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What's Wrong with Modern Macroeconomics? Why its Critics have Missed the Point[1]

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Abstract

The blame for the recent financial crisis has been attributed to modern macroeconomic theory rather than banking and finance. This article defends modern macroeconomics against its critics arguing that the critics have missed the point of why macroeconomics is carried out in the way it is. It also defends finance from some criticisms, especially of the efficient markets hypothesis. It is claimed that, far from being in a state of crisis as a result of recent events, modern macroeconomics has received a huge stimulus, and that the financial crisis was brought about more by a failure to employ modern macroeconomics than by the failings of macroeconomics. (JEL code: E00)

1 Introduction

The current financial crisis has been interpreted by many senior figures in economics as a crisis for economics and, in particular, for macroeconomics. Most of their criticisms concern the assumptions of modern macroeconomics, the inadequacies of these theories for dealing with the financial crisis and the consequent spillover effects for the whole economy. Much of this criticism has been aired in public in places like the Financial Times, The New York Times, and The Economist. This conference, like several others held recently, is an opportunity to examine these criticisms carefully and to reflect on the strengths and weaknesses of modern macroeconomics.

For those who work in banking and finance it will, perhaps, come as a surprise that the blame for the crisis has been widely attributed to modern macroeconomic theory rather than their own industry. Most people in banking and finance work with theories they regard as very different from those of modern macroeconomics, whilst most modern macroeconomic theories largely ignore banking and give only a cursory role to financial markets. Macroeconomics has been heavily criticized for assuming that financial markets are efficient and expectations are rational despite both being centre-pieces of modern finance theory.

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In this article I argue that these criticisms miss the point and that the emphasis on the lack of validity of the assumptions of modern macroeconomics is misplaced. It is not because modern macroeconomists know no better, but because, as in engineering, simple models are generally more useful than complex models. Macroeconomics never has, and almost certainly never will, be able to capture the full complexity of human decisions. This is not the criterion by which macroeconomics should be assessed. Rather, it should be judged by its usefulness: its predictive and explanatory power. For example, can it can provide an understanding of the causes of the financial crisis, the consequences for the macroeconomy and give guidance on what policies ought to be adopted? Modern macroeconomics should not be treated as something that one can take off the shelf and use uncritically. Instead, it should be recognized that its assumptions are simplifications designed to provide invaluable insights for what otherwise would be intractable problems. Arguably, the financial crisis was brought about more by a failure to employ modern macroeconomics than by its failings. If used sensibly, it will lead us out of the crisis. Far from macroeconomics being in crisis, it is in rude health as the *financial* crisis has provided a huge stimulus to macroeconomic research.

I will also argue that whilst it may be surprising to blame macroeconomics for failures in the banking and financial systems, there is an aspect of this that is welcome. If it results in macroeconomics becoming less divorced from banking and finance, and vice-versa, then this will benefit all three. Although macro and financial economics may seem very different in practice, looked at from the perspective of general equilibrium theory, they are two sides of the same coin as they are based on the same theory. I will therefore treat the criticisms of macroeconomics, banking and finance together.

The article is set out as follows. In the next section I briefly review the main criticisms of modern macroeconomics, and in the next section, I respond to these. In Section 4, I consider the some strengths and weaknesses of modern macroeconomics. In Section 5, I give my own account of the financial crisis. Section 6 summarizes my conclusions.

2 A brief review of the main criticisms

Most of the criticism has appeared in the pages of the quality newspapers. This reflects the widespread concern about the causes and consequences of the financial crisis. It also has the advantages of a greater freedom to express views colourfully and of timely publication compared with academic journals with their long publication delays. But it has also resulted on occasion in the use of intemperate language, perhaps in order appeal to a general readership.

Some of the most articulate and best-informed criticisms of modern macroeconomics have come from one its best-known exponents, last year's Nobel Prize laureate, Paul Krugman. Writing in the New York Times (Krugman 2009), he claims that the macroeconomics of the last 30 years is spectacularly useless at best and positively harmful at worst. He asserts that we are living through the dark age of macroeconomics in which the hard-won wisdom of the ancients has been lost, and singles out the Chicago school of economics ('freshwater' macroeconomics) for particular criticism. He believes that 'the economics profession has gone astray because economists, as a group, mistook beauty clad in impressive-looking mathematics, for truth'. 'Not only did few economists see the current crisis coming', he says, 'but most important, was the profession's blindness to the very possibility of catastrophic failures'.

