

# 1 Financial crises and the macroeconomy

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Success breeds disregard of the possibility of failures. The absence of serious financial difficulties over a substantial period leads ... to a euphoric economy in which short-term financing of long-term positions becomes the normal way of life. As the previous financial crisis recedes in time, it is quite natural for central bankers, government officials, bankers, businessmen and even economists to believe that a new era has arrived.

(Hyman P. Minsky, *'Can "It" Happen Again?' Essays on Instability and Finance*, 1982, p. 213).

As the above citation from Hyman Minsky shows, one may think of modern macroeconomic development as a sequence of boom-bust cycles. Boom-bust cycles occur not only for specific sectors, but also for the entire macroeconomy. Macroeconomic boom periods are usually characterised by overvaluation of assets, overconfidence, expectations of high returns and undervaluation of risk, and by overleveraging. Bust periods reverse confidence and expectations. The current macroeconomic developments in the USA as well as in other regions of the world have features of a typical bust period that is characteristic of boom-bust cycles. In the boom period not only do prices increase but there is often also an asset price boom and credit boom. High asset prices serve as collateral for new borrowing. When a downturn starts, often initiated by a sudden bust, and frequently entailing long-term protracted periods of low growth and low employment, prices may fall and periods of debt deflation are often experienced. Normally such boom-bust cycles are driven by specific sectors in the economy. In the recent boom-bust cycle in the USA, the real estate and credit sectors were the main driving forces. Open economies may magnify those boom-bust scenarios.

Much theoretical and empirical work on the impact of the financial sector on the macroeconomy has been undertaken by different schools of economic thought. One currently prominent school builds on the theory of perfect capital markets, which are mostly assumed in intertemporal general equilibrium theory, which deals with stochastic growth and develops into Real Business Cycle (RBC) theory. Yet it is rare to find in the literature from this school explicit modelling of the interaction of credit, asset prices and real economic activity. In the context of that class of models it is in particular difficult to explain credit crunches and the rising default premia at the onset of the bust periods. Default or risk premia are explained on the basis of consumption-based asset pricing models, which have great difficulty in matching actual risk premia.

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In contrast, many theoretical and empirical studies have applied the theory of imperfect capital markets. Moreover, there are other traditions, for instance, the Keynesian tradition as revived by Minsky (1975, 1986), Mishkin (1998), Kindleberger (2000) and Tobin (1975) that have been very influential in studying the interaction between financial markets and economic activity. This approach puts stress on how the instability of credit has a strongly magnifying effect on macroeconomic activity. Another important perspective on this interaction is that of Shiller (1991, 2001), which also explicitly deals with the overconfidence and overreaction in financial markets.

Our own thinking on these issues is heavily influenced by the Keynesian tradition. Yet one can also draw upon recent developments in information economics, as it has been developed by Stiglitz and others, wherein systematic attempts have been made to describe how actual financial markets operate. Many studies of financial markets, and this is Stiglitz's view, claim that a crucial impediment to the functioning of the financial system is asymmetric information. In this situation, one party to a financial contract has much less information than the other. Borrowers, for example, usually have much better information about the potential returns of their investment projects and the associated risks than do the potential lenders. Asymmetric information leads to two other basic problems: adverse selection and moral hazard. Adverse selection occurs when those borrowers with the greatest potential for default actively seek out loans. Moral hazard takes place after a transaction has taken place. Here, lenders are subject to hazards since the borrower has incentive to engage in activities that are undesirable from the lenders' point of view.

The Keynesian view as well as the information-based view of the financial markets explains why there is an important role for the government in the regulation and supervision of the financial marketplace. To be useful, proper financial architecture, regulation and supervisory mechanisms must aim towards the maximisation of access to information, while minimising overconfidence and underestimation of risk. This requires transparency and the creation of information through proper accounting, screening and monitoring. Firms and banks need to be required to adhere to standards of accounting and to make known publicly information about their sales, assets and earnings. Additionally, safety nets for institutions as well as for individuals are necessary to avoid the risks from a rapid liberalisation of financial markets. Before starting our formal analysis it is worthwhile for us to describe three types of typical financial crises that macroeconomies have experienced repeatedly over many decades.

