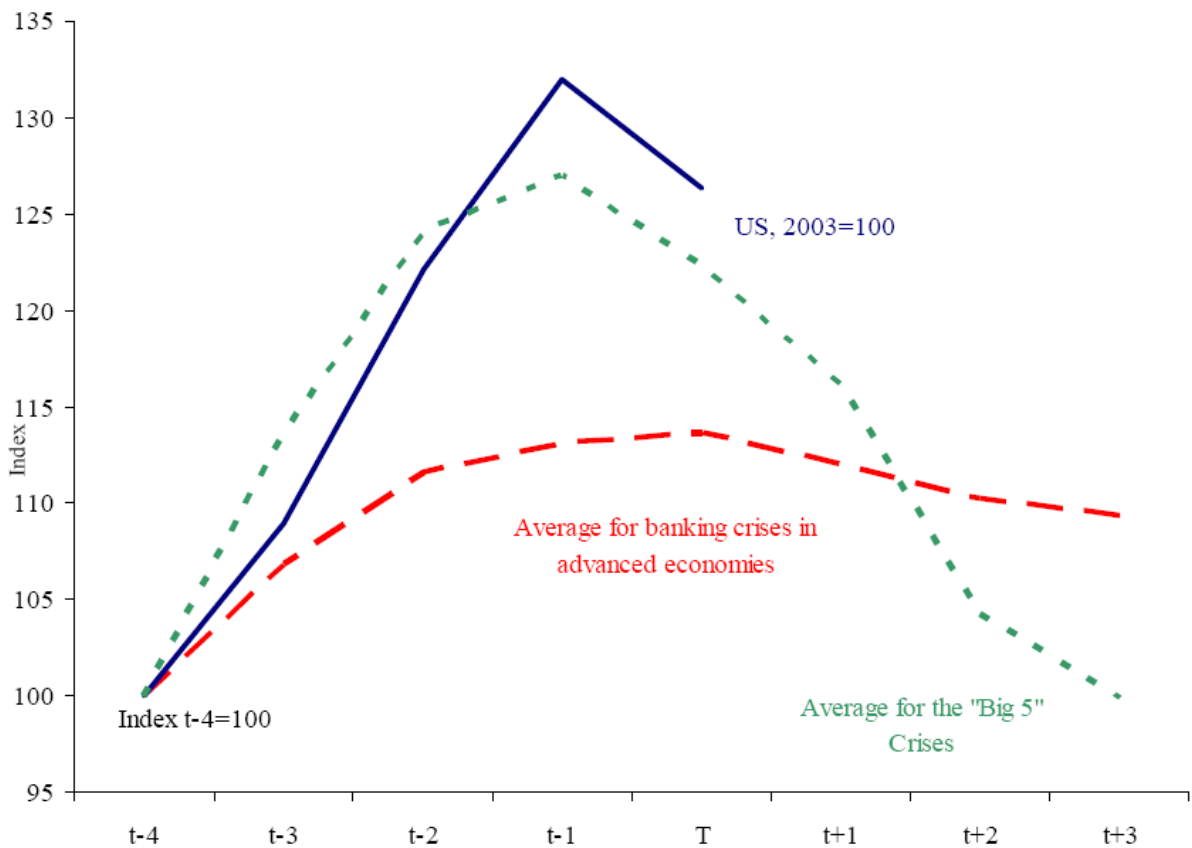


Figure 3.6: Housing Prices and Banking Crises (Reinhart and Rogoff, 2008b)

## Currency crises

**Currency crises** can be defined as *a forced change in parity, abandonment of exchange rate peg, or the exchange rate exceeding a critical value of exchange market pressure or international rescue* (Bordo et al, 2001). Different varieties of currency crises can be observed between developed and developing economies. The effect of currency crises can be amplified by the inability of many developing countries to borrow in their own currency, but having instead to borrow in hard currency (or gold). Large devaluations and implied soaring debt are particularly costly for developing countries, and led to the “lost decade” for Latin America in the 1980s and the sharp recessions following the East Asian crisis in the 1990s. We observe fewer currency crises in developed economies, the most notable recent exceptions being the crises of the European Monetary System (EMS) in 1992.

Crisis typically do not occur in economies with sound fundamentals. Emerging economies are often more vulnerable, due to a combination of fiscal problems, lack of competitiveness, a deteriorating current account, unsustainable external debt, or problems in the financial sector, especially banks. There is a large literature on models of currency crises, often categorized into first, second and third generation models, respectively<sup>19</sup>. *First-generation models* of currency crises are based on the central bank that attempts to combine the expansion of credit, to finance unsustainable fiscal policy with a fixed exchange rate (see Krugman, 1979). These models provided good explanations of repeated currency crises in Latin America in the 1960s and 1970s. However, the policies are mutually inconsistent, and if left unchanged, the fixed exchange rate has to be abandoned at a *known* time. Note that the models assume that the time of the speculative attack is known.

*Second-generation models* of currency crises introduce contradictory objectives of the government. For example, during the crisis of the European Monetary System (EMS) in 1992, EMS members wanted to achieve both low employment and an exchange rate target. If the fundamentals of an economy are sufficiently weak, multiple equilibria become possible, implying that speculative attacks can become self-fulfilling (see Obstfeld, 1984).

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<sup>19</sup> See Burnside, Eichenbaum and Rebelo (2008) for a recent survey of currency crises models.

*Third-generation models* of currency crises emphasize the role played by the financial sector. Balance sheets deteriorate sharply following a currency crisis, and there are problems of asymmetric information and moral hazard. Interestingly, balance sheets and the creditworthiness of banks have played a central role in the 2007 US subprime crises, but the initial shock originated in credit markets, as illustrated by the TED spreads shown in Figure 4.1 in chapter 4, and was not triggered by a depreciation.

### Twin crises

Twin crises are defined as a combination of both banking and currency crises. Kaminsky and Reinhart (1999) document the following regularities associated with twin crises. The *beginning* of banking-sector problems often predates a balance-of-payments crisis, but the *peak* of banking crisis often occurs after a currency crash. There is therefore no unidirectional causal link, but banking and currency crises are mutually reinforcing each other. Both banking and currency crises are typically preceded by a recession, or at least below normal growth, which can at least in part be linked to (i) worsening of terms of trade, (ii) an overvalued exchange rate, and (iii) rising cost of credit. As previously discussed, shocks to financial institutions, such as financial liberalizations and/or access to international credit markets, are often the starting point of twin crises. Economies become more vulnerable, as *unbacked liabilities* of the banking sector mount. Twin crises occurrences are particularly painful, because countries are often suffering from a number of weak and deteriorating economic fundamentals. The combination of weak fundamentals and mutually reinforcing shocks makes the effect of twin crises more severe than the occurrence of a single crisis.

Figure 3.7 shows empirical regularities of financial and macroeconomic variables 18 months before and after a twin crisis occurs, relative to “tranquil” times (see Kaminsky and Reinhart for details). The solid line in Figure 3.7 represents the behavior of macroeconomic variables during twin crises, whereas the dotted line tracks single crises occurrences, i.e. banking or currency crises only.

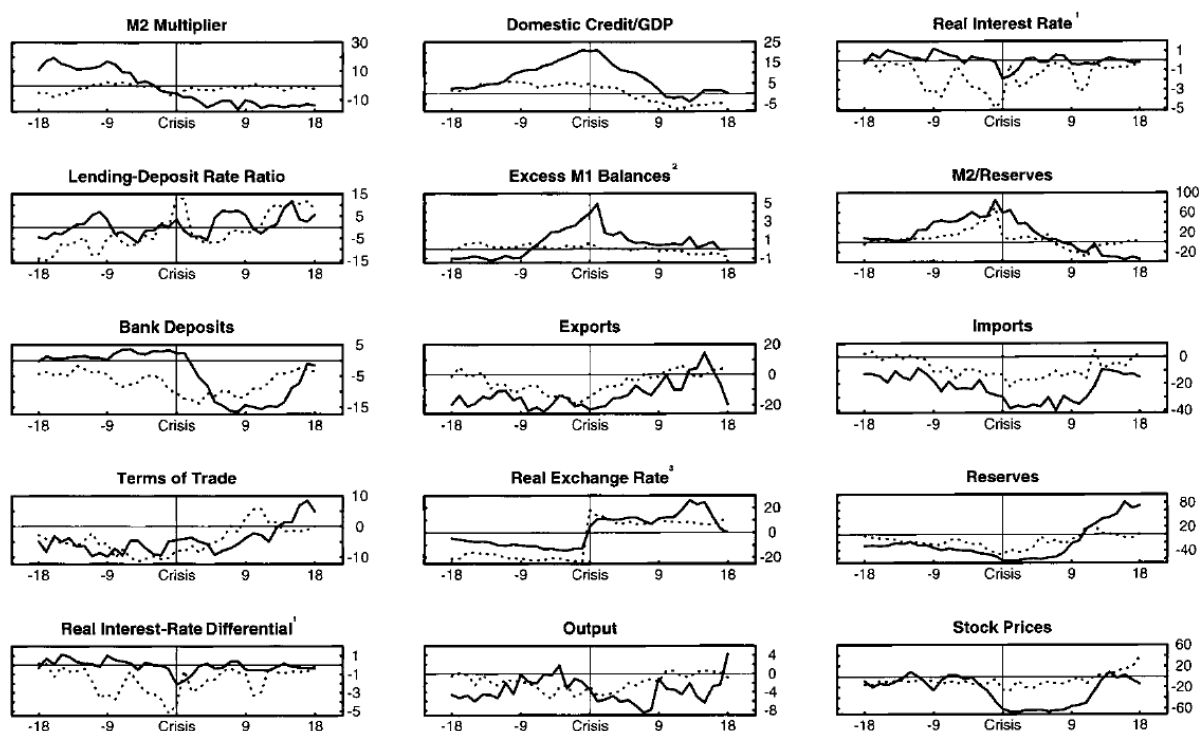


Figure 3.7: Regularities Around Twin Crises (Kaminsky and Reinhart 1999)

In the **financial sector**, we can see that the *M2 monetary aggregate multiplier* is systematically higher before the crises than after, and that the growth of domestic credit/GDP is accelerating up to the crisis event. Note that *real interest rates* are behaving very differently during currency and banking crises: compared to tranquil times, real interest rates tend to be lower than normal preceding currency crises, but one to two percentage points higher (at a monthly rate) before a banking crisis. The *lending-deposit ratio* tends to rise only after the twin crises have occurred. We also observe a buildup of *excess supply of real M1 balances*, which is consistent with first-generation models of currency crises discussed earlier. The *ratio of M2 to reserves* of the central bank also increases strongly, again consistent with the currency crisis literature. *Bank deposits* evolve close to normal before the crisis, but decrease markedly after the crisis erupts.