Others have expressed similar views. Writing in the Financial Times, Paul de Grauwe (2009) has claimed that macroeconomics is in deep trouble, and went on to blame some of its assumptions, notably that of rational expectations (RE). Also in the FT, Robert Skidelski (2009) has said that 'economics has displayed the Ricardian vice of excessive abstraction', 'econometrics (he may have meant economics) opted for maths instead of aligning itself with other social sciences in their study of human behaviour', and 'bankers displayed blind faith in their mathematical forecasting models'. A related criticism, largely made by policy makers, is that DSGE models—notably the New Keynesian model of inflation—are too simple to be useful. The efficient market hypothesis (EMH) is often a target for particular criticism, as it is perceived to embody all three 'faults'.

A common theme of the critics is a wish to return to the economics of Keynes or to the related, but different, Keynesian economics. According to Skidelski, Keynes 'exploded these fallacies 70 years ago'. Krugman says that 'Keynesian economics remains the best framework we have for making sense of recessions and depressions' while the Freshwater economists 'sounded like people who had no idea what Keynesian economics was about (and) were resurrecting pre-1930 fallacies in the belief that they were saying something new and profound'. Instead of RE, the critics urged the adoption of 'animal spirits' which formed the basis of Keynes's investment theory, and was an approach recently revived by Akerlof and Shiller (2009) as exuberance.

3 A response to the critics

In responding to these criticisms and, as part of my claim that the critics have missed the point of modern macroeconomics, in this section I shall

comment separately on various aspects of the criticisms. For convenience they may be grouped as relating separately to macroeconomics and finance. I am not, however, keen on such a separation. As I will argue later, the two should be seen as two sides of the same coin. In particular, under the heading of macroeconomics, I consider the roles of abstraction and formal mathematics in macroeconomic theory, the case for assuming RE, the role of macroeconomic shocks, and why modern macroeconomics initially turned its face against traditional econometrics. Turning to finance, I argue that most criticisms of the EMH appear to have misunderstood both what its claims are and what the evidence shows. I then consider the crucial, but often ignored, role of risk in asset pricing.

3.1 Macroeconomics

3.1.1 *Abstraction and formality*

A familiar criticism of macroeconomics is that the theories and hence the macroeconometric models are too simple. The assumption of the representative agent, of RE and the absence of a banking sector in most models are commonly cited examples. The argument is that abstraction and the use of mathematics, has caused macroeconomics to take a wrong path compared with the informal wisdom of the economics of Keynes who, brought up on Marshall's methodology, deliberately eschewed the use of mathematics.

These are very old criticisms of macroeconomics which extend to economics in general. It is surprising that they should be resurrected once more as an explanation of the current financial crisis. The use of mathematics is easily justified. It simply ensures that the logic of the argument is carried out correctly, as verbal reasoning is often unable to achieve this due to the intricacies of the argument. Significantly, Isaac Newton did not formulate his laws of motion using mathematics, but his followers soon did to the benefit of subsequent generations. It is now unthinkable that physics could be studied without using mathematics.

A related objection is that by formulating macroeconomics mathematically much of its complexity and subtlety is lost in the process. There is some merit in this position, but it can be over-played. It would also be fair to say that it is hard to think of examples where a mathematical representation is not helpful. A more likely difficulty is that the problem requires such a general or complex mathematical formulation that a tractable mathematical solution cannot be obtained. It is at this point that there may be advantages to simplifying the formulation in order to obtain an approximate solution. This is generally how macroeconomics proceeds. It is a practical answer to an otherwise intractable problem, and as such should be interpreted with caution. This is why, for example, it is

unwise to take a piece of macroeconomics off the shelf—such as the stylized New Keynesian model of inflation—and use it uncritically for policy.

