The Current Crisis and the Culpability of Macroeconomic Theory

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1. Introduction

One of Keynes's most well known statements refers to the power of ideas. In his 1936 magnum opus, *The General Theory*, he wrote "practical men, who believe themselves to be quite exempt from any intellectual influences, are usually the slave of some defunct economist. Madmen in authority who hear voices in the air are distilling their frenzy from some academic scribbler of years back."

A great deal has been written about the role of 'practical men' in the current financial crisis, whether bankers, regulators or politicians. I focus here on the role of ideas, and specifically of ideas in economic theory.

It is the ideas at the heart of modern macroeconomics which provided the intellectual justification of the economic policies of the past 10 to 15 years. It is these ideas which the current crisis has falsified. The dominant paradigm in macroeconomic theory over the past 30 years has been that of rational agents making optimal decisions under the assumption that they form their expectations about the future rationally - the rational agent using rational expectations, or RARE for short.

This is not the place to set out a detailed critique of the RARE view of the world. The specific focus is on the way in which mainstream economics deals with risk and uncertainty. It is this which is at the root of the problems, both for the discipline of economics and, much more importantly, for the economy itself and the financial crisis.

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2. Risk and uncertainty: historical background

Some of the best known names in economic thought made an important distinction between risk and uncertainty. The person who formalised the distinction was Frank Knight in Chicago, his key book on the topic being published in 1921. Knight is much less well known than two other names I am about to mention, but of such stature that Milton Friedman described him as 'one of the most original and influential social scientists of the twentieth century'.

Knight essentially argued that the concept of risk applied in circumstances where we know, or at least have a very good idea of, the probability distribution of possible outcomes. But where our knowledge of this is imprecise or even absent altogether, uncertainty is the relevant concept. So, for example, placing money on a fair roulette table is risk. We know the exact probability of each of the various outcomes on which we can bet. Uncertainty would arise, for example, if we bet but not only did not know how many numbers there were on the wheel, but even whether the ball would be spun on it at all. The essential feature of true uncertainty is that it is incalculable, no matter how smart we may be. Practical situations may be closer to the uncertainty paradigm than to that of risk because, for example, we may have too small a sample of events to estimate a probability or, more generally, we have inadequate knowledge about the causal mechanisms involved in any given situation.

Keynes believed that uncertainty was the more important of the two, and that it was the key reason for the business cycle, the booms and busts of capitalism. In the *General Theory* he wrote: 'the outstanding fact is the extreme precariousness of the basis of knowledge on which our estimates of prospective yield [of a new investment] have to be made … If we speak frankly, we have to admit that our basis of knowledge for estimating the yield ten years hence of a railway, a copper mine, a textile factory, the goodwill of a patent medicine, an Atlantic liner, a building in the City of London amounts to little and sometimes to nothing; or even five years hence'. On a purely rational calculation, very few investments would ever be carried out, very few new firms started, since most such ventures fail. It is the irrational optimism of the investor, the entrepreneur, which enables them to happen, the belief that he or she has a better idea, a better concept, which is bound to succeed.

Hayek went even further believing that there are inherent limits to knowledge which no amount of intellect can overcome. His 1974 Nobel lecture, for example, is entitled 'The Pretence of Knowledge'. On this view, inherent and inescapable uncertainty pervades the economy. In many ways, Hayek is an intellectual precursor of modern complex systems theory.

Although Hayek has suffered a form of guilt by association in that his work has been cited approvingly by rational expectations theorists, his analysis of the business cycle is in many ways similar to that of Keynes – though they did differ over policy matters. Hayek certainly thought that general equilibrium should be the foundation of business cycle theory. However, the theory

had to be extended considerably in order to be able to explain the persistent fluctuations in aggregate output. Firms and governments operate in such a complex environment that not only are their expectations often proved wrong, but they are unable to learn sufficient from the past in order to avoid the same mistake in future. The level of uncertainty is so high that even the central bank cannot learn to offset expectations by changes in monetary policy in order to smooth out the cycle and restore equilibrium.

Modern macroeconomic theory failed in its appreciation of *both* risk and uncertainty.

3. Rational agents, rational expectations (RARE)

The appropriation by economics of the word 'rational' to describe the behaviour of agents – individuals, firms, governments – in its core view of how the world operates is a great propaganda coup. Who, after all, would want to be thought irrational, or even have the temerity to suggest models in which agents behaved irrationally?