### 1.1 Open economies, foreign debt and currency crises

The first type of crisis that we want to discuss is the financial crisis triggered by currency crises. In open economies the boom period is often accompanied by a consumption boom, huge consumption imports and current account deficits. Capital market liberalisation became popular during the 1980s and 1990s. Financial liberalisation has actively been advocated by such organisations as the International Monetary Fund (IMF) and the World Bank (WB) and has been pursued by many governments since the 1980s.

Liberalisation of capital markets was thought to generate a long period of expansion of the world economy due to the establishment of global markets for products and financial services.

Yet as others have warned the rapid liberalisation and enlargement of the financial markets may lead to more financial instability which, in turn, could be devastating, see for example Stiglitz *et al.* (2006). The Mexican (1994), Asian (1997/8) and Russian (1998) financial crises demonstrated the degree to which a too-rapid market liberalisation could lead to a currency crisis wherein a sudden reversal of capital flows is followed by financial instability and a consequent decline in economic activity. It is interesting to note that this very volatility and lack of trust, especially when combined with the increasing globalisation of markets, had also led to new financial products, spread across the world, and to heightened activity in these same markets. Usually the operations were undertaken with little or unchecked collateral on the borrowers' side.

In contrast to the foregoing view, the liberalisation of financial markets has been more positively evaluated by other schools of thought. An emphasis on the benefits of financial globalisation in general can be found within the American business and financial community, citing mainly the possible benefits of free capital mobility such as:

- reduced trading costs, and in particular low costs of financial transactions;
- an increase in investment returns;
- a lowering of the cost of capital when firms invest;
- an increase in liquidity in the financial market;
- an increase in economic growth and positive employment effects.

Certainly, capital market liberalisation has benefits. Yet, as mentioned earlier, there are also costs if it is done too quickly and imprudently, in particular with inappropriate sequencing.<sup>1</sup> Often the theory of perfect capital markets has been used in order to justify rapid and radical market liberalisation, in particular product and capital market liberalisation. Whereas some parts of the academic profession broadly continue to see the benefits of market liberalisation outweighing the costs, others see increasing problems, so that the strategy of rapid capital market liberalisation has recently come under scrutiny. Too rapidly liberalised capital markets, with a wrong sequencing, can trigger financial instability, contagion effects and strong negative external effects on the real side of the economy.

The negative externalities that can arise from rapid capital market liberalisation (CML) have been laid out in the recent book by Stiglitz *et al.* (2006). This book gives a fair account of the pros and cons of rapid CML. The major argument of the authors is that too rapid a CML leads to financial instability and to boom and bust cycles, hampering economic growth in the long run. Taking the view that capital markets are basically imperfect, they argue that free capital markets have significantly different

<sup>1</sup> Meaning for instance liberalisation occurs before appropriate regulations are put into place.

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effects than free trade. CML might not produce the promised benefits but rather, as Stiglitz *et al.* (2006, Chs. 10 and 11) summarise:

- National fiscal and monetary policies become difficult to pursue, since national governments have to respond exclusively to the signals of the capital market, when pursuing policy objectives.
- Boom and bust cycles, rather than steady development, may come about. Booms in the housing sector, in land prices and equity prices as well as consumer purchases of imported goods lead to distortions of balanced growth, and are usually corrected by periods of bust.
- Financial instability and credit crises, leading to a general contraction of credit and higher risk premia for loans, can hamper economic development.
- There are strong contagion effects of financial busts, since capital movements – the inflow and outflow of capital – are fast in comparison with the changes in trade flows.
- The low income segment of the population as well as small businesses cannot insure and protect themselves against the risks that arise when bubbles burst and recessionary periods occur (or are prolonged). Indeed, those groups are very much affected.

Thus the proponents of (fast) CML frequently overlook the imperfect working of capital markets and attribute too much to their self-correcting mechanism. Frequently there is also mention of insufficient regulatory or supervisory institutions for the banking system, the stock market or the real estate market such that there are no stabilising forces or safety nets for certain countries – this in particular holds, as recent history of financial events has shown, for emerging markets and developing economies. Yet, even advanced countries with a long tradition of regulatory institutions such as for the banking sector and stock markets are also not protected from such events and the negative externalities of financial crashes and busts – as recent history, after the introduction of the new wave of financial innovations, has shown.