I am prepared to go even further and argue that instead of abstraction and simplicity being a vice, it is a virtue of modern macroeconomics. It is even a necessity. The economy is far too complex to be understood without abstraction and simplification. In the early days of the use of control theory for macroeconomic policy, the argument from engineers was that macroeconomic models were far too large and complex to be amenable to the use of control theory, and that economists should employ much simpler models—like those used in engineering and for sending rockets to the moon. The art in macroeconomics is to choose the simplest model that is suitable for the purpose, rather than using an all-purpose, and hence large, model. This is the logic behind modern macroeconomics and why modern macroeconometric models are relatively small. This may be contrasted with the huge number of equations in the Brookings econometric model of the USA. Another difference is that whereas modern macroeconomic models are built by individuals or small teams with a single unifying theoretical framework based on general equilibrium, the Brookings model was a partial equilibrium model, the construction of whose individual equations were delegated to different people scattered around the country. Not surprisingly, the solution properties of the model were unknown *a priori* and the model was difficult to solve. The drawbacks of large-scale macroeconometric models were a major factor in the development of modern macroeconomics.

Although simplicity is not necessarily a fault, *cet. par.* macroeconomists would prefer to use 'realistic' assumptions wherever possible rather than stylized assumptions. For example, although one of the aims of modern macroeconomics is to provide microeconomic foundations, it is still largely based on the relations between aggregates just Keynes's macroeconomics was. Much of microeconomics is also based on aggregates such as the household, the firm and the market, so there is no difference in principle between this and macroeconomics; only the degree of aggregation differs. As part of its continuous efforts to weaken its assumptions, but without losing the insights gained from simple models, current macroeconomic research is grappling with the problems of heterogeneous agents, incomplete markets, market failure and the incorporation of a banking or financial sector. Macroeconomic models that are suitable for purpose should be simple, yet robust to their inevitable misspecification.

3.1.2 *Rational expectations*

An assumption that has come in for the strongest criticism is that of RE. This is related to a larger issue, namely, the acquisition and processing of

information thought to be relevant for a problem. This could involve forecasting the future, or the reactions of others. It is difficult to believe that any economists, including modern macroeconomists, believe that people are completely rational. The original reason for making this assumption was the obvious drawback to the then popular assumptions of static and adaptive expectations, both of which implied that, in general, people would persist in making expectation errors even when this was pointed out to them. The immediate attraction of RE was that it implied that current errors could not be predicted from past errors. It also enabled expectations formation to be put on the same basis as most other economic decisions, that is, they are the result of an optimizing process subject to constraints and uncertainty.

RE is usually associated with Muth (1960). His conception of RE was that of an optimal forecast, specifically, a linear minimum-variance-unbiased forecast. Given a particular linear time series process, the optimal forecast—the rational expectation—is the Weiner-Kolmogorov prediction for that process. Such forecasts are on average correct and their variance depends on the amount and accuracy of the information used. The quality of the RE is therefore a choice variable, depending on the cost, and difficulty of exploiting this information. Using a complete structural model of the economy to form expectations lies at one extreme; using a univariate time series model—including assuming no change—lies at the other extreme.

An operational alternative to RE is still not available. Much has been made of 'animal spirits' by the critics which Keynes invoked to explain investment decisions; he was clearly recognizing that current investment decisions take into account expectations of the future. More recently, Akerlof and Shiller (2009), in their book of the same name, argued at length for replacing the assumption of RE with that of animal spirits. The problem is that animal spirits does not have a precise definition, it just represents irrationality. There are an infinite number ways of being irrational and, so far, none has commanded appeal, or has been formulated in such a way that it can usefully replace RE in macroeconomic models. Moreover, animal spirits is untestable. Until it is made operational in macroeconomics, RE will continue to be used, even though no one believes that people are fully rational. It is a simplifying assumption, and allowance should be made for this when using macroeconomic models.

In this conference Paul de Grauwe, a strong critic of RE, proposed representing animal spirits as an autoregressive-learning process. As the solution to a log-linearized RE stochastic dynamic general equilibrium (DSGE) macroeconomic model can be represented as a restricted vector autoregressive-moving average (VARMA) process, and this in turn can be

closely approximated by an autoregression, the difference is that the autoregressive representation of animal spirits may be relaxing some of the restrictions of the full VARMA solution. To be an improvement, learning would need to result in the eventually discovery of the correct autoregressive representation. This comes close to Muth's conception of RE.