As it happens, as noted above some of the greatest thinkers in economics such as Keynes and Hayek did not subscribe to the RARE view of the world. But such heresies have long been purged from the canon, and it is rare – in the normal English sense of the word – to meet a young economist who has read any of the works of these two economists in the original. It might also be added that virtually the entire discipline of psychology, to say nothing of much of anthropology and sociology, suggests that behaviour which approximates the RARE assumptions is at best a very limited special case of how humans really do behave.

Rational expectations do not require that an agent's predictions about the future are always correct. Indeed, such predictions may turn out to be incorrect in every single period, but still be rational. The requirement is that on average over a long period of time, expectations are correct. Agents are assumed to take into account all relevant information, and to make predictions which are on average unbiased. Deviations from perfect foresight in any given period are an inherent feature of this behavioural postulate, but such deviations can only be random. If there were any systematic pattern to the deviations, the agent would be assumed to incorporate the pattern into his or her expectations. Again, on average over a long period, such expectations are correct.

It will be apparent that the theory is difficult to falsify to someone who really believes in its validity. Even the most dramatic failure to predict the future, such as the 2008 financial crisis, can be explained away as a random error. A rational expectations enthusiast can still continue to maintain the correctness of the theory by simply assuming that over some (theoretically indeterminate) period of time, on average agents' expectations prove accurate.

An assumption of the theory is that, as part of the set of information being processed, the agent is in possession of *the* correct model of the economy. Indeed, on the logic of the theory itself, if the model being used to make predictions were not correct, the forecasts would exhibit some sort of bias, some systematic error, and agents would realise that it was wrong.

It might reasonably be argued that it is difficult to subscribe to the view that agents understand the correct model of the economy given that economists themselves differ in their views as to how the economy operates. For example, in the autumn of 2008, many prominent American economists, including a number of Nobel Prize winners, vigorously opposed any form of bail-out of the financial system, arguing that it was better to let banks fail. Others, including decision makers at the Federal Reserve and Treasury, took a different view entirely.

The response of the academic mainstream has been to insist that there have been strong moves towards convergence within the profession on opinions about macroeconomic theory, a theme taken up in section 5 below. By implication, anyone who takes a different view and is not part of this intellectual convergence is not really a proper economist.

But first of all, a discussion is merited on a real-life example of a model, widely used in finance by both practitioners and policy makers, which has not only been shown to be wrong, but has been known to be wrong for some considerable time. It is specifically wrong in the way in which risk is measured. And this incorrect assessment of risk played an important role in the financial crisis. So, in apparent complete contradiction to the RARE assumption that agents know the true model of the economy, a bad model was used in an absolutely critical sector of the economy.

4. Pricing risk: the fat tail problem

The value at risk (VAR) of any portfolio of financial assets is a measure of the potential loss on the portfolio over a specified time horizon. It has been, since the 1990s, in widespread use in financial institutions and regulatory bodies. A typical VAR calculation will estimate the amount of money at risk over the next day with a probability of either 1 per cent or 5 per cent.

It is a very seductive concept. Within minutes of the close of trading in London, say, or New York, the board of a company can be given a number which purports to give the amount of money at risk on the company's portfolio the next day with a specified probability.

The calculations essentially involve two steps. The first is the core of the approach. For an individual asset, the probability of the price the next day (or over any other chosen period) changing from the current price by specified amounts is calculated.

The second step then allows for any cross-correlations between the individual assets. A collection of assets may very well have less risk than any individual asset. Stock and bond prices, for example, tend to move in opposite directions. Harry Markowitz received the Nobel Prize in economics in 1990 for his work in this area, the so-called mean-variance analysis which is a key part of modern portfolio theory. As it happens, there are serious problems with the scientific validity of the usual way in which the cross-correlations are calculated (see for

example Laloux et.al. 1999 and Plerou et.al. 1999). But the focus here is on the way the probability of change in the price of an individual asset is calculated in most VAR systems.

This process seems to be a straightforward risk calculation. There is an enormous amount of data on which to calibrate the probability distribution of price changes of most assets. So it seems to be the same sort of problem as working out the probability of, say, shaking two sixes (or two fives or whatever) with a couple of fair dice.

