

# **Integrating financial stability: new models for a new challenge**

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## 1. Introduction

Reflecting on the financial crisis that is not yet over, it is natural to ask whether our macroeconomic models are still relevant. For all of their elegance and beauty, with their microeconomic foundations and complex endogenous dynamics, they provided the basis for monetary policy that delivered a quarter of a century of stability. The Great Moderation was great – inflation was low, growth was high, and both were stable. At least, that's what we thought. In retrospect, signs of smugness abounded. Academic journals are filled with papers explaining that this stability was, in large part, a result of good policy. And policymakers listened. The economy was inherently stable, with strong self-correcting forces. The financial crashes that were so common before the mid-20th century were banished by our deep and profound understanding that had been translated into mathematical models.

What a difference a year makes!

The models neither stopped the crisis from happening nor provided guidance on how policies could cushion its impact. They failed utterly in guiding our construction of an institutional framework capable of preventing systemic financial failure. Yes, there were warnings.<sup>1</sup> And yes, there were models that hinted at the sources of the difficulties we now face. And yes, the economic reasoning provides the lens through which we can start to understand what happened and why. But, in the end, we ignored the risks.

In this essay, we begin with a brief review of the pre-crisis consensus that provided the basis for stabilisation policy as it has been conducted since around 1980. Our main conclusion is obvious: we need to build economic models that integrate the financial sector in a serious way, accounting for the role of intermediaries with all of their linkages, both with each other and with the real economy. And, most importantly, these models must be capable of endogenously creating financial stress that can build up until the pressure leads to a crisis – that is, models in which booms and busts are normal.

## 2. Setting the scene: economic stability

### The consensus to date

The primary objective of macroeconomic policy is to maximise welfare – measured typically as income per capita. In working to meet this goal, the first question is whether policymakers should be concerned with stabilising the economy around its long-run growth path. Stabilisation is secondary if it has little or no effect on the *level* of real growth; while fluctuations have distributional consequences, they are of little direct concern to monetary policy. After all, interest rate policies have distributional consequences too.<sup>2</sup>

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<sup>1</sup> See BIS (2009) for a discussion of the warnings.

<sup>2</sup> This does leave open the question about whether we would care about business cycles if the burden were distributed equally across the population – that is, if a 2% reduction in GDP translated into a 2% fall in everyone's income.

The current consensus – as embodied in a variety of New Keynesian models – is that volatility can lower the long-run level of growth; so, smoothing fluctuations has first-order effects on welfare. While this conclusion is not without dissenters – see, for example, Lucas and Sargent (1979) and Lucas (2003) – it is accepted among policymakers, as is clear from the explicit or implicit role that output smoothing plays in the objectives of many central banks.

These same New Keynesian workhorse models also lead to the conclusion that combinations of monetary and fiscal policy can stabilise growth and prices – at least in principle. That said, the clear majority view is that fiscal policy has serious limitations as a countercyclical policy tool. Beyond its role as an automatic stabiliser, practical and political problems lead to nearly insurmountable hurdles in implementing discretionary fiscal policy to smooth real economic fluctuations.<sup>3</sup> Instead, fiscal policy is the main mechanism for society to decide on the distribution of output among its final uses (consumption, investment, size of government, net exports), as well as providing the foundations for long-run growth.

Monetary policy, in this view, is the primary tool to be used for active stabilisation policy. Quick, nimble and fast-acting, interest rates (combined with a flexible exchange rate and capital mobility) were the ideal tool for pursuing price stability while at the same time leaving policymakers the scope to smooth short-run output fluctuations.<sup>4</sup> Indeed, in some versions of the standard workhorse model, it is optimal to follow strict inflation targeting: smoothing output fluctuations only to the extent that they affect inflation forecasts (see Blanchard and Galí (2007) and Blanchard (2008) for a discussion). Unsurprisingly, this theoretical consensus is mirrored in real world monetary policy frameworks in advanced economies over the past two decades.

### **Some lessons from the crisis**

The financial crisis that began in 2007 has revealed a number of shortcomings in this consensus view of macroeconomic theory and policy. And these lead to various questions.