3.1.3 *Macroeconomic shocks*

Modern macroeconomics has its origins in real business cycle theory. The standard Ramsey model is a highly stylized model with one shock, a productivity shock. One of the aims of this research agenda was to examine whether a business cycle can be generated by the model as a result of a temporary productivity shock. This requires the internal dynamics of the model to propagate the shock so that output and other variables have the statistical properties—variances, serial correlation, and cross correlations—observed in actual data. The general finding is that it cannot quite manage this. Among the various modifications made to the model was the inclusion of shocks other than productivity shocks, such as demand shocks, and allowance for price stickiness. These additions made the model more Keynesian and less classical in its structure. Many macroeconomists—mainly of the 'freshwater persuasion—have been reluctant to allow for the possibility of demand shocks on the grounds that they are not proper shocks in the sense of innovations; their argument is that demand is an endogenous response to circumstances. This raises the interesting issue of what is a macroeconomic shock.

An obvious definition of a shock is something that was previously unpredicted. In other words, a shock is something that is determined with respect to an information set, and implies incomplete information. On this basis we can have demand as well as productivity shocks. Even though demand may be a response to income, endowments and prices, new information, or a change in preferences, could produce disturbances to the economy. For example, highly leveraged households facing an unanticipated fall in income, an increase in the cost of living, an increase in borrowing rates, or new borrowing restrictions are likely to cut demand, and in extreme circumstances may default on their debts. This is what seems to have precipitated the financial crisis. The collapse of exposed mortgage companies and banks was a consequence.

There is nothing in this highly plausible explanation of the financial crisis that need call into question the methodology of modern macroeconomics. Indeed, a better knowledge of modern macroeconomics and an awareness of the fundamentals underlying risk assessments might well have avoided the crisis. A full explanation would, of course, require the ex-post identification of the relevant shocks.

3.1.4 *Modern macroeconomics and traditional econometrics*

A criticism often made of modern macroeconomics, but not something that has been raised in connection with the current financial crisis, is that it has largely abandoned the use of classical econometrics in favour of calibration or Bayesian methods. The main objection against these ways of quantifying modern macroeconomic models is that they are based on strong and usually untested prior assumptions rather than 'letting the data speak' as in classical econometrics.

According to an interview by Evans and Honkapohja (2005) with Thomas Sargent, the explanation for using calibration is that, early on in their analysis of real business cycle models, Robert Lucas and Edward Prescott took the view that 'too many good models' were being rejected through the use of classical econometric inference. At first sight this may seem to justify the criticism: the prior assumptions were wrong and classical econometric inference revealed this.

To see why this obvious conclusion may require qualification we need to understand two things. First, we must recall the earlier observation that modern macroeconomic models—and especially RBC models—are deliberately simplified, and hence misspecified. Second, classical econometric inference, such as maximum likelihood methods, give weight to all aspects of a model. In other words, they don't discriminate between different types of misspecification. Even a small misspecification might be enough to cause the model to be rejected.

For example, a model could have good long-run properties but the short-run dynamics might be misspecified, or *vice-versa*. If the purpose of the model is long-run analysis, misspecified short-run dynamics may not matter; and if the purpose is short-run analysis and not what happens in the long run, then it may not matter that the model's long-run properties are poor. To illustrate, it is common to ignore capital accumulation when specifying a model that is to be used for short-run policy. Although a specification error, this may not matter. It would, of course, matter in the longer run. Significantly, in the earliest RBC models, capital was the central feature while the labour market was suppressed, yet the aim was to explain the business cycle, a short-run phenomenon. Not surprisingly, subsequent research has given much more weight to the role of the labour market in explaining business cycle dynamics.

A danger with using classical econometric methods uncritically is that of data-mining. Following the failure to pass a misspecification test, it has at times been common to add features to the model until the test is passed. For example, having discovered that the residuals are serially correlated, it used to be standard practice to respecify the errors as autocorrelated in order to pass the test. As serially correlated errors could be the outcome of

omitting serially correlated economic variables, this might be an incorrect respecification which could affect both the long-run and the short-run properties of the model.

Another consequence of using classical econometric methods when the model is misspecified is that the coefficient estimates may be biased, possibly badly. The misspecification may not be detected and, due to the biases, any analysis based on the estimated model could be highly misleading. These biases are likely to be greater when full information methods are used because misspecification in one equation of the model may create biases in other equations. Increasingly, the current practice is to estimate DSGE models using Bayesian methods in order to constrain the coefficients to lie within acceptable ranges. In principle this is better than calibration as it gives a role to the data. The extent of this role depends on the tightness of the prior distribution; a very strong prior is similar to calibration.