In practice, it was widely assumed that price changes follow the normal, or Gaussian, distribution. For the most part, they do. When we examine the evidence and look at actual price changes, they seem to follow this well-known pattern. But there is a subtle and profound difference. The chances of seeing a one inch or 20 foot tall man are almost literally zero, because human heights (for each gender) are very well approximated across the entire distribution by the normal distribution. But the chances of seeing the share price equivalent of these are definitely not zero. The chances are not high, but they really do happen.

In the jargon, this sort of pattern is known as 'fat tails'. The further we move from the average, the more we get into the 'tails', in other words the parts of the distribution where the number of times we see such values is very low. We have the bulk of the price changes we observe in the 'body' of the distribution, as it were, and just a few examples in the tails, which are only thinly populated. With the normal distribution, this fades away quite quickly, so the 'tail' disappears in practice once we move a reasonable distance away from the average. If the tail is 'fat', it does not mean we see lots of examples of really big changes. But we do see more than we would if the pattern of changes really did follow this 'normal' distribution.

This may seem esoteric. Yet it is at the very heart of the financial crisis. Everything seemed just fine, and the money rolled in. Until one day, a 20 foot tall man appeared. An underlying price changes by an amount which is effectively ruled out by the assumption of normality. Almost all Value-at-Risk systems became worthless, as indeed did some entire companies when the 20 foot man appeared.

The phenomenon of 'fat tails' in price changes has been known since 1900, when Louis Bachelier presented his doctoral thesis in Paris. Admittedly, his work languished in obscurity for decades, but in the final quarter of the 20th century, evidence for the fat tail phenomenon began to pour in. The initial discoveries were by another French mathematician, based in America for much of his life, Benoit Mandelbrot (Mandelbrot 1963). During the 1990s, the stream became a flood as some of the world's most distinguished statistical physicists began to take an interest in financial markets. Gene Stanley at Boston and editor of the world class journal *Physica A*, Rosario Mantegna at Palermo, Jean-Philippe Bouchaud in Paris, Yi-Cheng Zhang at Fribourg, these plus a host of their fellow scholars and graduate students examined the data on price changes in financial markets. And they found fat tails literally everywhere. Far from being unusual, the exception, fat tails were the norm. Large numbers of top quality academic papers

became available on the Internet, each demonstrating the existence of fat tails in some particular aspect of financial markets.

Despite this overwhelming scientific evidence, fat tails were largely ignored in the financial markets. The result was that the potential for volatility, and in particular the potential for large changes in the prices of financial assets, was systematically underestimated. So here we have a model, used by the world's largest financial institutions, used by regulators, which was not just wrong, but known to be wrong. But even so, a true devotee of RARE might be tempted to argue that this was not a refutation of the theory, but evidence in its favour, because agents have now learned that the Gaussian assumption on the distribution of asset price changes is wrong!

5. Convergence and complacency in macro-economics

The intellectual challenges posed by the core model of conventional economics dominated the subject for 100 years from 1870 to the early 1970s. This is the so-called general equilibrium model, 'general' because the theory purports to describe how equilibrium – supply equal to demand – can arise not just in one or two individual markets, but generally across the economy as a whole, in *all* markets. The technical details need not concern us, but the intellectual and mathematical challenge of this problem was immense. No fewer than 7 out of the first 11 winners of the Nobel Prize in economics received it for their work on general equilibrium. Eventually, by the early 1970s, the problem had finally been solved completely.

I say 'completely' but it is important to realise that the theory in this guise related to an economy with a fixed amount of resources, whether of land, labour, energy or capital. The theory essentially told us about the optimal, the most efficient, allocation of a given set of resources. But it was about a static and not a dynamic, growing economy.

The major project of the past 30-odd years has been to try to use equilibrium theory and RARE to explain the dynamic fluctuations in output which have been observed in the developed, market-oriented economies ever since the Industrial Revolution[2]. Given that these fluctuations are persistent both over time and across countries, they represent a serious challenge to a *Weltanschauung* based on the concept of equilibrium.

The first major attempt was 'real business cycle' (RBC) theory, developed in the 1980s. RBC has been very influential in mainstream economics, with its seminal authors Finn Kydland and Edward Prescott receiving the Nobel Prize in 2004.

According to this theory, periods of high or low growth– the booms and busts of everyday parlance – are initiated by random shocks to the economy. There are many problems with this

[2] A statistical classification of the size and duration of recessions under capitalism since 1870 is given in Ormerod (2009)

theory[3], not least of which is the identification of what these shocks actually are, but the most widely used shock in RBC models is that of random changes in productivity.