The first big lesson is that traditional stabilisation policy can fail miserably. One of the most important jobs of monetary policy is to insulate the real economy from financial sector shocks. It did not. World growth likely has fallen to its lowest level in over half a century, with a number of advanced countries experiencing the biggest contractions since the 1930s. From this, we question several aspects of the consensus:

*1. Does financial instability have important real effects?* The longer-term lessons from the financial crisis for stabilisation policies seem obvious: financial instability can have important effects on both macroeconomic stability and possibly also on long-run growth. Delivering economic stability requires careful attention to financial stability.<sup>5</sup>

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<sup>3</sup> There are a variety of well known reasons for this. First, there are lags. Fiscal policy is simply not very nimble. By the time the fiscal measures are in force, it is usually too late. Second, there is the simple nature of politics. The best policies are the ones that focus attention on getting a few important people to do something they were not planning to do, while avoiding paying for others to do what they would have done anyway. Temporary incentives to spur investment and income tax reductions for the less well-off who will spend what they get are good examples. Politicians, by contrast, often look for programmes that reward the largest number of people possible in order to win support and ensure re-election.

<sup>4</sup> The discussion here neglects the central role that exchange rate stabilisation plays in the monetary policy of many small open economies and emerging market countries. The consensus brought these frameworks into the tent, albeit in a somewhat awkward fashion.

<sup>5</sup> For a discussion by policymakers, see Shirakawa (2009).

2. *Does fiscal policy have a role?* Since September 2008, we have seen massive fiscal stimulus implemented worldwide. This has revived a debate most people thought was dead: when is fiscal policy useful, if ever?<sup>6</sup>

3. *Are interest rates enough?* The need for additional stabilisation tools (within and outside the central bank) has become painfully apparent. Conventional monetary policy quickly reached its limits (ie the zero lower bound for interest rates), and, with intermediaries' credit markets impaired, traditional channels of monetary policy transmission are impaired. What alternative central bank balance sheet tools do we have or do we need to develop? And, if we need to cushion booms and busts, we may need a complementary set of regulatory macroprudential instruments. Regardless, the framework within which we currently understand monetary policy needs to be revisited.

The second big lesson is that both gross and net quantities of financial assets and liabilities matter for real activity. This is surely new, as nothing like this appears in modern mainstream macroeconomic models.<sup>7</sup>

4. *What place should gross financial quantities have in macroeconomic models?* For financial instruments, the amount outstanding, as well as the capital and collateral backing them, matter; for financial markets, the amount of trading, and the platform on which the trading occurs, matter; for financial institutions, their size and that of their counterparties matter; and for central banks, the size and composition of both sides of their balance sheet matter.

The final lesson is about history: we need to study the past with a much more critical eye. Economics is fundamentally about history. It is about the interplay between modelling and data. But we have missed something truly fundamental: financial crises are frequent events. In the past 25 years, there have on average been three or four banking crises every year (Reinhart and Rogoff (2008)). Rather than seeing financial crises as rare and one-off, we need models that deal with financial crises as regular events.<sup>8</sup>

This leads us to the central task macroeconomists face: **we need to build macroeconomic models that create severe financial stress endogenously.**

If financial crises are just “bad luck” – the result of an exogenous shock that comes along regardless of the framework of the financial system or policy measures that have been put in place – then there is little we can do about them. But if, as we strongly suspect, financial crises are endogenous to the economy, recurring naturally, then we must build a new generation of macroeconomic models that take account of the linkages between the financial system, the real economy and the potential actions of policymakers.

We are not starting from scratch. The work on the financial accelerator by Bernanke, Gertler and Gilchrist (1999) and on endogenous credit cycles by Kiyotaki and Moore (1997) is an excellent beginning. But we need more.

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<sup>6</sup> Even for those who support the active use of fiscal policy for stabilisation, there is little academic guidance as to what form the fiscal stimulus should best take: the uncertainty of the size of fiscal multipliers for pretty much any fiscal measure is a case in point.

<sup>7</sup> While it is new for modern macroeconomic models, it may be more accurate to characterise it as having been forgotten. Financial quantities did play a prominent role in the older monetarist literature such as Brunner and Meltzer (1963), as well as in Tobin's 1969 paper.

<sup>8</sup> Economics is of course also about the history of economic thought: sometimes, it is worth revisiting past debates in economics.

In the next section we discuss the elements of the conventional workhorse models that we feel need to be examined before there can be a meaningful integration of financial instability into macroeconomic models.