Next, we can look at developments in the **external sector**. *Exports* are systematically below the level of tranquil times before either currency or banking crises, and pick up once the *real exchange rate* corrects after the currency has devalued in times of crisis. Imports decline before the crisis erupts and remain depressed after the crisis. The *terms of trade* (or relative

price of exports over imports) deteriorate before the crisis, eroding purchasing power and contributing relative price effects to the performance of net exports. Consistent with the currency crises literature, *foreign-exchange reserves* of the central bank fall substantially in the run-up to the crisis, and only recover once the currency devalues. *Real interest rate differentials* do not change systematically before the crisis erupts, however they tend to be systematically above normal before banking crises.

Finally, in the **real sector**, *output growth* and the development of *stock prices* start to slow already before the crisis erupts, and show persistent weakness, particularly after twin crises events.

## Debt crises

External debt crises include outright default, but also repudiation or restructuring of debt into less favorable terms for the lender (see Reinhart and Rogoff, 2009). In practice the distinction between these definitions can be less sharp. For example, in the 2007 US sub-prime crisis illiquidity and risk adjustment played an important role.

Bordo and Meissner (2006) and Reinhart and Rogoff (2009a) document that the following factors are related to the occurrence of debt crises: currency mismatch, measured by the ratio of hard currency debt to total debt; terms of trade fluctuations, and in particular spikes in commodity prices; high levels of debt (relative to revenue or GDP); interest spreads, which could be measures of reputation; a surge in global capital flows, so-called “bonanzas”, followed by sudden stops or reversals of capital flows; finally, more generally, weak economic fundamentals.

Reinhart and Rogoff (2009a) emphasize that domestic debt constitutes an important part of government debt, including many emerging markets. They note that buildup of domestic debt often occurs after external defaults, when countries find it difficult to borrow abroad.

## Aftermath of financial crises

Financial crises are often protracted and have significant impact on financial and real parts of economies. In a sample of 56 countries Bordo et al (2001) find the following average durations of and cumulative loss of GDP caused by different crises in the period 1973-1997:

	Average duration in years	Average depth <i>% cumulative GDP loss</i>
Currency Crises	2.1	5.9
Banking Crises	2.6	6.2
Twin Crises	3.8	18.6

As we observed earlier, twin crises are on average longer lasting than currency or banking crises on their own. Twin crises are also markedly larger, measured by the cumulative percentage loss in GDP. Reinhart and Rogoff (2009b) compare the impact of different banking crises on some key economic variables, measured as peak-to-trough change and duration of the change:

- The Financial sector:** Figures 3.8 and 3.9 show that banking crises are associated with deep and prolonged declines of housing and asset markets. On average, equity markets contract more sharply (-56%) than housing markets (-35.5%), but the duration of the correction is shorter for equities (3.4 years) than for housing (6 years). The figures also show interesting variations of the impact of banking crises in individual countries. Notice the particular sharp contractions of housing and equities in several East Asian countries in the late 1990s and the collapse of the stock market in Iceland in 2007.
- The Real sector:** Figures 3.10 and 3.11 show the impact on real GDP growth and unemployment rates. On average, banking crises are associated with profound declines in output (-9.3%) and rising unemployment (+7%), where the duration of the cycle is shorter for GDP (1.9 years) than for unemployment (4.8 years). Particularly noteworthy is the catastrophic impact of the Great Depression in the US.

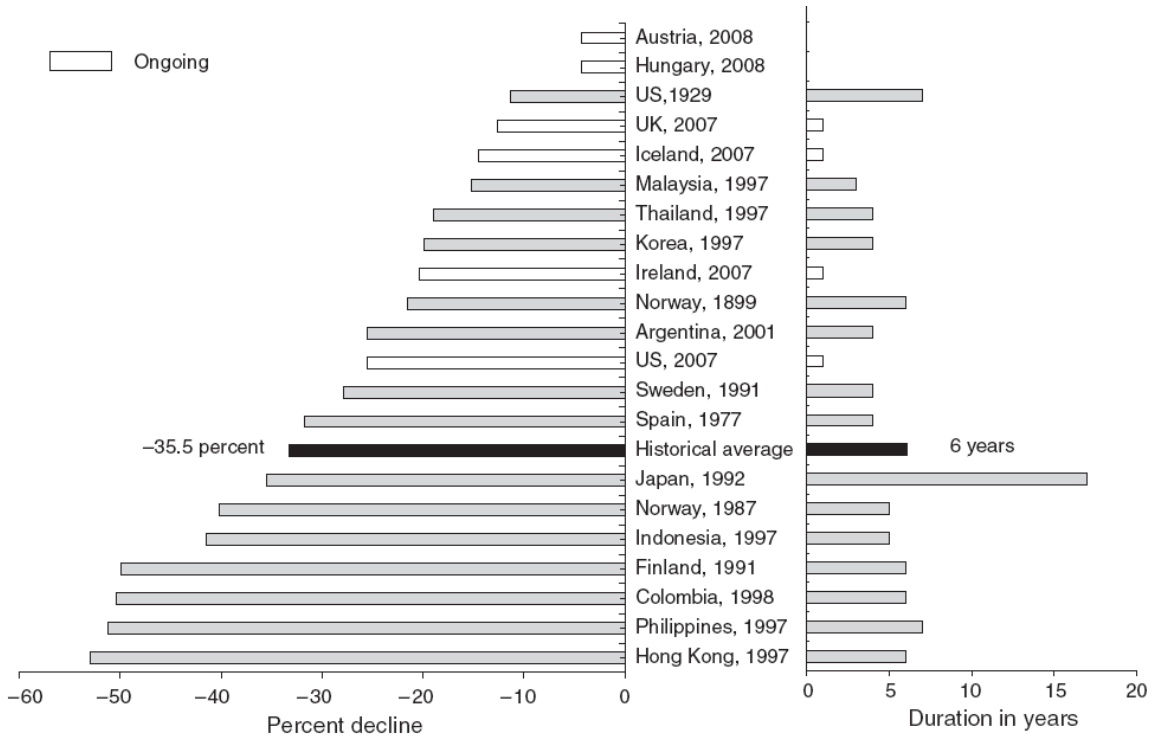


Figure 3.8: Real house price cycles and banking crises (Peak-to-Trough declines and years of duration), Reinhart and Rogoff (2009b)

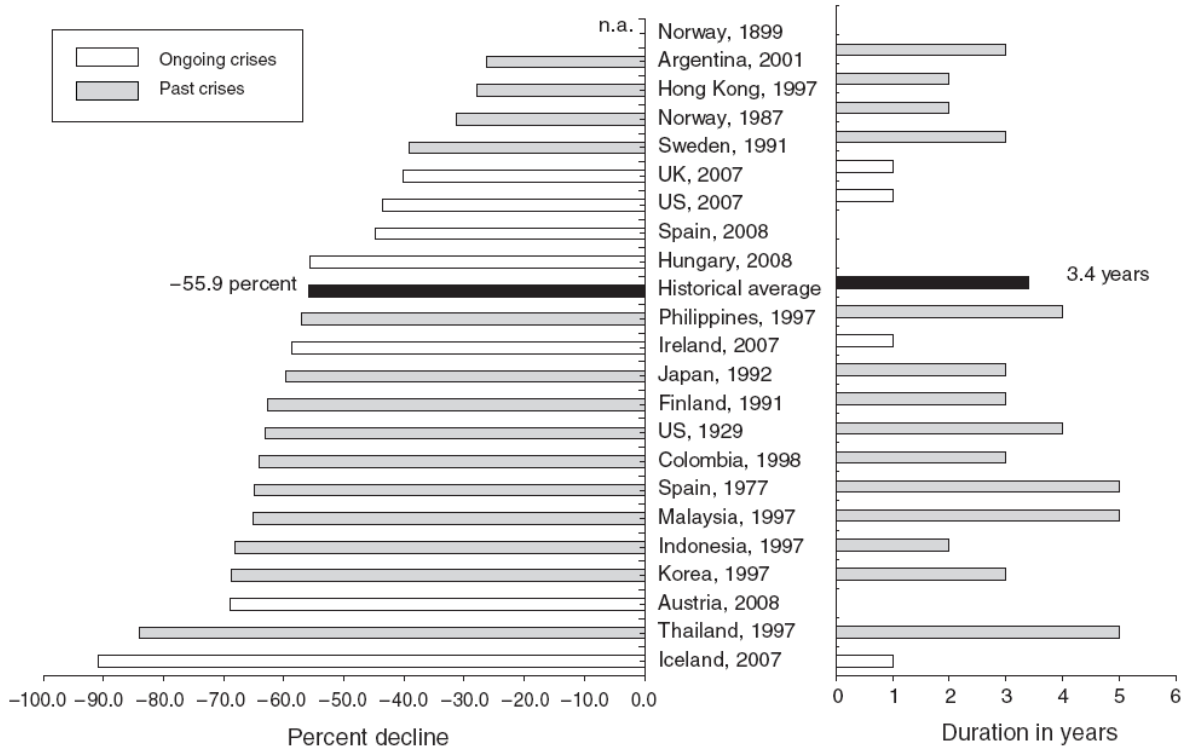


Figure 3.9: Real equity price cycles and banking crises (Peak-to-Trough declines and years of duration), Reinhart and Rogoff (2009b)