In real business cycle theory, recessions arise because of the rational response of individuals to adverse productivity shocks[4]. In a further illustration of the rather Orwellian use of words by mainstream economics, 'real' means that recessions are caused by 'real' factors such as productivity and rational behaviour by agents. 'Real' is juxtaposed with 'nominal', nominal factors being such obviously irrelevant things such as money, credit and debt!

Agents maximise utility over time, choosing between consumption and leisure. They have two decisions to make in every period. First, how much of their time to spend at work producing output (income) and how much to take in leisure. Second, how much of this output to allocate to investment, which will increase future levels of output, and how much to consume now.

Focusing just on the first of these may illustrate why many fairly mainstream economists failed to be persuaded by the RBC approach. A temporary reduction in productivity today encourages people to work less now than in the future, because they will earn relatively more per hour in the future than they do today. So they choose to work less now. Some may work sufficiently less for it to seem as if they are unemployed, whereas according to RBC, they are actually rational agents maximising their expected lifetime utility. Krugman famously noted that this account of the world suggests that the Great Depression, when nearly 1 in every 4 workers in America was unemployed, was essentially an extended voluntary holiday.

The latest attempt to explain business cycle fluctuations, booms and busts, by equilibrium, RARE theory is something called 'dynamic stochastic general equilibrium' models, or DSGE to use the mnemonic by which they are usually referred to. I sometimes feel it is a pity that they weren't invented by someone from, say, a Centre for Research in Applied Phrenology, then they could have been referred to by a more appropriate set of initials.

These models are, just like RBC theory, based on the key microeconomic assumptions of orthodox economic theory. In other words, rational utility maximisation by consumers, rational value maximisation by firms, both operating under the assumption that they form expectations about the future rationally. Interested readers can find a detailed survey of DSGE models in Tovar (2009).

Essentially, DSGE models build on the RBC framework by trying to incorporate some features of the real world. So, for example, in RBC models, prices are very flexible and adjust rapidly to

[3] An early and powerful critique is Summers (1986)

[4] There have been attempts to try to identify monetary factors as the source of shocks in this theory, but without success.

prevailing economic conditions. Under DSGE postulates, firms exercise some degree of market power and so prices may be more 'sticky' and take time to adjust to their new equilibrium levels following a shock to the system

Although they are very complicated and difficult to construct, these models have rapidly become very influential in academic economics. For example, the American Economic Association launched in January 2009 a new journal. Its title ? '*Macroeconomics*'. It turns out that the academic profession believes it has reached a broad consensus. The first issue carries an article by one of the world's leading academic macroeconomists, Michael Woodford, entitled 'Convergence in Macroeconomics: Elements of the New Synthesis' (Woodford 2009).

The first and most important part of the new synthesis is that 'it is now widely agreed that macroeconomic analysis should employ models with coherent intertemporal general equilibrium foundations'. Incredibly, Woodford's article was published in January 2009. I suppose it was written at some point during 2008, but even so the West as a whole was already in recession in the middle of that year.

Olivier Blanchard is the chief economist of the IMF, and here is what he had to say in August 2008 in an MIT working paper entitled 'The State of Macro' (Blanchard 2008): 'For a long while after the explosion of macroeconomics in the 1970s, the field looked like a battlefield. Over time however, largely because facts do not go away, a largely shared vision both of fluctuations and of methodology has emerged…… The state of macro is good.' The state of macro is good! In August 2008!

He went on: 'DSGE models have become ubiquitous. Dozens of teams of researchers are involved in their construction. Nearly every central bank has one, or wants to have one. They are used to evaluate policy rules, to do conditional forecasting, or even sometimes to do actual forecasting'. To be fair to Blanchard, he did then express some reservations about them, but these were largely technical in nature, and he did not challenge the fundamental idea of rational equilibria. On the contrary, he concluded 'macroeconomics is going through a period of great progress.'

So when politicians proclaimed the end to boom and bust, they had incredibly powerful intellectual authority behind them, the models of the major central banks, the leading orthodox academic economists and the leading economic journals. They really did believe they had solved the macro problems of the Western world.