Already in the 1990s much critical work on the issue of open economy financial market liberalisation and currency and financial crises was published. Mishkin (1998), for example, posited an explanation of the Asian financial crisis of 1997/8 using the above information-theoretic ideas. A similar theory by Krugman (1999, 2000) pointed to the deteriorating balance sheets of banks and firms in the process of currency and capital market liberalisation. Miller and Stiglitz (1999) employed a multiple-equilibria model to explain financial crises in general.

Whereas these theories point to the perils of too rapid a liberalisation of financial markets and to the role of government bank supervision and guarantees, Burnside *et al.* (2001) view government guarantees as actual causes of financial crises. These authors argue that the lack of private hedging of exchange rate risk by firms and banks led to financial crises in Asia. Other authors, following the bank run model of Diamond and Dybvig (1983), argue that financial crises occur if there is a lack of short-term liquidity. Further modelling of financial crises triggered by exchange rate shocks can be found in Schneider and Tornell (2004), Edwards (1999) and Rogoff (1999), with Rogoff discussing the role of the IMF as the lender of last resort. A recent book elaborating on

the sequence of events in many types of financial crisis is that of Reinhart and Rogoff (2009).

Recent work on the roles of currency in financial crises can be found in Corsetti *et al.* (1998), Aghion *et al.* (2004), Kato and Semmler (2005), Flaschel and Semmler (2006), Proaño *et al.* (2007) and Röthig *et al.* (2007). Röthig *et al.* pursue a macroeconomic approach to model currency and financial crises and consider also the role of currency hedging in mitigating financial crises.<sup>2</sup> A further review of the stylised facts and literature on the interrelation of currency crisis, financial crisis and output loss is given in Chapter 2, where a proper modelling of this type of crisis is presented.

## 1.2 Household borrowing, debt default and banking crises

Another type of financial market instability and crisis arose from the interplay of household borrowing, a housing boom and new financial engineering tools developed and applied by the financial market. Although the financial market should play the essential role of channelling funds to households and firms that have potentially good buying or investment opportunities, and financial markets should permit economic agents to borrow against future income, this has not always been properly done.

Financial deepening is often accompanied by waves of financial innovations. Recent new financial innovations are hedge funds and all kinds of options and derivative instruments. Collateralised debt obligations (CDOs) and collateralised loan obligations (CLOs) are financial instruments where the loans of households and companies are turned into tradable securities (the so-called process of securitisation). These are relatively new financial instruments that have helped to diversify risk for the issuer of household mortgages or commercial credits. The number of such innovative financial products has grown rapidly, in fact credit derivatives in the form of credit default swaps, mortgage-backed securities or loan-backed securities have expanded exponentially, but so too have financial markets for them, which have also grown enormously. Yet in the USA as well as in many other countries, this interplay of new financial instruments and real estate boom has helped to build up an enormous bubble in real estate as well in the financial sector.

It is worth focusing more in detail on the housing and financial sector bubble. In the USA this triggered what has become known as the subprime crisis. How did it evolve, and why did it lead to a financial market meltdown, creating contagion effects and externalities not only to other sectors in the USA but had worldwide repercussions? Both the Federal Reserve Board (FED) and the European Central Bank (ECB) had few means to deal with this sudden meltdown and bust. Let us first survey briefly what led to the financial market meltdown from the middle of 2007.

As recent events have shown, reflected also in recent academic debates, there are large externalities and contagion effects arising from financial instabilities – either

<sup>2</sup> For further details on the early literature on currency and financial crises, see Reinhart and Rogoff (2009) and Semmler (2011).