### **3. Extension of current models needed**

Building a model in which severe financial stress occurs endogenously from time to time requires a change in research focus along two key fronts. First, as already noted, we must incorporate a substantive link between financial factors and the real economy. There must be an explicit role for financial intermediaries and institutions, including interbank markets with all of the network effects we have learned about in the past two years. Second, we need to introduce endogenous propagation mechanisms for shocks that mirror self-reinforcing feedbacks that are at the heart of boom-bust cycles. This means developing a better understanding of the incentives governing the behaviour of agents in financial markets, as well as the dynamics of asset prices, credit growth, leverage, various risk premia and the mechanisms that tie them all together.

Building models that can help us to understand the sources of systemic collapse requires that we revisit a number of fundamental assumptions embedded in modern macroeconomic models. To enhance clarity of exposition, we discuss these in two related steps. First, we examine mechanisms that admit the linkage between the financial sector and the real economy. And second, we suggest the sorts of refinements that might lead to endogenous financial booms and busts.

#### **3.1 Linking the financial sector and the real economy**

##### *The role of financial frictions*

One way of characterising the evolution of macroeconomic models over the past three decades is as a search for frictions (or market imperfections) that can be superimposed on the core real business cycle model. The purpose of these frictions is to generate serially correlated deviations of output and employment from the first-best equilibrium level; as well as persistent, but sluggish, movements in inflation. Importantly, models in which frictions lead to movements in output and inflation naturally give rise to a rationale for stabilisation policies. But much of this modelling work focused on rigidities in the goods and labour markets (both prices and quantities), with relatively little attention paid to the potential for financial frictions. Needless to say, if you want to build a model where finance matters, so that there is a link between developments in the financial sector and those in the real sector, you will have to model the reason for finance existing in the first place. And here, financial frictions are the obvious place to start.<sup>9</sup>

Financial frictions allow for a role of balance sheet variables and risk premia in influencing economic outcomes. In this way, they provide a channel through which changes in variables like financial depth and attitudes toward risk affect economic activity. Some financial frictions

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<sup>9</sup> Given that a large part of the monetary transmission mechanism is assumed to work through expenditures on long-lived consumption and investment goods, which usually require borrowing and lending, it is surprising how little attention has been paid to the intermediation process in mainstream policy models.

have been integrated into general equilibrium models and shown to enhance the persistence of shocks (Bernanke et al (1999)). For the most part, however, the quantitative effects of the frictions are small. These models are not able to generate the sizeable boom-bust cycles that are increasingly the focus of policymakers. And, importantly, because the focus has been on frictions at the level of the ultimate borrower, researchers have downplayed the role of financial intermediaries.<sup>10</sup>

#### *Why do we need financial intermediaries?*

The current crisis has taught us the dangers financial intermediaries can pose for the real economy, despite all their benefits. We clearly need macroeconomic models in which financial intermediaries play a significant role. Such an effort must focus on the interaction between borrowers and lenders, as well as among the lenders themselves.

The evolution of intermediaries' financial strength, as well as the manner in which they manage their balance sheets, can exert important effects on overall funding conditions for firms and households (Adrian and Shin (2008)). At the same time, the instability that can arise from complex financial networks (eg contagion and systemic risk, at both the domestic and global levels) serves to reinforce the importance of financial intermediaries in macroeconomic models. Indeed, financial institutions are special because they represent greater systemic risk than other, non-financial industries (Bullard et al (2009)). And, by either ignoring banks or assuming that they are just like any other industrial firm, our models are clearly missing something essential.

### **3.2 Generating endogenous financial booms and busts**

Putting financial intermediation into macroeconomic models is the first step. Next we need to find a realistic propagation and amplification mechanism in which the link between the financial and real sectors results in boom-bust cycles. We suggest a number of standard assumptions that might be relaxed to create such fluctuations.

#### *The role of financial frictions/imperfections*

One possibility is to rely on self-reinforcing dynamics that arise from the interaction between asset prices and financial frictions to generate an intertemporal multiplier process. Well known examples are Kiyotaki and Moore (1997), Suarez and Sussman (1999) and Allen and Gale (2000) as well as the large literature on distressed selling (see the survey by Shim and Von Peter (2007) as well as Brunnermeier and Pedersen (2009)). The key element in these formulations is the feedback between credit, asset values and binding financial constraints. Given the prominent role of credit in financial cycles, it would seem to be worth exploring this further.