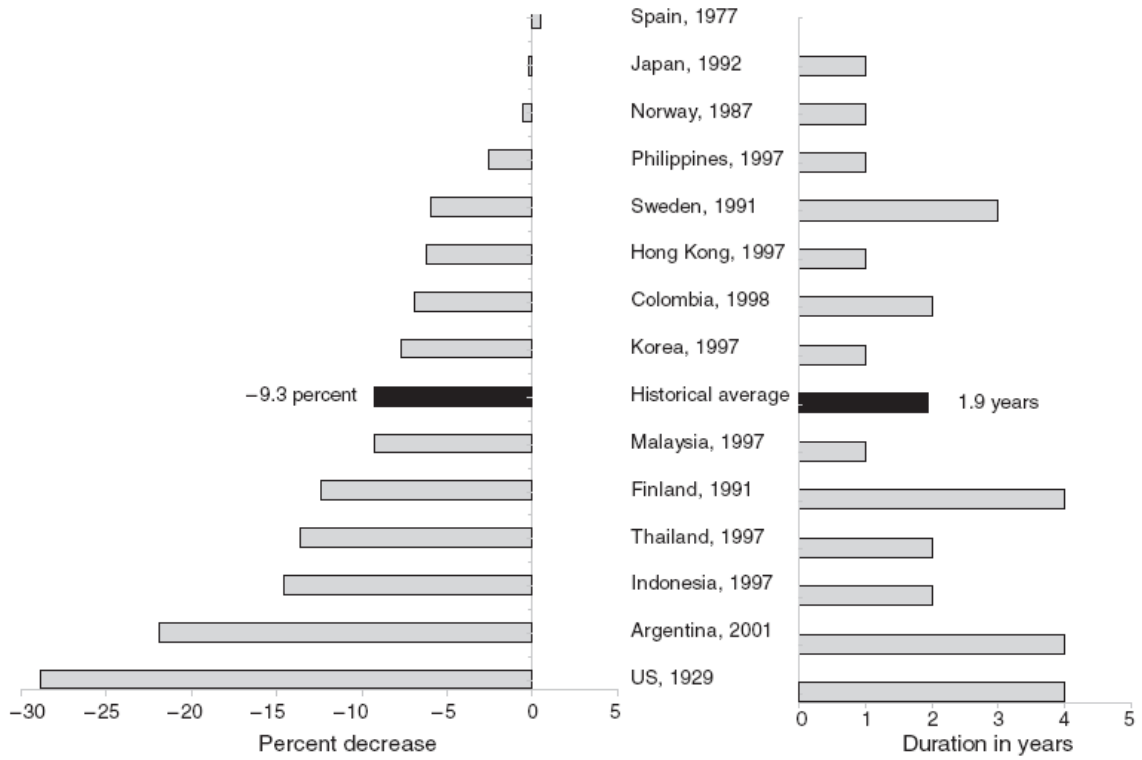


Figure 3.10: Real GDP per capita and banking crises (Peak-To-Trough Decline in Real GDP and years of duration), Reinhart and Rogoff (2009b)

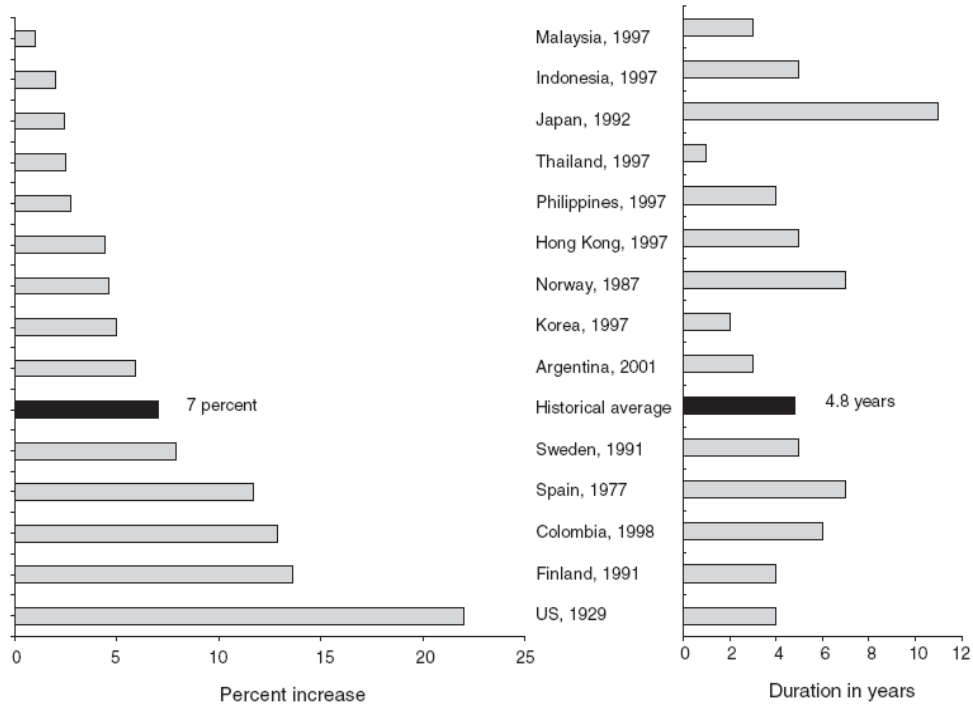


Figure 3.11: Unemployment cycles and banking crises (Percent increase in unemployment rate and years of duration), Reinhart and Rogoff (2009b)

- Fiscal sector:** Figure 3.12 shows that the real value of government debt increases by a staggering 86% following a typical banking crises. Reinhart and Rogoff argue that the main explanation is not necessarily the direct cost of bailing out the financial system and recapitalizing banks after a banking crisis, but the collapse in tax revenue, as well as countercyclical fiscal policies associated with downturn in real economic activity.

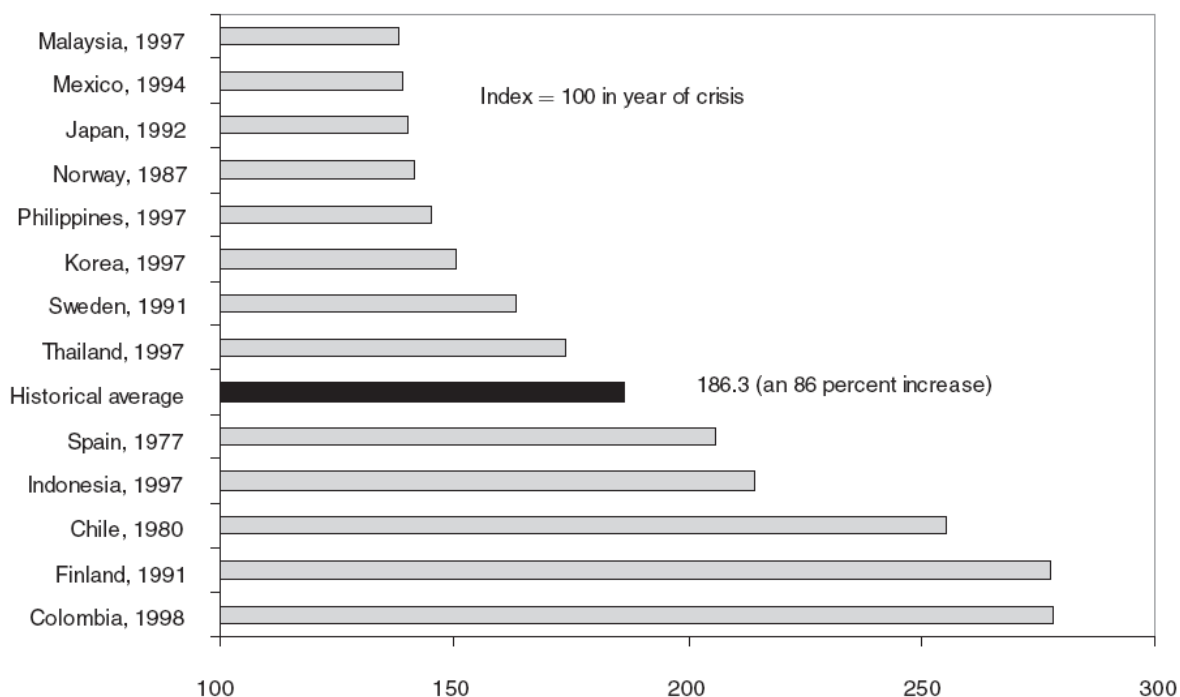


Figure 3.12: Cumulative increase in real public debt During Selected Banking Crises, Reinhart and Rogoff (2009b)

### Nordic countries' experience

The experience of the Nordic countries in the late 1980s and early 1990s is an interesting contrast to the recent global financial crisis. Note that three of the Nordic countries experienced large financial crises which were counted among the “Big 5” banking crises by Reinhart and Rogoff (2008b): Norway 1987-93, Finland 1991-94, and Sweden 1991-94.

In all three countries large parts of the banking system were affected, leading to a systemic crisis. Governments had to support the banking system, partly taking over insolvent banks. In Finland the banking crisis also coincided with a collapse of the trade with the Soviet Union, contributing to a sharp recession of the Finish economy. Figure 3.10 shows that Norway experienced a much milder contraction, with Sweden somewhere in between. Similarly, the

cumulative increase in unemployment was largest for Finland, followed by Sweden, and was above the path of unemployment for the average banking crises and also the more moderate increase in Norway.

In all three Nordic countries that experienced a banking crisis in the late 1980s/early 1990s, financial markets developed similarly to typical crisis scenario outlines earlier: *property markets* rose sharply in the boom period and started to decline before the onset of the crisis (see Figure 3.6). Equity markets also experienced booms in the late 1980s, but the increase was more moderate for Norway. *Bank lending* rose sharply during the 1980s, but the boom occurred earlier in Norway than in Sweden and Finland, where the boom-bust cycle was the most pronounced (see Honkapohja, 2008)

Several factors contributed to the 1980s/90s financial crises in the Nordic countries. First, financial markets were deregulated in the 1980s, explaining the surge in bank lending and increased systemic risks. Following deregulation, bank managers had limited experience with the new financial regime, and strong competition led to increased risk-taking, which fits well with the initial “shock” scenario of the Minsky model. The tax system also provided incentives for debt finance of business and housing investment. Notice that the one Nordic country not on the list – Denmark – had liberalized the financial markets earlier and its government had started earlier to introduce steps to limit the boom, such as prudential supervision and reduced fiscal incentives for debt financing.

Second, the small open Nordic economies experienced large international capital flows (bonanzas), fueling the lending booms while exchange rate risk was perceived to be low and restrictive monetary policy aimed at containing the boom led to high interest rate differentials. Third, terms of trade movements contributed to the booms in Finland and Sweden, while the fall in global oil prices contributed to limiting the boom in Norway.

Following the banking crises in all three Nordic countries, major restructuring of the entire banking system took place. In Finland, 250 savings banks were combined, and after several restructuring rounds about 60 percent of the Finnish banking system is now owned by foreign capital (see Honkapohja 2008). In both Sweden and Norway, the government took over several large banks and a new Nordic bank, Nordea, was formed with sizeable public ownership. The cost of the restructuring to the Norwegian and Swedish taxpayers was

limited (in the case of Norway even a slight profit), but in Finland it mounted to 5.3% of GDP (for details, see Moe *et al*, 2004).