6. What happened next

Despite these apparent major intellectual advances, forecasters continued to make exactly the same mistakes which they used to make when I started off as a macro modeller and forecaster at the National Institute way back in the 1970s. The Bank of England's 'fan charts', which were

meant to express the range of uncertainty around any given forecast, refused to countenance the possibility of a recession in the UK at any time in the next five years, until we actually were in recession.

The problem was general amongst forecasters. Below is a chart from the October 2008 *Bank of England Quarterly Bulletin* about the revisions made to forecasts for GDP growth in 2009 as we progressed through 2008.

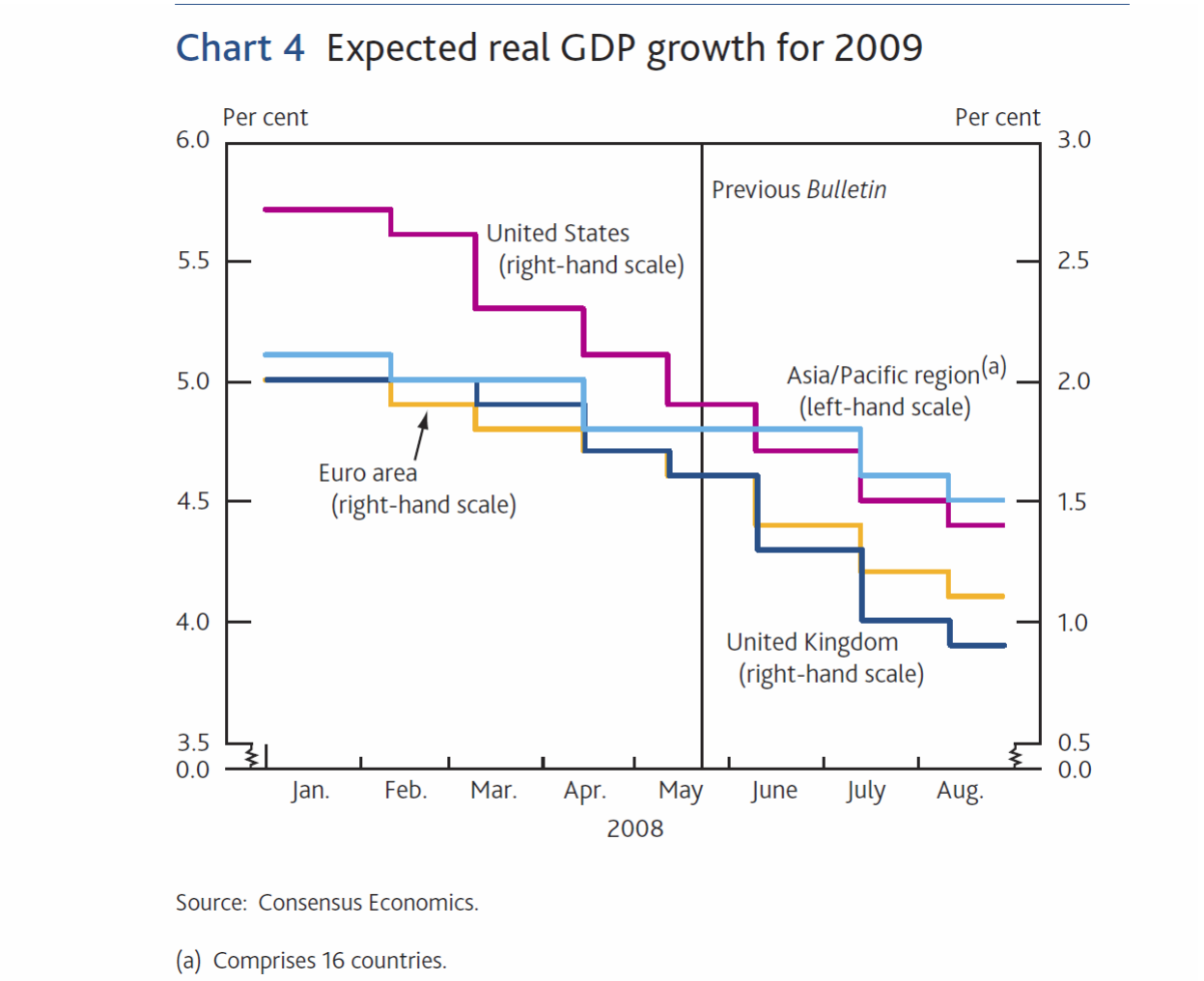


Figure 1 *Predictions of real GDP growth for 2009 made during 2008; chart taken from the October 2008 Bank of England Quarterly Bulletin*

So at the start of 2008, decent growth was predicted for 2009. Even as late as August, the general view was that there would still be positive growth in 2009. But in fact, the West was already in recession in August 2008!