Frictions in the form of informational asymmetries may also play a role in propagating shocks through the financial system. In the presence of strategic complementarities, for example, actions that may be rational at the level of individual agents or institutions can result in undesirable collective outcomes. Specifically, coordination failures and herding both can lead to sustained departures of asset prices from fundamentals, which can then feed back

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<sup>10</sup> Some recent work has begun to address this shortcoming, notably Goodfriend and McCallum (2007), Cúrdia and Woodford (2009) and De Fiore and Tristani (2009).

through the real economy. Recently observed booms and busts in housing prices might be an example of this.

### *Departures from rational behaviour*

The prevailing macroeconomic paradigm requires a very strong form of rationality: agents make decisions in a fully optimising way, with complete knowledge of the underlying economic model. This has tremendous appeal, as it ensures internal consistency. For example, the expectations of the agents that populate the model are the same as the expectations the model itself produces. What could be more elegant than that?

This rationality postulate rests on two key pillars: decision rules are derived from optimisation principles, and information sets encompass the entire structure of the economy as well as other agents' decision rules. In this context, agents are able to act based on optimal forecasts of economic developments. These assumptions, which relate to the nature of the associated learning and information extraction process as well as to the homogeneity of agents, play a crucial role in the dynamics of the model economy and its response to monetary policy. In addition, they form the basis for the efficient markets hypothesis.

Casual (and not so casual) observation of past boom-bust episodes suggests an absence of rationality, and that moving away from this fundamental postulate of most of neoclassical economics might help us to capture some of the key drivers of such dynamics. Departures from full rationality are especially important in understanding how financial risk is priced. Importantly, economic agents seem to be better at measuring the cross-sectional (relative) rather than the time dimension (absolute) aspect of risk.<sup>11</sup> Furthermore, we see self-reinforcing waves of optimism and pessimism.<sup>12</sup> These are all key elements of the inherent procyclicality of the financial system. We need a better understanding of how investors price risk – both individually and collectively price risk – and how they get it wrong. And then we need to make better use of the results of behavioural finance,<sup>13</sup> embedding them into our macroeconomic models.

### *Departures from representative agent models*

Largely to aid the implementation of the rational maximisation framework, macroeconomic models have relied on representative agents, avoiding the many complications that interactions among multiple disparate agents can create for the analysis of aggregate behaviour. But precisely *because* the aggregation of heterogeneous behaviour and beliefs can lead to aggregate dynamics which have little direct relation to individual dynamics, the assumption of a representative agent can inhibit the analysis of financial instability. There are no coordination failures, for example, when the behaviour of rational and forward-looking representative agents is consistent with the model of the aggregate economy.

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<sup>11</sup> Summers' (1985) famous parable suggests that the same may be true of financial economists as ketchup economists. As he wrote: "General economists are concerned with the fundamental determinants of the prices and quantities in the ketchup market." By contrast, "ketchup economists have shown that two quart bottles invariably sell for twice as much as one quart bottles". From this, the latter conclude that the ketchup market is efficient. See, also, Borio et al (2001).

<sup>12</sup> For example, models based on heuristic behaviour have been shown to lead to cycles based on waves of optimism and pessimism (eg De Grauwe (2008)).

<sup>13</sup> A recent example is the work of Akerlof and Shiller (2009).

The importance of heterogeneity is that it generates trade.<sup>14</sup> In financial markets, heterogeneity of information and expectations plays a crucial role in driving prices. Asset prices are determined in real time by opposing bids and offers rather than by a commonly agreed-upon valuation based on uniform perception of future income streams. And, as shown in many contexts, the interaction between chartists, fundamentalists and noise traders can result in wild sustained swings in asset prices (Hommes (2005)).