### Policy lessons

What are the lessons for economic policy from the past and current financial crises? First, policymakers should ensure the stability of the financial system by putting in place an appropriate regulatory regime and prudential supervision. At the same time, regulation should not stifle the functioning of financial markets that can lead to better resource allocation, diversification of risk, and ultimately increased welfare. Ranciere, Tornell and Westermann (2008) show that even though financially liberalized countries experience a higher risk of financial crisis, countries with *occasional* financial crises also tend to have higher mean growth rates. It appears that timing of deregulation matters, as well as an effective prudential supervision regime.

Second, policymakers should aim for a stable macroeconomic environment. Both monetary and fiscal policy face challenges in the context of unstable financial markets. For example, the tasks of central banks may be broadened beyond inflation targeting, taking the stability of financial markets into account. Central banks are likely to improve their understanding of forces leading to financial instability and their communication of counteracting policies. Fiscal authorities could reduce the incentive for boom-bust lending cycles.

Third, a well-defined system of liquidity support should be in place, while maintaining discipline for the financial sector. In this respect, the supervisory framework, well-defined responsibilities and clear communication policy seem essential, as illustrated by the recent example of the bank run on Northern Rock.

Fourth, as demonstrated by the crisis resolution of the recent financial crises in the three Nordic countries and the responses to the 2007 global financial crises, swift government intervention and stabilization policies can mitigate the impact of financial crises on the real economy and facilitate a faster recovery.

## Chapter 4: Financial Crises and Challenges for Monetary Policy

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This chapter documents the timeline of the 2007-2008 financial crises, and summarizes the monetary policy actions taken.

For some time now, there has been a consensus among policymakers on the main elements of monetary policy design. They include principles like independence and transparency and that the main tool of monetary policy is the short term interest rate through which it provides liquidity to the financial system.

During the current crisis monetary policy has had to respond with new tools. While monetary policy was injecting liquidity into the system, governments had no means of making sure that this liquidity was passed on by commercial banks to the economic participants needing it the most. Conventional tools stopped being effective and monetary policymakers had to invent new ways of lending money, for example the Term Auction Facility and the Primary Dealer Credit Facility. Since 2008 the Federal Reserve has even financed purchases of commercial papers.

In this section we explain how the crisis has reshaped monetary policy making. What are the new monetary policy tools used, and what they are intended to do. Our analysis will focus on US monetary policy.

### **Prelude to the financial crisis**

The economic environment before the current financial crisis was characterized by strong economic growth and a buildup of bubbles in asset markets. A mix of loose monetary policy that kept interest rates low for a prolonged period of time and new financial innovations that were not well supervised by regulators were both important factors behind the crisis.

### Developments on the financial market

To understand the underlying causes of the current crisis one should also understand recent innovations on the financial markets. Over the last decades financial development has made it possible to separate financial instruments into their most fundamental pieces and trade them separately (securitization).

In the past payment streams and risk were bundled together. Bonds were a sequence of coupons with a principal payment at maturity. Today a coupon and a principal can be bought and traded separately. It is virtually possible to purchase or sell any stream of payments with any risk characteristics. This financial development improved the efficient operation of the economy, and allowed savers and borrowers to reallocate consumption over time, and to share and trade risks. This repackaging of payments and risk has also extended to consumer lending.

Since 2000 residential real estate prices have started to increase, which has enhanced consumer spending and consumer borrowing too. Case, Quigley and Schiller 2005 estimate that a one percent increase in housing wealth raises consumption by 0.11 -- 0.17 percent. The easiest way to convert housing wealth to consumption is by borrowing.

Securitization also made it more beneficial for banks to lend, since it allows them to transfer part of their credit risk to the markets. Existing rules on capital adequacy require banks to put some capital aside for each asset, which sets up a perverse incentive to create structures free of the capital burden. Banks started securitizing not only home mortgage loans, but also other loans like credit card debt and student loans. With the closer integration of financial markets securitization became easier, and the escalation of securitization became a global trend<sup>20</sup>.

In 2007 it became apparent that pricing of repackaged residential mortgage loans was not correct. The quality of some loans in these mortgage pools was lower than previously thought. The increase in consumer demand for mortgage loans and the new-found ease of commercial banks to cut up and repackage risk had created not only new opportunities but

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<sup>20</sup> For a more detailed analysis of securitization see for example Altunbas, Gambacorta and Marqués (2007).

also new risks. Mortgage lending was so profitable that lending conditions became looser and looser. This was also facilitated by the new subprime lending model. In contrast to the traditional lending model, where the bank landed directly to the home buyer and evaluated the value of the property and the creditworthiness of the borrower, in the new model the bank outsourced these functions. The mortgage loans were arranged through mortgage brokers, whose income depended entirely on the number of mortgages arranged.

Ratings also played an important role. Securitized debt was repackaged in different risk categories, that were determined by rating agencies. Unfortunately banks could shop around between different rating agencies, which created a perverse incentive for rating agencies to provide good ratings.

Banking regulations also became less strict. Everyone knew that lax regulation would damage customers, yet whoever had less severe regulations could give an advantage to its banks compared to other countries. This is what Hans-Werner Sinn (2009) calls "the competition of laxity".

The U.S. 2007 subprime mortgage crisis revealed this weakness of mortgage portfolios and more and more mortgages started to default. Through securitization the problem on the US housing market became global, affecting not only the US market. The extent of this problem was a surprise to most economic policymakers. Greenspan, for example, admitted making a mistake of insufficient regulation: "I made a mistake in presuming that the self-interest of organizations, specifically banks and others, was such that they were best capable of protecting their own shareholders" (Greenspan, Financial Times, October 24. 2008)

### **Monetary policy before the crisis**

Monetary policy has also added to the boost in mortgage lending by keeping interest rates low for a prolonged time period before the crises. Low interest rates added to the ease of borrowing and the buildup of asset bubbles.

Us monetary policy remained loose for several reasons. The reason for this is that US inflation remained low, despite the increase in asset prices, and there is no consensus on whether monetary policy should respond to developments in asset prices or should just

respond to developments in inflation. It is well understood that the burst of an asset price bubble can cause economic downturn; the biggest financial crises, like the Great depression (1929-1939) and Japan's lost decades (1990-present), were all preceded by the burst of housing and stock market bubbles. Yet, it is difficult to identify a bubble ex ante and the central bank might act against economic growth instead of pricking a bubble<sup>21</sup>.

Greenspan was often criticized for keeping interest rates low and allowing the housing bubble to grow. He has replied to these critiques in several articles in the Financial Times (for example April 6, 2008, FT), arguing that keeping interest rates low was a worldwide phenomenon. By 2006 long term interest rates in developed countries and many developing countries had declined to single digits. Between 2001 and 2006 a housing bubble emerged in many countries and the most likely common cause for this was the fact that long term interest rates were low.

### **Conventional monetary policy tools**

Since the aim of this chapter is to summarize how the conduct of monetary policy has changed as a result of the recent financial crisis, we now briefly summarize how monetary policy usually works and what the conventional monetary policy tools are.

The textbook treatment of monetary policy focuses on three main tools to influence the economy:

1. Federal Funds Rate Target
2. Discount Lending
3. Reserve Requirement

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<sup>21</sup> For a summary on the debate on whether central banks should target asset prices see World Economic Outlook 2009, October, chapter 3.



### **Federal Funds Rate Target**

The main instrument of the Federal Reserve (Fed) is the federal funds target rate which is set by the Federal Reserve's policymaking body, the Federal Open Market Committee (FOMC). This is a short term interest rate on overnight interbank loans. It is a market determined interest rate, so, in practice, the Fed sets it by adjusting the supply of bank reserves through open market operations in the government securities market.

The Fed buys and sells treasury bills, notes, and bonds on the secondary market, it cannot add to its holdings by buying securities directly from the U.S. Treasury. Repurchase agreements (repos) are also important; the Fed uses repos to adjust the level of reserves in the banking system from day to day. A repurchase agreement is a short-term collateralized loan in which a security is exchanged for cash, with the agreement that the parties will reverse the transaction on a specific future date at an agreed-upon price, sometimes as soon as the next day. The Fed carries out these transactions through the Federal Reserve Bank of New York's Open Market Desk.

The federal funds target rate influences the economy through several channels. The traditional interest rate channel is that higher interest rates decrease the level of investment projects. The exchange rate channel is that a higher interest rate results in more appreciated currency which in turn makes imports cheaper and exports more expensive. There are lending channels, where the level of interest rate influences the lending patterns of banks. And, finally, interest rates also influence stock and property prices through the so-called asset channel. Asset prices in turn influence consumer behavior through the wealth effect.

### **Discount Lending**

Commercial banks can borrow from the central bank at a rate called the "discount rate" or the "primary lending rate". Any bank can borrow, which is the main difference compared to open market operations, in which only 19 primary dealers are authorized to participate. Discount lending is collateralized; in the event of default the Fed is taking the collateral from the bank. A collateral can be a very broad range of assets, while in regular open market operations only a restricted set of assets qualify for a repurchase agreement.

### **Reserve Requirement**

Banks are required to hold a fraction of their deposits as reserves. In the US reserves do not pay an interest rate, which makes it costly for banks to hold reserves. By increasing the reserve requirement the Fed increases this cost and decreases commercial bank lending. This tool is not used very actively, however; the reserve requirements are changed only very infrequently.

### **The crisis hits**

The earliest signs of the crisis appeared in February 2007, when several large subprime mortgage lenders started to report losses. Credit spreads between risky and risk free bonds started widening in July, but the real trigger came on 9 August 2007, the day when the large French bank BNP Paribas temporarily stopped redemptions from three of its funds that held assets backed by U.S subprime mortgage debt. As a consequence overnight interbank market rates in Europe immediately shot up and the European Central Bank intervened with the largest short-term liquidity injection in its nine-year history.

Stress in the interbank market became apparent by the sudden increase in the interbank market rates. The so-called TED spread, the gap between the 3-month LIBOR rate and the 3-month T-bill rate, rose sharply (See Figure 4.1). By August 20 2007 the TED spread reached a peak of 242 basis points. Liquidity in the interbank market had dried up and central banks across the world supplied large quantities of reserves in response to the increased demand from banks.