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arising from the stock market (as in the 1990s) or from the credit market, for example as now triggered by the subprime crisis. The evolution of the subprime crisis and its effect on the financial sector in the USA is described by the following trends:<sup>3</sup>

- the current financial market crisis is likely to have originated in low interest rates, rapidly rising household debt and a bubble in the housing market (high housing prices compared with fundamentals);
- the bubble phase has undergone an acceleration due to the outsourcing of risk because of the securitisation of mortgages (that were packaged and sliced into risky securities of different types, in particular CDOs);
- expectation of returns from investment in real estate and CDOs were rising, due to low interest rates, low default rates and high recovery rates;
- liquidity in the housing sector (and financial market) was pumped up by capital inflows, partly from abroad;
- the burst of the bubble was triggered by the failure of hedge funds (for example by the hedge funds of Bear Stearns), triggering a credit crunch in the banking sector;
- default risk and risk premia suddenly shooting up and a credit crunch occurring (as at the beginning of all downturns);
- the feedback to the real sector causing the growth rate of GDP to fall, with further feedback effects expected from the real to the financial side, that is, insolvency of financial institutions.

Indeed, as we have recently experienced, besides the open economy and currency crisis mechanism, an important financial market instability is likely to arise from the interplay of the real estate boom and the financial market boom. In the USA the financial market crisis of 2007/8 originated in the interaction of the housing market and the banking sector. Often one can also observe other scenarios; see Kindleberger (2000). For instance a stock market crash, together with the instability of credit, can trigger a downturn. Yet, this time in the USA it was not the stock market that triggered the bust. The stock market reaction came later. When the investors in subprime mortgages felt the first fallout, the holders of those securities experienced a massive credit crunch.

The real estate and banking crisis in the USA and UK has all the hallmarks of a boom-bust cycle. Although there was a regular business cycle from 2001 to 2007/8 the real estate boom-bust cycle had already started in the middle of the 1990s, during the information technology and stock market boom, the latter lasting from the beginning of the 1990s to 2000/1.

There are many views as to why the boom-bust cycle in real estate continued beyond the regular economic expansion, ending with the contraction of 2001. Some researchers attribute the boom-bust cycle in the real estate market and the run-up of the housing prices to the Greenspan low interest rate policy. In contrast, one might say that interest rates had already come down earlier (from the middle of the 1980s) with the decline of the inflation rate, but the housing boom started much later. There is also some truth

<sup>3</sup> For details see Semmler and Bernard (2009).

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in the view that Greenspan nowadays has expressed: the FED can lower the short-term interest rate, but it has no power over the long-term interest rate, and thus the yield curve. Indeed, the yield curve over a long time period, in fact until quite recently, was rather flat or even downward sloping. The USA had become a magnet of capital inflow and attracted savings from the rest of the world and this has kept the interest rate at the long end rather low.

A further explanation, proposed by Piazzesi and Schneider (2009) and Piazzesi *et al.* (2005), uses a portfolio approach and argues that the fraction of housing assets in household portfolios went down in the 1980s, whereas the fraction of equity held in the portfolios rose rapidly in the 1990s. Then, the trend reversed starting in 2000/1 with a rapid increase of housing assets in portfolios and a decline in the equity fraction. They attribute this to the shift in expected returns from three types of asset: from nominal assets (bonds), from equity and from real estate assets. Piazzesi *et al.* (2005) also argued that this large change in asset allocation has something to do with the inflation rate since the 1980s. Housing assets and equity assets show a negative co-movement which seems to arise from their different sensitivity to inflation rates. Yet, still the question remains as to why the equity prices and returns relatively declined as compared with housing prices and returns. Why did the housing asset boom take over from the equity boom starting at the end of the 1990s?

One could realistically attribute the housing price boom, as Shiller (2000) does, to some overshooting mechanism and excess volatility, namely first in the equity market and then in the real estate sector. Shiller also stresses the mechanism of overvaluation, overconfidence and overleveraging as causes of the housing and banking boom.

As above mentioned, another explanation refers to the recent development of new financial instruments, in particular credit derivatives, which have been rapidly and widely employed in the financial market. This has led, as many researchers have pointed out, to the outsourcing and diversification of risk. The main instruments in the real estate sector were mortgage-backed securities (MBS) and CDOs.

Yet, most of the literature seems to explain only the expansion period of the boom-bust cycle in the real estate market. The subsequent issue is thus how the bust was triggered. One might need a theory that explains both the excessive run-up in asset prices as well as the surprisingly fast decline and bust in the real estate sector.