Ideally, recognizing that models are probably misspecified, we need empirical methods that produce models that are robust for the purposes that we wish to use them. This requires that the critical parameters are well estimated and consistent with the data, but may otherwise allow the model to be misspecified. A mixture of classical econometric methods and the incorporation of prior information will usually be necessary.

3.2 Finance

3.2.1 *The efficient market hypothesis*

A popular target of criticism is the EMH. Although a key proposition of financial economics, many of the critics have seized on the EMH to illustrate the failure of macroeconomics. They also attribute the current financial crisis largely to believing that markets are efficient and will always price assets correctly. According to Krugman, the EMH 'asserts that financial markets always get asset prices right given the available information', whereas 'many real-world investors bear little resemblance to the cool calculators of efficient-market theory: they're all too subject to herd behaviour, to bouts of irrational exuberance and unwarranted panic'. Richard Thaler (2009), agreeing that the EMH guarantees the right price for assets, argues that this is hard to reject as we need to know what the right price is in order to be able to do so. Amongst other critics of the EMH, the noted financial journalist Richard Lowenstein recently declared that 'the upside of the current Great Recession is that it could drive a stake through the heart of the academic nostrum known as the efficient-market hypothesis'.

These criticisms of the EMH are dangerously simplistic as they ignore the many qualifications made in the EMH that are required for its

prediction that the market prices all assets correctly. Strictly, the EMH asserts that financial markets are 'informationally efficient', meaning that the prices of traded assets reflect all known information, and instantly change to reflect new information, thereby making it impossible to consistently outperform the market by using any information that the market already knows, except through luck. In the EMH information or *news* is defined as anything that may affect prices that is unknowable in the present and thus appears randomly in the future.

Even this description requires further clarification. The EMH does not predict that markets always price assets correctly. As with RE, the information used may be flawed. Although mistakes are asserted to be temporary, they may still occur and distort asset prices for a time. Moreover, information may be asymmetric and incomplete. It varies between people from the highly informed, to the not well informed, and to the uninformed, or noise traders. The assumptions of strong and weak information found in the RE literature is an attempt to capture this point. The implication is that market prices will incorporate the distribution of information among participants, and this will vary through time and place. Many market trades will arise from the acquisition of new information by some but not by others. The EMH says that the market price will reflect this new information and thereby help correct informational asymmetries. If it takes time for new information to diffuse through investors, then, as in macroeconomics more generally, the EMH should be interpreted as saying that resulting market price is a temporary and not a long-run equilibrium.

The willingness to hold an asset, and hence determine its price, also depends on the attitudes to risk of investors. This is not usually mentioned in the EMH, but pricing risk is really the key to asset pricing and asset-pricing theory. For example, in the capital asset pricing model (CAPM)—often mentioned by the critics in the same breath as the EMH—the market risk premium is an asset's beta multiplied by the expected excess return on the market. Since people take different attitudes to risk, they may not assess the price of risk in the same way as the market, and hence they will be willing to pay different prices to hold an asset. Moreover, assessing risk involves information about the future, as does forming expectations of the future market price, and so is subject to the above caveats on information.

It is commonly held that the EMH implies that asset prices (strictly their logarithm) follow a random walk, implying that the best guess for future asset prices is their current price. The observation that asset prices are serially correlated—i.e. they have momentum—is then taken as conclusive evidence against the EMH. This argument would be correct if investors were risk neutral. But if asset prices incorporate a serially-correlated

time-varying risk premium then this might explain the serial correlation in asset prices. It is surprising how widespread this misconception is.