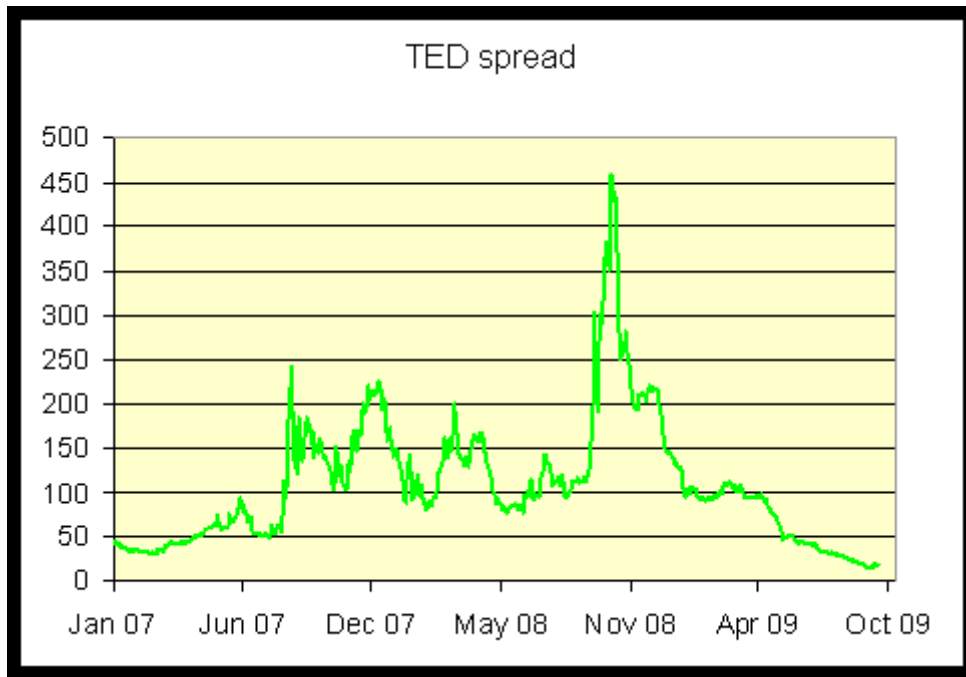


Figure 4.1: TED spread. Source <http://wallstreetpit.com/11207-federal-reserves-targeted-liquidity-operations>

The spread between U.S. government agency securities - those issued by Fannie Mae and Freddie Mac<sup>22</sup> - and the U.S Treasury's equal maturities had also increased substantially. Normally these securities are considered very similar in risk, but starting in August 2007 the spread doubled from 15-25 basis points to 40. Then, as the crisis became more severe, the spread increased even further. Trading in commercial papers had also decreased and their interest rate increased.

In November 2007 it became clear that financial institutions were experiencing large losses, so the interbank market spreads shot up again (see Figure 4.1).

The reluctance of commercial banks to lend to each other dried up the interbank market. Interbank rates remained high and volatile for a substantial period. This might have come

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<sup>22</sup> Federal National Mortgage Association, commonly known as Fannie Mae, and Federal Home Loan Mortgage Corporation, known as Freddie Mac are a government-sponsored enterprise. Fannie Mae was founded in 1938 during the Great Depression, with the purpose of purchasing and securitizing mortgages in order to ensure that funds are consistently available to the institutions that lend money to home buyers. Freddie Mac was founded in 1970, it buys mortgages on the secondary market, pools them, and sells them as mortgage-backed securities to investors on the open market.

from banks' assessment of an increase in credit risk, which increased the interest rates they were charging. Banks also had uncertainties regarding their own balance sheets. Soon after the crisis started it became apparent that everyone, banks included, had difficulties in valuing a broad range of assets. Not knowing exactly the value of their own balance sheets, banks were also uncertain about their lending capacity.

### Monetary policy during the crises

The first aim of the Fed was to calm down the interbank markets, and lower interest rates<sup>23</sup>. The Federal Reserve has cut its target rate several times; by December 2008 the effective fed funds rate was 0.16 percent (see Figure 4.2). The Fed has also dropped the premium on primary discount lending, from 100 to 50 to 25 points above the fed funds rate target.

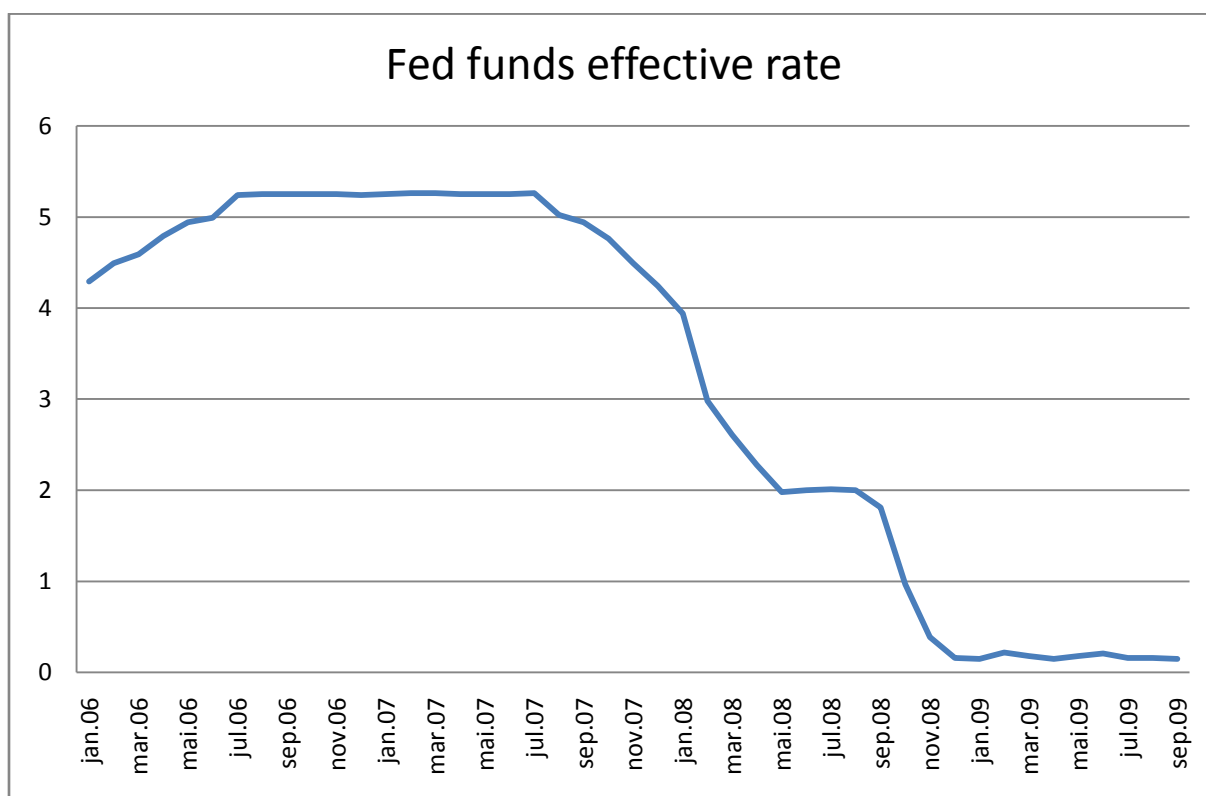


Figure 4.2: Fed Funds Rate (Source: <http://www.ny.frb.org/markets/omo/dmm/fedfundsdata.cfm>)

<sup>23</sup> This section is partly based on Cecchetti (2008)

In well-functioning financial markets, changes in actual and expected targets for the federal funds rate are arbitrated through the financial system to affect the cost of credit and the price of assets. Many factors affect these markets and the relationship between them but, on balance, the Fed has previously been able to control the federal funds rate to make the adjustments to financial conditions needed to foster its objectives for prices and employment.

From the time that the financial market turmoil emerged in August 2007, the relationship between the federal funds rate and financial conditions, and hence spending, was disrupted, with any given federal funds rate implying much tighter conditions than usual.

Not only has the Fed reduced the target federal funds rate aggressively, essentially to zero, but it has also made credit available to institutions and markets in which it had not previously intervened<sup>24</sup>. This was necessary on the one hand because the interest rate basically had reached its zero lower bound. On the other hand it quickly became apparent that with the traditional ways of introducing liquidity there was no way to guarantee that liquidity reached those banks that really needed it. The Fed has introduced several new facilities to provide liquidity to targeted segments of the market.

### **Term Auction Facility**

Since the aggressive discount lending policy did not work, on December 12, 2007 the Fed announced that it was going to provide liquidity through an auction, the Term Auction Facility (TAF). This auction is different from borrowing through the discount window in two important respects, it provides liquidity for longer periods (28 or 84 days depending on the auction) and, more importantly, it offers anonymity. The idea behind the TAF is to remove the stigma of borrowing through the discount window.

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<sup>24</sup> To varying degrees, similar actions have been taken by other central banks around the world.

The TAF does more than merely distribute funding to the banks that need it. In the TAF the Fed allows banks to use collateral that might otherwise have very little market value. The Fed offers a price for these collaterals that is usually above the market value. The TAF provided liquidity to banks who would otherwise find it hard to obtain liquidity, and also gave banks time to value the assets they had.

There is some evidence that the TAF helped to decrease the spread between the three-month LIBOR and the three-month Treasury bill rate by decreasing the amount of securities on the Fed balance sheet and increasing the amount of loans. Yet the evidence is not very clear. Taylor and Williams (2009) for example argue the opposite, they find no evidence that the TAF contributed to the decline in the TED spreads. They show that the TED spread decrease dwell before targeted liquidity operations were introduced. . Christensen, Lopez and Rudebusch (2009) and McAndrews, Sarkar and Wang (2008) noted that there was an impact, but it was on the day of the auction announcement. The Fed announced its intention to make aggressive use of the Term Auction Facility and currency swaps on December 12. The TED spread peaked at 225 basis points on that day, and fell steadily after the Fed's announcement.

### **Providing international dollar liquidity**

One lesson from 2007 is that conventional central bank tools do not always provide liquidity for those who need it. This problem becomes even more acute when liquidity is needed by foreign entities.

On December 12, when the Fed announced that it would provide liquidity through the TAF, it also announced that a swap line was created with the ECB and the Swiss National Bank. Through this swap line the Fed provided dollar liquidity to the ECB and the Swiss National Bank, and those in turn provided dollar liquidity to the European banks.

### **Term Securities Lending Facility**

On 11 March, 2008 the Fed announced an extension of its long-standing securities lending program creating the Term Securities Lending Facility (TSLF).