For those asset pricing theories that adopt an intertemporal approach the occurrence of sudden busts is also a problem. According to the intertemporal view, the asset price represents the discounted expected future income stream, and these expectations drive the asset prices. Yet, usually it is hard to explain boom-bust cycles of the magnitude observed by an intertemporal model, since temporary blips or temporary strong deviations of pay-offs from the trend usually get smoothed out in intertemporal models, and boom-bust cycles are rarely observable in such models. Even strong technology shocks are not able to deliver such results.

The way, however, such boom-bust cycles have been constructed is to allow for expectation dynamics – for some time periods – that get revised after some time.

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When agents realise that they have followed incorrect expectation dynamics this might then trigger at some point some sudden revision of expectations. Models of this type can be found in Beaudry and Portier (2004), Christiano *et al.* (2006, 2008) and also Lansing (2008), all of which work with the above mentioned mechanism of expectation dynamics.

Yet, in most literature based on the Dynamic Stochastic General Equilibrium (DSGE) model, the expectation dynamics concern technology shocks, which are capable of explaining only a small part of the boom-bust cycle in asset markets. Another source of expectation dynamics would be related to the expected pay-offs which themselves could be ill-founded, at least in the long run. In this approach we also can allow expected pay-offs to be discounted in order to arrive at some asset price dynamics. This looks like a realistic approach where one can assume that there is some expectation (as erroneous and ill-founded as it might be) that will be self-justifying. But then certain events may trigger the collapse of this self-justifying mechanism.<sup>4</sup> Since the real estate sector has the feature of being mostly credit financed, an important component of this mechanism is the build-up of debt. Yet, the expansion and then the contraction of credit, has something to do with the instability of credit as mentioned in Kindleberger (2000) to be relevant for the Great Depression. We thus need to explain the rapid build-up and contraction of credit, and thus the triggering of a collapse in asset prices. A detailed modelling of some of these issues in the context of this type of financial crisis is undertaken in Chapter 3.

### 1.3 Overleveraging, debt and debt deflation

Overborrowing is not only typical for households but also for commercial banks, investment banks, firms, states and even entire countries. If there is general overleveraging and unsustainable debt, triggering a credit crisis there may not be only a downturn, but also a deflation, in commodity prices as well as in asset prices. In recent public debate on problems of the world economy, indeed ‘deflation’ or more specifically ‘debt deflation,’ has again become an important topic. The possible role of the credit crisis and debt deflation in triggering the Great Depression of the 1930s has come back into academic studies as well into the writings of economic and financial journalists. It has been observed that there are similarities between recent global trends and the 1930s, namely the joint occurrence of high levels of debt and falling prices. But with prices falling the real value of debt will rise. Debt deflation thus concerns the interaction of high nominal debt of banks, firms, households and countries and shrinking economic activity due to falling output prices and increasing real debt.

There is often another mechanism accompanying the one above, focusing on how a large amount of debt may exert an impact on macroeconomic activity by working through the asset market. Asset price inflation during economic expansions normally

<sup>4</sup> For details of such a model, see Semmler and Bernard (2009).

gives rise to generous credit extension and lending booms. Assets with inflated prices serve as collateral for borrowing by firms, households or countries. On the other hand, when asset prices fall the borrowing capacity of economic agents shrinks, financial failures may set in, macroeconomic activity decreases and consequently large output losses may occur.

Countries that have gone through such booms and busts are some Asian countries (in particular Japan), Russia and Brazil in 1998 and 1999. In all of those countries as well as during the financial crisis in Mexico in 1994 asset price inflation and lending booms entailed subsequent debt crisis and asset price deflation. Thus, usually the mechanism of debt deflation due to falling output prices has been accompanied by the asset price deflation mechanism. Some academic commentators have recently also criticised the single-minded preoccupation of certain central banks and the IMF with inflation, and the word reflation has been coined in order to stress the fact that providing some room for inflation should be of help in preventing global financial crises. The viewpoint of the FED and of the government in the USA has of course received particular attention in this respect. When Alan Greenspan was chair of the FED, he was widely regarded as a person taking wise monetary policy decisions by lowering interest rates in 1998 and 1999 as a pre-emptive strike against a global debt deflation process.