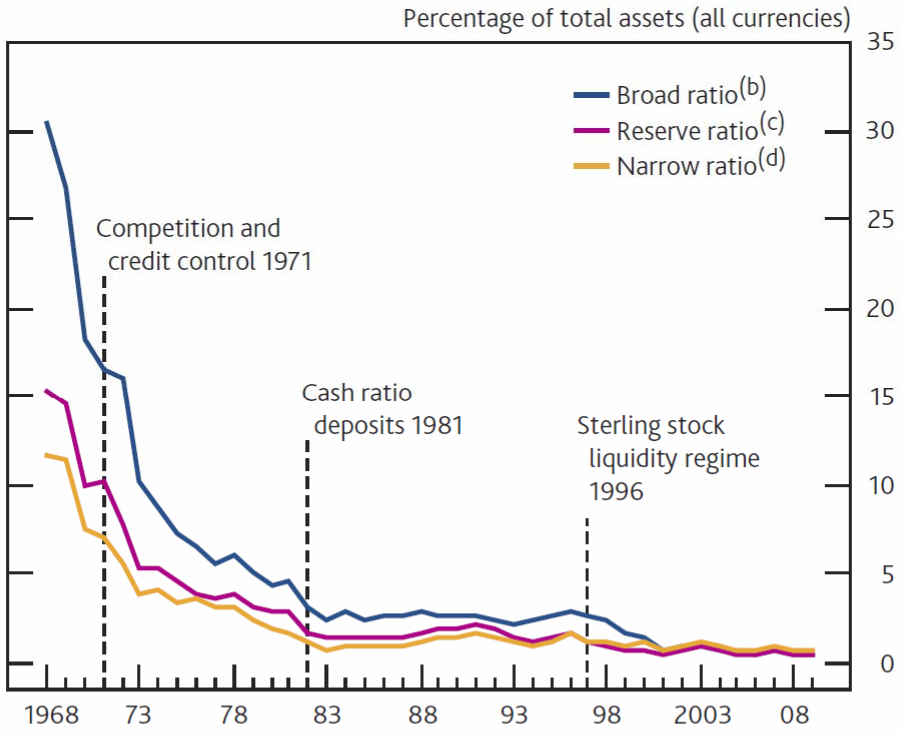
This was not simply a one-off error in an otherwise exemplary forecasting record. The major crisis in East Asia in the late 1990s was, for example, completely unforeseen. In May of that

year the International Monetary Fund (IMF) predicted a continuation of the enormous growth rates which those economies had experienced for a number of years: 7 per cent growth was projected for Thailand in 1998, 7.5 per cent for Indonesia and 8 per cent for Malaysia. By October, these had been revised down to 3.5, 6 and 6.5 per cent respectively. But by December the IMF was forecasting only 3 per cent growth for Malaysia and Indonesia, and zero for Thailand. Yet the actual outturns for 1998 for these countries were spectacularly worse, with output not growing but falling by large amounts. The fall in real GDP in 1998 was -10 per cent in Thailand, and -7 and -13 in Malaysia and Indonesia respectively.

7. What went wrong: an overview

A huge amount has already been written on this. But I want to try to capture the failure of economics to understand both risk and uncertainty in a single chart. This is taken from the Bank of England's October 2008 *Financial Stability Report* and shows the percentage of assets held in liquid form by UK banks.

Sterling liquid assets relative to total asset holdings of UK banking sector(a)



Source: Bank calculations.
(a) 2008 data are as of end-August 2008.
(b) Cash + Bank of England balances + money at call + eligible bills + UK gilts.
(c) Proxied by: Bank of England balances + money at call + eligible bills.
(d) Cash + Bank of England balances + eligible bills.

Liquidity, or rather the lack of it, was absolutely central to the financial crisis. Northern Rock went under at the very start because it couldn't refinance its loans. At the height of the crisis, credit markets froze completely because banks simply did not know whether the next institution was solvent or not.