For many years the Fed has lent Treasury securities to primary dealers on an overnight basis in case they were short of certain maturities. Since the Fed holds some of nearly every Treasury issue, they can lend whatever is needed, thereby ensuring that markets function smoothly.

The new program transformed the existing program in three ways. The TSLF provided securities not only overnight but on a longer horizon, for up to 28 days. The TSLF also broadened the set of collaterals accepted quite dramatically, including "AAA/Aaa-rated private-label residential [mortgage-backed securities] not on review for downgrade."<sup>25</sup> Finally, the Fed announced its willingness to loan up to \$200 billion through the TSLF.

Like the TAF, the TSLF has changed the composition of the Fed balance sheet without changing its aggregate size. The Fed is selling Treasury securities and buying mortgage-backed securities. The aim is to decrease the spread between these two asset classes. Fleming, Hrung, Keane, and McAndrews (2008) estimate that the program was immediately successful.

### **Bear Stearns**

On Friday 14 March 2008 the Federal Reserve Bank of New York gave a loan to Bear Stearns. Data released on 20 March, combined with press coverage report that the loan was repaid on 17 March. This was an unconventional action, since Bear Stearns was not a commercial bank. It was not regulated by the Fed and could not officially borrow from the Fed. The Fed had to use Article 13.3 of the Federal Reserve Act that gives the Board of Governors the power to authorize the Federal Reserve Banks to provide loans to any individual, partnership, or corporation provided that the borrower is unable to obtain credit from a banking institution.

This was also an unconventional action because the Fed had not issued loans based on Article 13.3 since the 1930s. Yet, after determining that the failure of Bear Stearns would put

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<sup>25</sup> See the announcement at [www.ny.frb.org/newsevents/news/markets/2008/rp080311.html](http://www.ny.frb.org/newsevents/news/markets/2008/rp080311.html)

the whole financial system at risk, the Fed did provide a loan. After the loan, the Fed officials brokered a deal with JP Morgan Chase to purchase Bear Stearns, with a promise of a \$29 billion loan from the Federal Reserve Bank of New York.

In the spring of 2008 around the time of the Bear Stearns problems, the TED spread exhibited a similar spike (see Figure 4.1). The TED spread peaked at 200 basis points on March 19. Christensen, Lopez and Rudebusch (2009) chose March 24, the date of Bear Stearns' rescue, as the key turning point, after which risk spreads became significantly lower than their model predicts that they would otherwise have been.

### **Primary Dealer Credit Facility**

The Fed announced its new Primary Dealer Credit Facility on March 16 2008 and also significantly expanded its repo positions and Term Auction Credit over the next several weeks.

When creating the Primary Dealer Credit Facility the Federal Reserve used its Article 13(3) powers for a second time in three days. The 19 primary dealers authorized to participate in daily open market operations are not investment banks and brokers, so they could not borrow directly from the Fed. Through the Primary Dealer Credit Facility, however, they became eligible to borrow from the Federal Reserve.

The PCDF is a collateralized loan facility, which allows for a broad set of collaterals including "investment-grade corporate securities, municipal securities, mortgage-backed securities and asset-backed securities for which a price is available"<sup>26</sup>. One aim of the PCDF was to provide liquidity to investment banks that now had direct borrowing access. This, in practice, meant an extension of the lender of last resort function of the Fed to investment banks. A second aim was to reduce the spread on the assets that were eligible as collaterals for a FCDF borrowing. The idea is that since the Fed now accepts these assets at any time, it

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<sup>26</sup> See [www.ny.frb.org/newsevents/news/markets/2008/rp080316.html](http://www.ny.frb.org/newsevents/news/markets/2008/rp080316.html).



should provide a safe demand for these, and they should be readily accepted as collateral in private borrowing too.

### **After the failure of Lehman - the Fed's new Alphabet soup**

After Lehman Brothers Holdings Inc. filed for bankruptcy on September 15, 2008, the TED spread skyrocketed (see Figure 4.1). Targeted Fed liquidity operations increased by \$691 billion between September 3 and October 8, despite which the TED spread rose from 114 to 385 basis points and would continue to rise until peaking at 458 basis points on October 10. By November 12 nonstandard Fed assets had expanded by \$1,312 billion.

The Fed has also introduced several new liquidity facilities. The number of acronyms for these programs started increasing so much that the press often referred to the new facilities as new additions to the Fed's alphabet soup.

On September 19, 2008 the Fed introduced the *Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility* (AMLF). The aim was to provide liquidity to mutual funds<sup>27</sup>. In normal circumstances mutual funds fulfill their redemption requests by selling their commercial papers. After the bankruptcy of Lehman there was an exodus from these funds, and selling their commercial papers became more and more difficult. "The Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility is a lending facility that provides funding to U.S. depository institutions and bank holding companies to finance their purchases of high-quality asset-backed commercial papers (ABCP) from money market mutual funds under certain conditions. The program is intended to assist money funds that hold such papers in meeting demands for redemptions by investors and to foster liquidity in the ABCP market and money markets more generally."<sup>28</sup>

On October 7<sup>th</sup> 2008 the Federal Reserve Board announced the creation of the *Commercial Paper Funding Facility* (CPFF), a facility that complements the Federal Reserve's existing

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<sup>27</sup> Mutual funds pool together investors and invest in stocks, bonds and short-term money market instruments and other securities.

<sup>28</sup> <http://www.federalreserve.gov/monetarypolicy/abcpmmmf.htm>

credit facilities to help provide liquidity to term funding markets. CPFF was targeted primarily at issuers of commercial papers and intended to improve market conditions for businesses that rely on the commercial paper market to finance themselves.

*Money Market Investor Funding Facility (MMIFF)* was announced on October 21, 2008. MMIFF is aimed to help mutual funds meet their redemptions, just like the AMLF. It differs from the AMLF primarily because it is targeted at purchasing a broader set of assets, including unsecured commercial papers. The MMIFF differs from the CPFF in that it aims to help money market funds rather than issuers of commercial papers.

On November 25, 2008 the Fed went even further and announced plans to provide liquidity for consumer and small business loans by creating the *Term Asset-Backed Securities Loan Facility (TALF)*. Starting on March 17 2009, the Fed is offering loans to large investors to buy newly issued Asset Backed Securities. On March 3, the Fed announced that “Federal Reserve Bank of New York will lend up to \$200 billion to eligible owners of certain AAA-rated ABS backed by newly and recently originated auto loans, credit card loans, student loans, and SBA-guaranteed small business loans.”<sup>29</sup>

These new facilities are still in place. On February 3, 2009 the Fed announced the extension through October 30, 2009, of its existing liquidity programs that were initially scheduled to expire on April 30, 2009.

## Conclusion

By early 2007 house prices had increased to unprecedented levels, households became highly leveraged, mortgage quality had declined and asset-backed securitization had become widespread also internationally. In August 2007 the financial system started to crack, house prices fell and it became apparent that the quality of mortgage debt was not as high as previously rated. The loss on balance sheet of banks was hard to value, and liquidity dried up in the interbank market.

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<sup>29</sup> <http://www.federalreserve.gov/monetarypolicy/20090303a.htm>

The Fed first responded with the traditional central bank tools, decreased interest rates and made borrowing through the discount window cheaper. Yet, it soon became apparent that these tools did not work, and the Fed had to improvise to get liquidity to market participants who were in need. New monetary policy tools were introduced, that intended not only to introduce liquidity, but to introduce liquidity in a directed way to market participants who were in need. The Fed started following what James D Hamilton calls “monetary policy using the asset side of the Fed’s balance sheet”. On the asset side the Fed replaced its traditional holdings of Treasury securities with a variety of new lending programs and alternative assets.

These new tools were aiming to maintain financial stability in the economy, which is a function beyond the traditional central bank role. It is an open question how the responsibility of central banks will change in the future.

Along the way, the Fed has also cooperated internationally with other central banks to provide enough dollar liquidity to the international banking system. Other central banks faced similar disruptions in their financial markets and have implemented new facilities in a similar fashion to the Federal Reserve.

# Part II: Macroeconomic Research Related to Financial Crises

## Chapter 5: Adjustment of financial imbalances – China versus the United States

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The two most important economies in the world at the current stage, namely China and the United States (see e.g., Heston, Summers and Aten (2006)), have had very different impacts on the world financial flows. Whereas China has had persistent positive current account surpluses, the United States has had persistent negative current account deficits. We have seen that the savings rate for China has increased as China has become richer, whereas the opposite has been the case for the United States during the last decades. Figure 5.1 displays the development of the current accounts for the two countries.

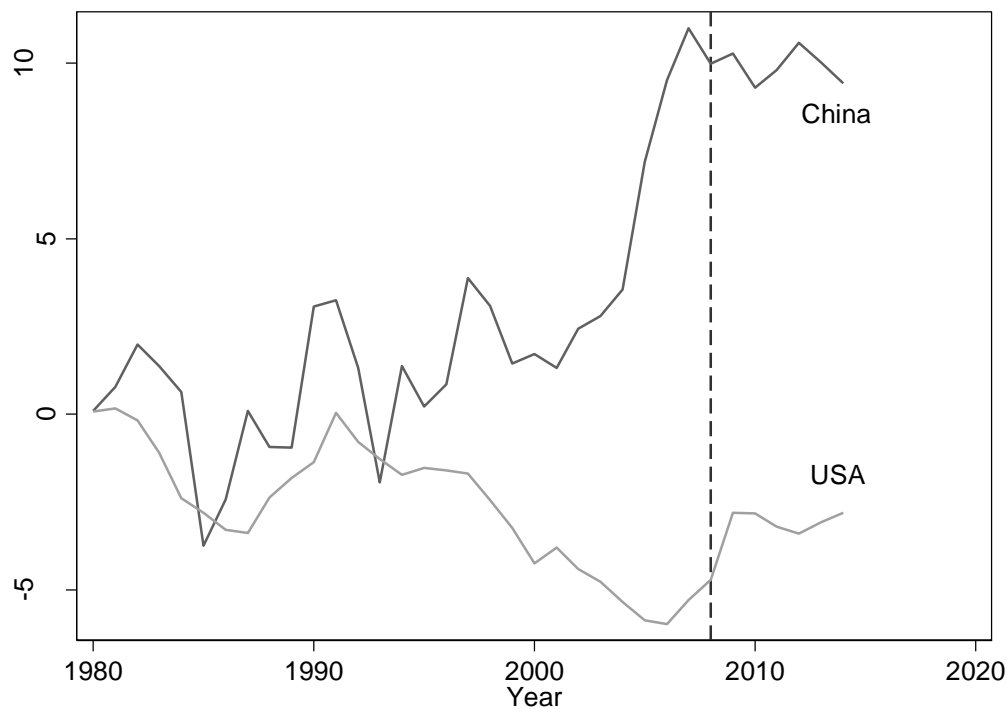


Figure 5.1: Current account developments. Source: IMF, World Economic Outlook. Predicted Values after 2008.