It might be claimed that history has produced so much evidence against the EMH that, despite defences like this, in practice, it is a fatally flawed. This argument has been assessed, and persuasively rejected, by Malkiel (2003). Whilst conceding that there is documented evidence of the predictability of stock prices changes—such as seasonal effects, value, size effects and momentum—and prices have been out of line with fundamentals for periods of time—such as the internet bubble, and there is evidence of irrationality in pricing—for example the crash of October 1987 and higher price of Palm Pilot in 2000 than the parent company 3-Com Corporation—he argues that, sooner or later, fundamentals prevailed and no-arbitrage profits disappeared, especially when transactions costs and survivor bias are taken into account. The same is true of the current crisis. Assets that were over priced, such as mortgage backed securities, have crashed, while the value of bank assets and the stock market have plummeted. The issue, therefore, is not whether markets correctly price assets all of the time, but whether it is possible to make no-arbitrage profits for long. The downside is that the longer it takes for asset prices to fully reflect fundamentals, the less the predictive content, and hence usefulness, of the EMH. A related point can be made about macroeconomics.

3.2.2 *Risk*

Although risk is commonly associated with finance, and asset pricing is largely about pricing risk, there is a deep divide between macro and financial economists in the way that they think about risk. Financial economists tend to price one asset in relation to another (relative asset pricing), and use CAPM to price their relative risks on the basis of the past behaviour of prices, particularly their volatility and their degree of kurtosis. In contrast, macroeconomists tend to use general equilibrium models of risk that are based on how movements in the fundamentals affect consumer/investor welfare.

The dangers of basing risk on either recent or average long-term price volatility are that volatility can change very quickly, that extreme but infrequent price movements tend to be discounted, and that possible future volatility may be over-looked. It is clear that in the recent financial crisis all three occurred. One advantage of a fundamentals assessment of risk is that it need not be based purely on time series analysis and historic evidence, particularly univariate time series evidence which ignores cross correlations and systemic risk. If households and financial companies are highly leveraged then both are vulnerable to shocks and default whatever the time series evidence suggests.

There are well-documented differences between the predictions of financial and general equilibrium models of risk. The best known is the equity premium puzzle, but the same phenomenon occurs for bonds and FOREX. The 'puzzle' is that investors in financial markets seem to be willing to accept far more risk than general equilibrium models of risk would indicate. Malkiel (2003) observes that one should distinguish between *ex ante* and *ex post* returns. Higher *ex post* than *ex ante* returns could, for example, reflect unexpected capital gains. Related to this, survivor bias will bias upwards *ex post* returns. In other words, the problem may be one of measurement rather in the fundamentals theories of risk.

A key principle in finance is that risk may be reduced through holding a diversified portfolio. Diversification works best when asset returns are negatively correlated. When they are highly positively correlated, as in the current financial crisis, reducing risk through diversification fails. Risk then becomes systemic and non-diversifiable.

My own view is that a mixture of being willing to take on risk and a gross underestimate of the riskiness of assets was the prime cause of the financial crisis. The liquidity crisis, often mentioned as the main cause, was just the result of lenders not being able to evaluate risk and so withholding refinancing capital for short-term loans. Firms like Lehman, which was leveraged 44 times, were then left highly exposed once the riskiness of their strategy became known. The spillover effect that made the crisis universal was the result of investors being unaware of the risks they were taking in holding the securitized assets of such companies. In other words, it was a lack of information, and the exploitation of this in financial markets, together with a willingness to take on risk, that caused the crisis, not a failure of macroeconomics. All macroeconomic theories would predict that certain shocks (informational gaps) could result in default on loans, and thereby generate risks perhaps not often experienced before. Macroeconomics would emphasize the likelihood that risks may be systemic and not idiosyncratic, and so not fully diversifiable. If anything, the weakness is not the failure of macroeconomics to incorporate finance, but of finance to incorporate macroeconomics.

4 Some strengths and weaknesses of modern macroeconomics

Modern macroeconomics with its emphasis on microfounded optimal behaviour was initially largely a reaction to the perceived weaknesses in Keynes's macroeconomics, to the ad hockery of Keynesian models, to the incomprehensibility of large-scale macro-econometric models and to the a-theoretical data-mining of many econometric time series studies. As each of these alternatives to modern macroeconomics has been praised for their

superiority by the critics let us consider them in a little more detail to see what modern macroeconomics is said to be missing.