How could it be that the authorities allowed the banks to run down the liquid part of their assets to such a low percentage? There are some interesting questions here for political scientists and sociologists about how finance capital was able to exercise such an influence over governments – and particularly the social democrat Anglo-Saxon ones - as to persuade them to carry out such ludicrous policies. But from a purely economic perspective I think there were two main reasons why such incredibly low liquid asset ratios were permitted.

First, the authorities deluded themselves that the massive amounts of loans and debts had been priced rationally and hence optimally. They believed, in the true spirit of the RARE view of the world, that agents had used the correct model in setting these prices, whereas as we have seen they had not. If loans and debts had been priced rationally and optimally, the logical implication was that the interest payments receivable exactly covered the risks involved on the loans. So if individual or institution A defaulted on a loan, sufficient provision via the optimal pricing of the loan had been made to cover the loss arising from any such default. There was no need to tie up capital unnecessarily in liquid assets when it could be lent out at a profit. Across a portfolio of many such loans, the default of a single loan simply could not cause a problem.

This leads directly to the second point. In the brave new world of DSGE, the possibility of a systemic collapse, of a cascade of defaults across the system, was never envisaged at all. Modern complexity theory, and specifically network theory, tells us that in an interconnected system, the *same* initial shock can, if we could replay history many times, lead to dramatically different outcomes[5]. The economics profession in particular has become very insular and hostile to scientific work outside its own field. Just as with the case of fat tails discussed above, economists are largely ignorant of the large amount of work carried out on cascades in interconnected systems by a whole range of disciplines over the past decades such as control engineers, computer scientists, physicists, mathematicians

Most of the time the system - whether it is the financial system, the economy as a whole or fashion and cultural trends amongst consumers – most of the time shocks are contained and do not spread very far through the system. But in principle a shock of identical size can trigger a cascade of global proportions. Here, we are much more in the realm of uncertainty, of finding it

[5] See for example Watts (2002) and Ormerod and Colbaugh (2006)

hard even to judge the probability distribution of potential outcomes, than we are in the world of the precise calculation of risk.

8. How was the world saved?

In the week of 15 September 2008 capitalism nearly ground to a halt. It was the American authorities who really saved the world in that terrifying week. And they did so not by the manipulation of elegant rational expectations models and theories, but by experiment and by relying on their knowledge of what had gone wrong in the Great Depression of the 1930s.

It was fortuitous that the Chairman of the Federal Reserve at the time, Ben Bernanke, was a leading academic authority on the Great Depression. He knew that, above all, the banks had to be protected. It may seem monstrously unfair that the bankers themselves escaped penalties – indeed it *is* unfair – but the abiding lesson of the 1930s is that in a financial crisis the banks have to be defended.

Admittedly, the authorities did try the experiment of allowing Lehman's to fail. But it very rapidly became very evident that any repeat of this risked the total collapse of Western capitalism. No monetary authority since has seen fit to repeat this experiment.

Much of the publicity and controversy surrounded the Troubled Asset Relief Program (TARP), which required political approval and so was played out in full light of the democratic process in America. But in many ways this was of second-order important to the purely administrative actions of the American authorities. They:

- Nationalised the main mortgage companies
- Effectively nationalised AIG
- Eliminated investment banks
- Forced mergers of giant retail banks
- Guaranteed money market funds

This latter in particular has attracted very little attention, but was crucial. The money market funds hold very short term assets, and are consequently obliged to hold highly liquid, high quality assets. Indeed, the funds are essentially required to hold a dollar of assets for each dollar lent. But on 16 September, the Reserve Primary Fund[6] wrote off Lehman Brothers' stock, and the value of its shares fell to 97 cents. This almost triggered a massive run on the banking system as a whole. If this had happened, an immediate consequence would have been that ATM machines would have been closed and consumers would have had difficulties getting hold of

[6] this was its name, it had no connection with the Federal Reserve

cash. Companies would not have been able to roll over their short-term debt, and if they did not have cash in hand to cover this would have had to file for bankruptcy.

In short, the default of money market funds could easily have triggered by itself a massive recession. But on 19 September, the US Treasury announced that it would guarantee the holdings of any public money market fund which participated, for a fee, in the program.

The key point about all these actions is that the American authorities paid no attention to academic macro-economic theory of the past 30 years. Real business cycle theory, dynamic stochastic general equilibrium models, rational expectations – all the myriad of erudite papers on these topics might just as well have never been written. Instead, the authorities acted. They acted imperfectly, in conditions of huge uncertainty, drawing on the lessons of the 1930s and hoping that the mistakes of that period could be avoided. It was not a grand plan, nor did one ever exist. This was a process of people responding to events on the basis of imperfect knowledge and trying and seeing what did and did not seem to work.