Moreover, global growth strategies, and the elements they should contain, continue to be discussed in academic and policy circles. The need for a fundamental restructuring of the IMF and World Bank and a new financial architecture is currently stressed in such discussions, based on the judgement that in 2007/8 the world faced its biggest financial challenge since the 1930s. Debt deflation and its destabilising potential therefore appears to be an important threat that the world economy is still facing.

Modern macroeconomic theory, as it has evolved since the Second World War, has paid scant attention to the above described mechanism of debt deflation. No doubt this is due to the fact that during that period the major economies in the world experienced a long period of growth followed by a long period of inflation from which we have only recently emerged. The classic study of debt deflation remains Fisher (1933), although Minsky (1975, 1982) in his writings on the financial instability hypothesis continued to warn of the dangers of another great depression. There is therefore an urgent need for economists to model the process of debt deflation in its interaction with monetary and fiscal policies that may stop the process of rising debt, falling output and asset prices and a collapse into depression.

In Chapter 4 we embed the process of debt accumulation and debt deflation via a sequence of partial models of debt accumulation and price deflation into fully integrated macroeconomic models of closed and open economies that are consistent with respect to budget constraints. At the core of the model will be firms that finance fixed investment as well as involuntary inventory investment not from retained earnings, but by loans from the credit market. In that chapter we neglect equity finance. Our model will thus focus mainly on the first mechanism of the debt deflation process, the destabilising role

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of flexible wages and prices in economies with high nominal debt. The destabilising role of asset prices will be by and large neglected.<sup>5</sup>

Our macroeconomic model contains a sufficient number of agents and markets to capture the essential dynamic features of modern macroeconomies, and stresses the dynamic interaction between the main feedback loops of capital accumulation, debt accumulation, price and wage inflation/deflation, exchange rate appreciation/depreciation, inventory accumulation and government monetary and fiscal policies. Our modelling framework relies on previous work by the authors and contributions by other co-authors.<sup>6</sup> The essential difference is that here we focus on debt-financed investment of firms in place of pure equity financing considered in the earlier works. We will thus add a further important feedback loop missing in our earlier approach to macro modelling, namely, from a partial point of view, the destabilising Fisher debt effect of deflationary (or inflationary) phases of capital accumulation arising from the creditor–debtor relationship between asset-owning households, banks and firms.

Keen (2000) has investigated the Fisher debt effect, between firms and financial intermediaries, in the context of an augmented classical growth cycle model of Goodwin (1967) type. He has found that it may imply local asymptotic stability for the overshooting mechanism of the growth cycle, but the overshooting can lead to instability, for high debt outside a corridor around the steady state of the model. In addition he provides an interesting discussion of Fisher’s vision of the interaction of over-indebtedness and deflation and of Minsky’s financial instability hypothesis. Keen extends the proposed model of the interaction of indebted firms and income distribution to also include a study of the role of government policies in such an environment. He focuses on nominal adjustment processes in the place of the real ones of the classical growth cycle model.

We will start our analysis in Chapter 4 from Keen’s 3D model of the debt accumulation process, expand it by flexible prices (to obtain a 4D model), include inflationary expectations and an interest rate policy rule (so getting to an 8D model) and will finally provide general 16D dynamics with a complete representation of stock-flow interactions, adjusting prices and quantities, asset market behaviour, issues of open economies and fiscal and monetary policy rules. We discuss briefly subjects of importance in the development of market crises (and domestic or foreign policy intervention) on this general level. These issues have to be integrated and investigated, however, in much more detailed ways in order to allow a full treatment of the dangers of the joint occurrence of debt and deflation in certain areas of the world economy or on a worldwide scale.

### 1.4 Plan of the book

In Part I we provide an introduction to our modelling philosophy of financial and real interactions. We provide a basic model of the three types of financial crisis phenomena

<sup>5</sup> For work on the credit market, economic activity and the destabilising role of asset price inflation and deflation, see Minsky (1975) and Mishkin (1998).

<sup>6</sup> See Chiarella and Flaschel (2000), Chiarella *et al.* (2000) and Chiarella and Flaschel (1999b,c,d).