The current account surpluses for China can partly be explained by the fact that savings rates are tremendously high. Looking at individual savings profiles over the life cycle, the Chinese seem to have a very different profile than the citizens of most Western economies, such as the United States. Whereas the young contribute very little to national saving in most

countries, the young generations save a lot in China. There are especially two reasons that can explain the high savings rates among the young in China, namely precautionary savings and life cycle savings. The strength of both these savings motives potentially reflects the lack of social insurance and public pension programs. Hence, a future introduction of social security and/or social insurance in various forms will contribute, potentially significantly, to higher private consumption.

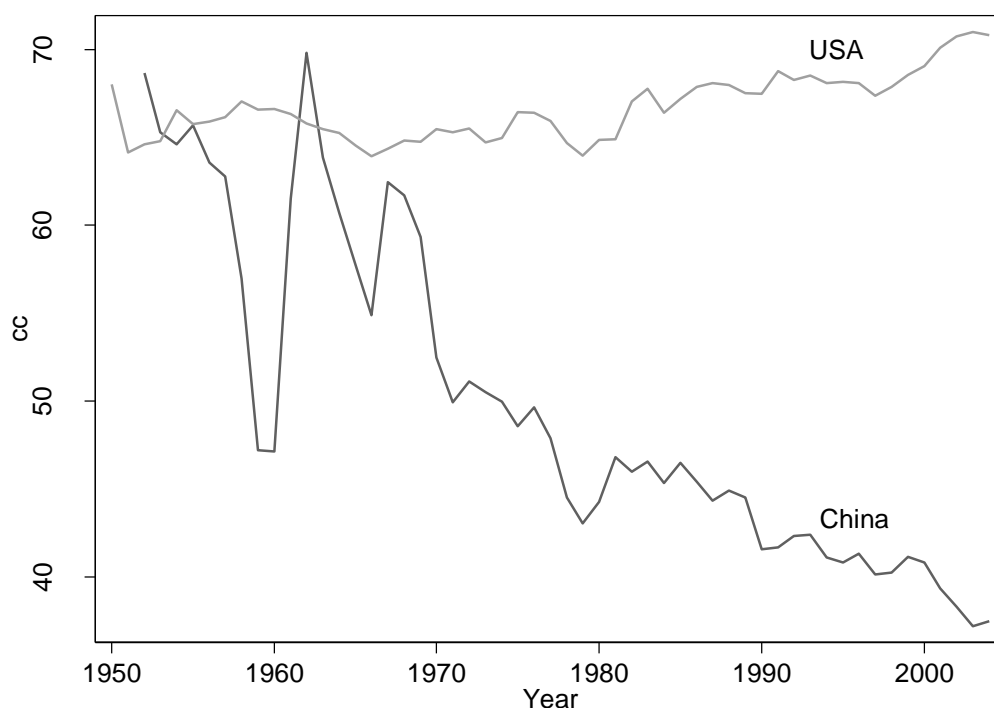


Figure 5.2: Consumption as shares of GDP. Source: Penn World Table 6.2

The young generation in the United States on the other hand, hardly saves at all. There are several potential reasons: The young have expectations of (potentially unrealistic) high future income, they invest (at least until recently) in housing instead of in financial savings, and the United States have a pay-as-you-go social security system. The latter feature implies that a change to a (more) funded pension system and also a privatization of the social security system could potentially increase savings significantly. Further, the current fiscal policies seem to be non-sustainable. Figure 5.3 displays government net debt in the United States.

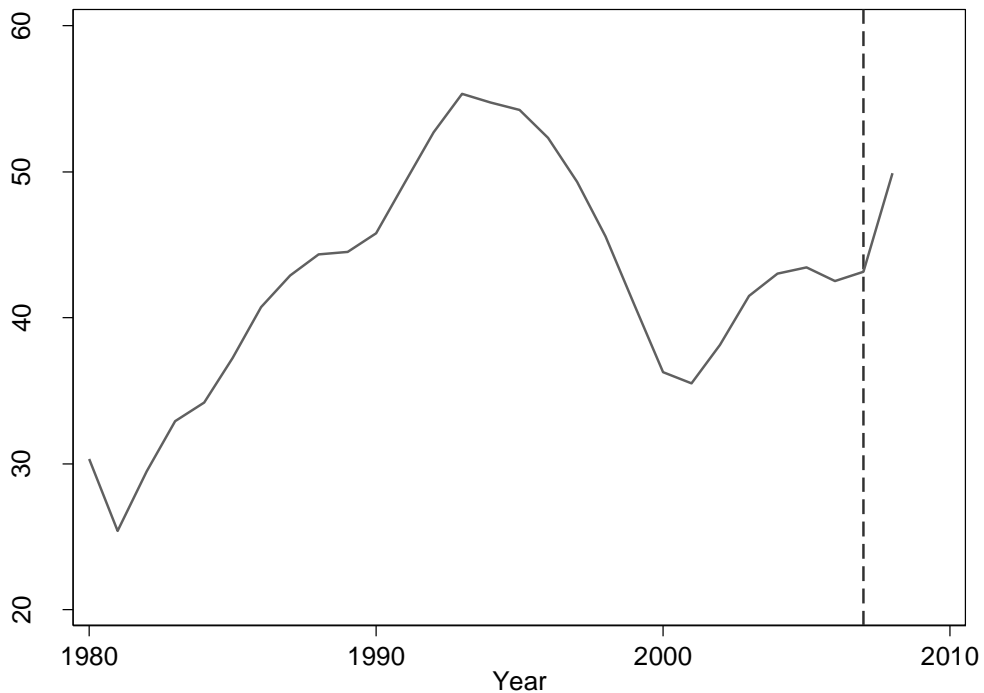


Figure 5.3: Government net debt as a share of GDP. Source: IMF, World Economic Outlook. Predicted Values after 2008.

We have reason to believe that the savings patterns in the United States and China reflect both business cycle conditions and structural explanations, such as the existence and design of the social security system, e.g., old age pensions, and other forms of social insurance, e.g., unemployment benefits and public health care. Hence, we also believe that various social security and social insurance systems could alter the savings patterns in these countries, and, subsequently, impact capital flows, factor prices, and hence the global imbalances.

There are specifically two potential reforms that we plan to analyze in this chapter. The first is a reform towards a funded and potentially private social security system in the United States. Such a reform could lead to domestic investments or investments in emerging markets, or a mixture of the two. The second is a reform introducing social security and/or social insurance in China. The most interesting reform to consider for China, might be a reform introducing a pay-as-you-go pension system, since China at the outset over-accumulates capital, i.e., the situation may well be characterized by dynamic inefficiency.

We plan to analyze these two reforms by using a general equilibrium model with overlapping generations. The basic framework is a two-region overlapping generations (OLG) model, in the tradition of Diamond (1965) and further developed into a multi-region framework by Persson (1985). In our analysis we plan to provide four extensions. First, a more detailed model of the life-cycle should be developed, capturing realistic interactions between tax-transfer schemes and consumption and saving profiles. Second, we plan to introduce a realistic demographic structure, simulated by information on the demographic structure in the two countries. Third, we want to introduce a two-sector production structure with one tradable good and one non-tradable good. Fourth, we plan to introduce idiosyncratic income risks.

Introducing these types of features, we will build on the large literature on computable overlapping generations models, see Fehr and Thøgersen (2009: section 3) for a survey. Focusing mainly on the interlinkages between China and the US, and the overall effects on “global financial imbalances”, we will particularly focus on extensions of the somewhat less developed literature on multi-region versions of this kind of models, see for example Fehr et al (2007) and Börsch-Supan et al. (2006).



## Chapter 6: Determinants of Financial Crises: Jointness and the Role of Expectations

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This project will investigate empirically the determinants of financial crises, banking, currency, twin and debt crises, as discussed in chapter 3. The project will focus on two questions: First, to what extent is there dependence or *jointness* among determinants of financial crises? Second, what role do expectations have in predicting financial crises.

In a recent survey on financial instability, Eichengreen (2004) observes that “[r]ecent empirical studies suggest that explanations for financial vulnerability are complementary rather than competing and that they interact in mutually reinforcing ways.” This project will apply a novel method recently developed by Doppelhofer and Weeks (2009) to investigate dependence among determinants of financial crises. By looking beyond marginal measures of variable importance, jointness reveals generally unknown forms of dependence.

Conceptually, one can think of two forms of dependence or jointness: Positive jointness implies that regressors are *complements*, representing distinct, but mutually reinforcing effects. Negative jointness implies that explanatory variables are *substitutes* and capture similar underlying effects. The case of complementary determinants of financial crises could be of particular interest to economists and policymakers. In this case, individual determinants of financial crises interact and reinforce the effect of one another, thereby increasing the probability of experiencing a financial crisis. As discussed in chapter 3, a combination of different forms of financial crises, so called twin crises, have particularly severe economic costs, as illustrated by the recent example of the crisis in Iceland.

The second part of the project assesses the role of expectations quantitatively. We augment data on determinants of financial crises by a set with private expectations to examine the predictive power of expectations in the past currency and exchange rate crises. Expectations of many economic and financial variables are likely to contain information that can be used to predict financial crises.

## Chapter 7: Financial Frictions and Business Cycles

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A fundamental and unresolved problem in the business cycle literature is to understand how shocks to various sectors of the economy are amplified and propagated to have a systematic impact on key macro aggregates and welfare. The state of the art business cycle literature, whether of the RBC or DSGE strands, have made significant progress in matching macro aggregates' behavior in response to diffusely specified or catch-all type shocks, such as total factor productivity shocks in the RBC literature. However, the literature has little to say about what these shocks actually are or what causes them.

At least since Fisher's (1933) theory of debt deflation as a cause and/or magnifier of the great depression, economists have been interested in understanding how financial market imperfections impact economic fluctuations. However, neither the classical Keynesian approach that dominated macroeconomics for much of the 20<sup>th</sup> century, nor the RBC and DSGE models that have become the workhorses of modern macroeconomics, have given any prominence to financial factors as causes or amplifiers of economic fluctuations. Following the Modigliani-Miller theorem macroeconomists viewed financial factors only as a veil over real activity.