So far, this seems to have worked. It looks at the time of writing that American GDP in 2009 will fall by some 3 or 4 per cent compared to 2008, and that the economy is stabilising. In contrast, between 1929 and 1930, the first year of the Great Depression, GDP fell by nearly 9 per cent, and the cumulative drop 1929-1933 was 27 per cent. We do not, of course, know the medium and longer term consequences. One might be that the dollar will lose its reserve currency status. Essentially, for many years America has been able to finance its balance of payment deficit by simply printing dollars and giving them to the rest of the world, a process which up until now has satisfied all concerned. The huge increase in US public debt built up in the rescue programs may call this into question. But this is merely a speculation. We do, in contrast, know that so far the stabilisation program has worked, and a catastrophic collapse in output averted.

9. What went wrong: a mea culpa?

Shortly after his August 2008 MIT economics working paper, Olivier Blanchard wrote a further paper in the series, which appeared in January 2009[7]. It is a remarkable about-turn, which recalls another of Keynes' famous phrases: 'When the facts change, I change my mind. What do you do, sir?'

He identifies four main reasons for the crisis.

First: 'Assets were created, sold, and bought, which appeared much less risky than they truly were'.

[7] Blanchard (2009)

Exactly! Blanchard gives the example of sub-prime mortgages. But his strictures could be applied just as well to the more complicated world of derivatives, where the probability of very large changes in prices was grossly underestimated by the conventional pricing models.

This, the so-called 'fat tails' problem, had been established beyond doubt by econophysics research, yet was effectively ignored. Large changes in asset prices are not frequent, but they happen many times more frequently than is implied by the conventional assumption that they follow the normal (Gaussian) probability distribution.

Blanchard wonders why this happened: 'History teaches us that benign economic environments often lead to credit booms, and to the creation of marginal assets and the issuance of marginal loans. Borrowers and lenders look at recent historical distributions of returns, and become more optimistic, indeed too optimistic about future returns'.

We are a world away from rationality and DSGE models. Indeed, we are back in the world of both Keynes and Hayek, where agents can make persistent mistakes, and even the central bank does not learn from the past.

Second: 'Securitization led to complex and hard to value assets on the balance sheets of financial institutions'.

The maths of pricing even the simplest derivative are hard enough[8], but the truly exotic nature of many of the products which were created meant that neither the buyer nor the seller had a good approximation to the probability distribution of the likely outcomes. In other words, they faced a world in which uncertainty was even more important than risk.

Third: 'Securitization and globalization led to increasing connectedness between financial institutions, both within and across countries'.

We have to be very careful in drawing conclusions about the degree of connectedness and the vulnerability of a system to a global cascade following a shock. Greater connectedness can in principle strengthen rather than weaken a system. But given the ludicrously low liquid asset ratios with which banks were operating, it appears plausible that this was a factor in the crisis.

Fourth: 'Leverage increased'

Blanchard helpfully translates this into English: 'Financial institutions financed their portfolios with less and less capital, thus increasing the rate of return on that capital. What were the reasons

[8] The seminal article is Black and Scholes (1973)

behind it? Surely, optimism, and the underestimation of risk, was again part of it'. Further comment is superfluous.

In this latest paper, Blanchard is effectively discarding the entire corpus of mainstream macroeconomic theory of the past 30 years.

10. Brief conclusion

Modern macroeconomics, with its basis in rational agents and rational expectations (RARE), bears a heavy burden of responsibility for the financial crisis.

The discipline provided the intellectual underpinning for a world in which situations involving risk led to it being systematically underestimated, and in which situations of genuine uncertainty were not recognized for what they were.

It surely now is time to scrap once and for all this RARE view of the world. Central banks should ditch their DSGE models. Funding agencies should no longer support RARE proposals. The scientific evidence provided by the 'experiment' of the financial crisis should enable us to draw these conclusions. But will any of this happen? There, I am afraid, you are asking me to speculate about a world in which uncertainty really does rule. At some point, RARE will be abandoned, but it has already been subjected to what a detached observer would regard as so many empirical falsifications that I am hesitant to be too optimistic.

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