As I have written elsewhere—Wickens (2008)—I am surprised that Keynes, having written two path-breaking books (The Treatise and The General Theory), and having, according to Skidelski (1992), realized that neither resolved one of the key theoretical issues he was concerned about—namely, how to define equilibrium—yet was the editor of The Economic Journal in which Ramsey's path-breaking paper that contained a solution to this problem was published. The General Theory improved on The Treatise by having two variables (income and the interest rate) instead of just one (the interest rate) to clear two markets, but this only gave a flow equilibrium when what is required is a stock equilibrium because there are potentially an infinite number of flow equilibria associated with each stock equilibrium. As the Ramsey model is the starting point of modern macroeconomics, the notion of going back to Keynes's formulation of macroeconomics seems retrogressive.

Three features of Keynesian economics, the successor to the economics of Keynes, that are often cited by the critics are that it explains the persistence of recessions and unemployment, that government intervention via fiscal policy is required to get out of depressions, and the notion of Keynes that financial markets are a 'casino' reflecting animal spirits rather than a process which correctly prices assets. Having already discussed animal spirits and asset pricing, let us focus on the macroeconomy, particularly as Keynesian economics is based mainly on the first two and, in particular, on the roles of price and wage stickiness in causing and prolonging recessions.

The main point is that modern macroeconomics does not overlook the evidence of serial correlation in unemployment and output, or in prices and wages—though there is less serial correlation in growth rates. On the contrary, the latest generation of DSGE models, also known as New Keynesian models, explicitly focuses on modelling the causes of price and wage stickiness and of analysing whether this can explain observed macroeconomic behaviour. It does so, however, by attempting to endogenize pricing behaviour rather than treating it as exogenous. The Smets–Wouters models of the EU and USA, Smets and Wouters (2003, 2007), and the model of Christiano et al. (2005) are well-known examples. However, whether the explanation really lies in price and wage stickiness or in autoregressive shocks still remains unresolved, see Del Negro et al. (2006) and Le et al. (2009).

While it is true that the first generation of DSGE models did not incorporate these features, as the DSGE paradigm spreads, ways are being found of adopting more realistic assumptions without losing the advantages of these models of being simple, logically consistent and providing the

essential intuition required to understand the behaviour of the macroeconomy. A similar argument applies to other aspects of modern macroeconomic research. Since the financial crisis it has been particularly noticeable how many DSGE models are now including a banking sector and more elaborate financial sectors, though at present there is still no consensus on the best way to do this.

This shows, not the bankruptcy of modern macroeconomics, or that it is a catastrophic failure, as Krugman claims, but its vibrancy. Nonetheless, there are many aspects of modern macroeconomics that could, with benefit, be improved, and there are many questions that remain unresolved. This does not entail the abandonment of the modern approach as the critics demand, but further refinements. In other words, normal progress is all that is required.

No doubt we all have our particular preferences and interests for future research. Before giving a list of my own, it is important to emphasize the advantages of keeping DSGE models simple and, as far as possible, tailored to answer a specific problem. The larger and more complex they become, the more we will need to rely on simulation methods to determine their properties. This would reduce their value in giving immediate guidance and intuition in, for example, policy discussions, and render them more like the discredited macro-econometric models of the past.

Having entered this caveat, at the top of my list of things to do is the need to better integrate macroeconomics and finance. The key issue is to be able assess risk in order to price assets and take investment decisions. This may necessitate more institutional detail in the form of the explicit inclusion of banks, both commercial and investment. Incorporating default risk seems essential if we are to explain the current financial crisis. Other tasks, in no particular order of preference, include modelling market imperfections and wedges and evaluating policies designed to improve general welfare, given these imperfections; analysing fiscal policy in the same detail as monetary policy; constructing models better suited to different problems of emerging market economies; finding ways of analysing the interactions in the global economy, arising especially from finance and the need to re-cycle current account surpluses. The difficulty is to incorporate these features without allowing the model to become too cumbersome. This requires carefully tailoring the model to the problem at hand.

Apart from adding to this list, which could continue indefinitely, I shall make one further observation, namely, that as with the EMH, more attention should be paid to the time dimension of DSGE models when interpreting their predictions. It is, for example, common to formulate the household utility function with consumption and leisure as arguments and from this derive the supply of labour, which is then interpreted as

responding instantaneously to real wages. The obvious implication is that there can be no involuntary unemployment as observed employment lies on the labour supply function. This result is the basis of much criticism of DSGE models. At best the prediction holds over a very long time horizon. It then helps to explain the secular decline in labour supply by individuals. In the short run, however, it would probably be more plausible to interpret the supply of labour as highly inelastic with respect to real wages, and hence much unemployment as involuntary. Certainly, this would be true during recessions. This would suggest omitting leisure from the utility function for short-run analysis. Such an interpretation would be significant for assessing the effectiveness of fiscal policy during a recession. It would imply that households would not work less hard today as a result of anticipated future tax increases that are required to pay for the fiscal expansion.