In a broader sense, the prevailing emphasis on microeconomic foundations needs to be re-examined. That emphasis has been synonymous with the requirement that aggregate behaviour be derived from maximisation by representative agents with rational expectations. To the extent that aggregate economic movements in practice can be subject to fallacies of composition, in that aggregate economic variables do not simply reflect the sum of microeconomic decisions by agents, representative agent models will be unable to capture the dynamics that result from such complex non-linear interactions. An alternative way would be to model the non-linear behaviour of the aggregates directly, in the spirit of structural macroeconomic models of the 1960s and 1970s in the tradition of Keynes and Solow. Short cuts and reduced-form methods may prove useful in capturing some of the complex interactions between agents to generate non-linear dynamics in the financial system.<sup>15</sup>

#### *Persistent deviations from market clearing (prices and quantities)*

Perhaps the most challenging problem facing macroeconomic theory will be treatment of the assumption that markets clear, and that a Walrasian general equilibrium provides the basis on which modern macroeconomics is built. The foundations of the research paradigm advocated by Lucas (1980) and Kydland and Prescott (1982) rest on the idea that a fictitious centralised auctioneer costlessly collects and disseminates information, adjusts prices and quantities, and organises and executes trades.

The introduction of this Walrasian auctioneer resolves by assumption perhaps *the* central challenge for macroeconomics: to explain how self-interested trading parties coordinate in decentralised markets and how failures of such coordination can occasionally give rise to large-scale economic distress without any apparent external cause. Since the “tâtonnement” process inherent in solution methods based on a Walrasian general equilibrium implies that the formation of prices precedes the process of exchange, the possibility of trade and production happening at non-market-clearing prices – and the prospect of sustained deviations of prices from fundamental values – is precluded a priori. In an efficient market, the environment is always stable. And in equilibrium, investors neither make mistakes nor do they need to learn or adapt.

Addressing the shortcomings of these key assumptions is not going to be easy. After all, in many cases this is what gives models analytical tractability. Without them, we have no natural way to select from among the multiplicity of equilibria our models normally yield. Even

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<sup>14</sup> One of the biggest embarrassments of modern economics is that there is no trading of financial assets. Prices move based on fundamentals, but there are never any transactions. Clearly, something is wrong.

<sup>15</sup> It could also be said that microfoundations should instead be defined as modelling agents' behaviour in a way that is consistent with microeconomic evidence. A well known example of a widely adopted microfounded element of DSGE models that is strongly at odds with the evidence is that of backward indexation of prices (Chari et al (2009)). From this perspective, conventional application of microfoundations can be seen as simply the specification of *arbitrary* assumptions about the maximisation problem in the form of constraints, information sets and objectives. It is not clear that this approach is necessarily any more structural than using models based directly on reduced-form aggregates.

so, it may be possible to use existing solution methods to rule out categories of equilibria, providing guidance for policymakers in restricting the space for possible outcomes.

#### **4. Conclusion**

For macroeconomics, the biggest lesson of the financial crisis is that our models need to find a more meaningful role for finance. Episodes of financial stress are too frequent, and seem too costly, to be treated just as events that are “bad luck” and therefore of little consequence to forward-looking stabilisation policy, as suggested by Lucas (2009). Rather, we should ask whether policy can and should intervene to make financial stress less likely and less damaging when it inevitably comes.

While the New Keynesian workhorse models are built around a role for stabilisation policies, they appear to have stopped too soon. Understanding how to deliver economic stability must include an understanding of how to avoid financial instability.

Modelling financial booms and busts requires a model where financial imbalances matter for the real economy. As we have suggested in this essay, this means questioning a number of fundamental assumptions of the current workhorse macroeconomic models, including whether capital markets function properly, whether individuals behave rationally, whether we can really rely on the fiction of a representative agent, and whether markets clear.

As daunting a task as this may seem, prospects for progress are encouraging. Not only is there a clear awareness of the challenge (Bean (2009)), but work is already under way: heterogeneous agent models are being solved, bounded-rationality and learning are being actively explored, agent-based models are being simulated, and incomplete financial markets as well as substantive financial frictions are being introduced.

It is our hope and expectation that successfully integrating financial imbalances into models of real fluctuations will yield a toolkit for policymakers. It will guide us in the creation of new stabilisation tools as well in the improved use of old ones. It will help us understand how to measure financial stress in real time and allow for transparency and accountability of policymaking in the same way that price measurement is essential for holding inflation targeting central banks accountable. Getting there will not be easy, but then, the challenge to conventional monetary policymaking 50 years ago surely appeared daunting as well. Hopefully, this time it will not take as long to get things worked out.

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