Since the seminal contributions of Bernanke and Gertler (1989), Bernanke, Gertler and Gilchrist (1999) and Kiyotaki and Moore (1997), and in light of the recent crises there has been a renewed interest among macroeconomists in understanding what impact financial factors have on economic fluctuations, and in incorporating these factors in state of the art macroeconomic models. The underlying economic arguments in the models mentioned above are appealing at an intuitive level; financial constraints on investment in production factors contribute to magnifying small shocks into large scale aggregate fluctuations. However, the quantitative effects of these models have in general been found rather small (see e.g. Chari, Kehoe and McGrattan, 2007) and their impact on modern macroeconomic models developed for e.g. central bank policy analysis has been limited.

We lack macroeconomic models with financial frictions that are able to produce convincing answers and reasonable economic stories along the following three dimensions:

1. significant and reasonable quantitative impacts on real and financial variables;
2. a plausible model specification;
3. a transparent transmission mechanism between the real and financial sectors of the economy.

Although some researchers argue against the ability of modern macroeconomic models to cope with the difficulties associated with incorporating financial market imperfections, these frictions could be introduced with relatively modest modifications of the current literature.

Bear in mind that modern dynamic general equilibrium models can produce environments where the Modigliani-Miller theorem does not hold; defaults occur along the equilibrium path; there is a role for non-trivial financial intermediation; and, there are multiple interest rates and credit spreads.

In addition these models provide a laboratory where we can see how they measure up to real and financial business cycle data and an environment where the dynamic interactions between agents and policy over time can be analyzed.

Hence modern dynamic general equilibrium models do, in my opinion, provide the best framework available to analyze the impact that financial market imperfections have on aggregate fluctuations and what the macroeconomic policy implications of the financial market imperfections are.

In light of the lack of a clear quantitative impact in the first generation macroeconomic models with financial frictions, two potential areas of research seem especially promising:

First, the role of a heterogeneous balance sheet constrained corporate sector. The literature has so far focused on using a representative balance sheet constrained firm. However, as documented by e.g. Covas and den Haan (2008), there is significant heterogeneity in the US data on firms' potential balance sheet constraints.

The largest US firms are least likely to be balance sheet constrained. They also dominate the aggregate data to such a degree that it is hard to detect significant financial constraints in the aggregate data. As documented by Chari, Kehoe and Christiano (2008), in the aggregate, US non-financial firms can actually finance new investment by retained earnings and dividends alone.

However, smaller firms are far more likely to be balance sheet constrained. Smaller firms are also important drivers of job creation in the US. Hence it seems reasonable to research whether macroeconomic models with firms with differing likelihood of being financially constrained can perform better along the three dimensions set out abroad than the first generation macroeconomic models with financial frictions.

Second, the role of a balance sheet constrained financial sector. The literature on financial frictions in macroeconomics has generally focused on a balance sheet constrained corporate sector. However, as the recent crisis has shown, the financial sector may also become constrained in its ability to raise external finance.

Few papers have been developed along these lines; notable exceptions are Goodfriend and McCallum (2007), Gertler and Karadi (2009) and De Walque et al. (2009). As in the literature on a balance sheet constrained corporate sector, heterogeneity across financial intermediaries should play a major role in any meaningful analysis of a balance sheet constrained financial sector.

Developing macroeconomic models with a balance sheet constrained financial sector will allow us to analyze macro prudential policy for financial stability within a unified framework that is not available today. However, given the complexity involved in modeling the financial sector, it is essential to focus on a few key issues in order to achieve a manageable macroeconomic model. It seems particularly important to understand how balance sheet constraints on some intermediaries in a heterogeneous financial sector can lead to systemic dry up of financial lending through contagion and the effects such events have on economic fluctuations. This is where I plan to focus my effort.

Reasonable macroeconomic models that incorporate financial frictions should be able to match key features of both real and financial data. Along the real economic dimension the model should match the amplification and persistence in output and investment in response to primitive shocks and the positive comovement among the macro aggregates; labor supply, output, investment and consumption. Along the financial dimension the model should match credit spread behavior in the data, and the interpretation of credit spreads in the model should be clearly tied to the risk of default. In addition leverage should play a key

role in determining how hard the financial constraints bite; i.e. the effects of the financial frictions should be increasing in the leverage ratio of the constrained sector.

## Chapter 8: Sectoral allocation and endogenous political preferences

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In Norway as well as in other European welfare states, the overall sectoral allocation of individuals shows one particularly clear trend. The share of individuals (out of the total number of citizens aged 18 and above) supplying labor to market-exposed private business sectors is declining, while the share allocated to “the public sphere” broadly defined as employment in the public sector, in the education system or in some sort of welfare scheme (old age pensions or other schemes) is increasing.

As discussed in more detail by Thøgersen and Aarbu (2007), there are several explanations to this development. These include the direct and indirect effects of: i) ageing populations, automatically increasing the share of individuals receiving old age pensions, ii) the interaction of generous economic incentives and potentially deteriorating social norms, leading to an increasing number of exits from the labor force and into disability and other welfare schemes, and iii) economic growth in general, stimulating reallocation of labor from capital intensive private business sectors and into labor intensive sectors (including a public sector that, to a major extent, supplies many income elastic services like schooling and health care). While some of these explanations hinge on factors that are exogenous to politics (i.e., ageing population), others are heavily influenced by political choices (i.e., incentives of tax-transfer programs and the size and scope of the public sector).

Figure 8.1 shows the development of the sectoral allocation of adult Norwegian individuals during the period 1978 – 2004. While the median voter during the 1970s was clearly an employee in a private company, this changed during the 1980s, and during the recent years the medium voter is clearly in the public sphere.

The tendency discussed above raises an important research question. To what extent will the described developments in sectoral allocation feed back to the political preferences of the voters and, in turn, how will that impact the political landscape and the electoral platforms of the different political parties?

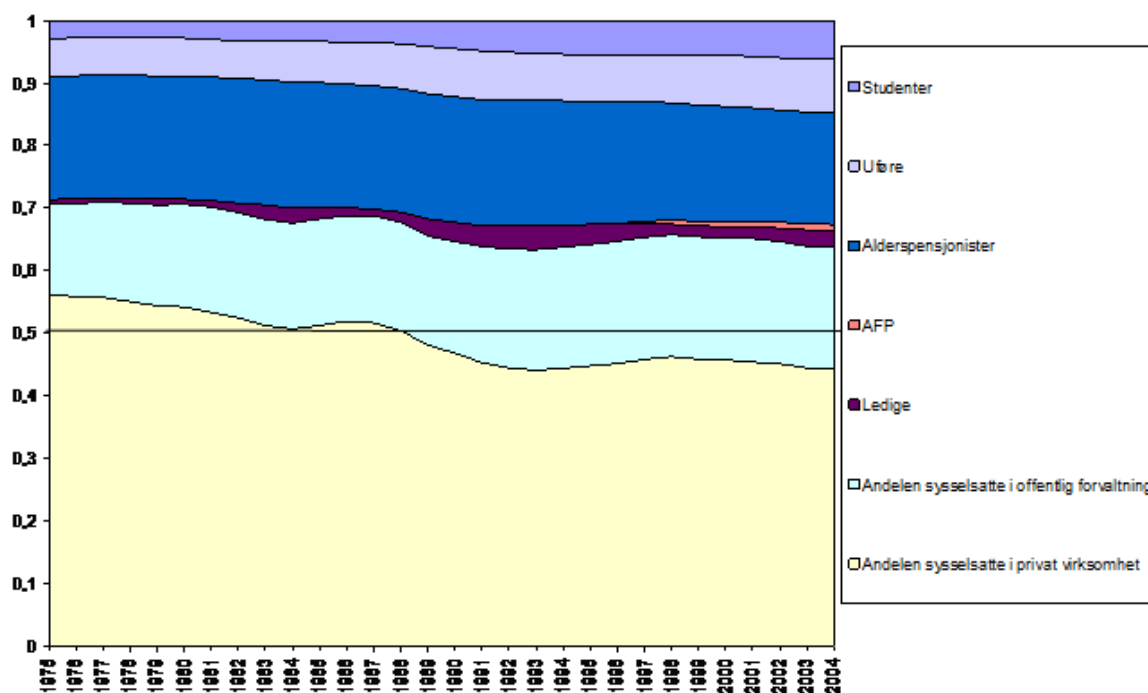


Figure 8.1: Overall sectoral allocation of adult Norwegian citizens

The existence of feedback effects of this type may hinge on several potential mechanisms. For example, voters belonging to the public sphere may find that left-wing parties have a platform that is more favourable for them, while the opposite tendency may apply to voters employed in private firms. A slightly different mechanism may be that individuals' knowledge and framing of different political issues are influenced by their sectoral allocation.

Empirical evidence supports the existence of such mechanisms. For example, Knutsen (2001, 2005) finds that sector employment impacts voters' party choice in the Scandinavian countries as well as other West-European countries.<sup>30</sup> Moreover, Rattsø and Sørensen (2004) find that a higher share of employees in the public sector in a region reduces the likelihood of structural reforms.

<sup>30</sup> Anecdotal evidence in this direction is also presented in Aftenposten, October 3, 2009.

This part of the project will suggest a theoretical model that captures: (1) a potential causal link between the political landscape and sectoral allocation, and, in turn, (2) the feedback from sectoral allocation to political preferences of the voters. We will also attempt to provide empirical evidence of the alternative mechanisms that come into play.

We will extend a recent paper by Matsen and Thøgersen (2009). They present a probabilistic voting model where voters' preferences for alternative public goods display habit formation. Current policies impact the habit levels for various public goods and services, and in turn the future preferences of the voters. This implies that the incumbent can influence the probability of re-election, and this link can be used strategically. As compared to a benchmark case of a certain re-election, it turns out that a forward-looking, outcome-oriented government will indeed choose a more polarized allocation between the alternative public priorities in order to increase the probability of re-election.

Cassing and Hillman (1986) also provide a related framework. They consider the interaction between the size of an industry and the political support it receives in terms of protection, for example by means of tariff policy. The current level of protection influences the size of the industry. In the next stage, this feeds back on political preferences because changes in industry size alter the political gains and costs of a given level of protection.



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