In summary, modern macroeconomics has its weaknesses, but it also has great strengths, and its research agenda is continually being revised in response to new challenges. This is how we reached the current state of macroeconomics from its Keynesian origins. The current crisis has been a major stimulus to such research, especially in embracing banking and finance in modern macro theory. The claim of one of its critics that the macroeconomics of the last 30 years is spectacularly useless is just wrong.

5 What caused the crisis?

The crisis was the result of a sequence of events. Briefly, the collapse of the dot com bubble in 2001 led, in the USA, to a fiscal and monetary stimulus. The resulting monetary expansion and low interest rates encouraged excessive consumer borrowing and a low savings rate, the excessiveness being due to an under-assessment of the subsequent risks of such an expansion. Banks and mortgage companies, in part reacting to political pressures to expand mortgage lending, satisfied this demand for loans by borrowing heavily short term in international capital markets that were awash with the proceeds of large Chinese and oil-producer current account surpluses.

The Chinese current account surpluses and the USA (and UK) current account deficits were a consequence of the deliberate undervaluation of the renminbi as China pursued its domestic policy of shifting from an agricultural to a manufacturing nation. This shift has been characteristic of economic development over the centuries, and is at the heart of the globalization debate earlier at the end of the previous century. In part mitigation of US policy, it should be recalled that as the US dollar is the main reserve currency, for some time, in order to generate sufficient reserve assets for surplus trading partners, the USA has had to run large

current account deficits. Only a devaluation of the US dollar can prevent this. As China is a major loser, until recently it sought to avoid a devaluation of the dollar/appreciation of the renminbi.

The expansions in the USA and in the wider world increased the demand for raw materials and resulted in large increases in commodity and metals prices. This, as in the 1970s, generated a major disturbance to western economies. Food and finished goods prices rose causing a tightening of interest rates and a contraction in demand and hence output, employment and income. This precipitated large-scale defaults on mortgage loans and credit card debt, especially in the USA where default does not carry such a stigma as in Europe.

Banks and mortgage companies had been financing the consumer boom, offering credit at what proved to be suicidally low rates based on the availability of massive short-term liquidity. Partly, this was achieved through securitizing their assets and selling them at inflated prices, because the holders believed that a diversified portfolio of such assets was far less risky than holding individual mortgages. So keen were they to hold these securitized assets, that the leverage ratio at Lehman was 44.

Once households began to default, the asset side of many investment banks' balance sheets looked very weak. Having lent long and borrowed short, they needed to roll over their debts quickly, but not knowing how risky these loans had become, the inter-bank market began to seize up. The globalization of financial markets meant that the whole world was caught up in this. Not only did banks not lend to banks, they stopped lending to the rest of the economy too. Trade credit, a key to exporting, also collapsed. As result, the world found itself in a deep recession.

Although the initial source of the problem was not of Europe's making, the single currency has clearly exacerbated the problem. By delivering negative real interest rates in high inflation countries like Ireland, Portugal and Spain, the single currency caused property booms which, when they collapsed, brought about severe recessions. Germany has also suffered a deep recession, but this was more due to a loss of export markets caused by the world recession. Nonetheless, the single currency played its part here too as, having low inflation, and hence a relatively high real interest rate compared with other eurozone countries, it lacked the same stimulus to domestic demand but, as it gained in competitiveness with respect to other eurozone countries, this was compensated to some extent by vigorous export growth. This resulted in Germany being heavily dependent on exports.

Is modern macroeconomics to blame for all of this? Hardly at all. On the contrary, the macroeconomic aspects of the crisis are easy to understand, and easily predictable from modern theory. In my view the causes were a mixture of poor policy—unwise political pressures, over-loose monetary

policy in the early 2000s, and an over-ambitious Chinese development policy—and a failure of the banking system and households to assess risk correctly: the risks of providing cheap credit based on short-term finance, and the risks of taking out large loans when default is a strong possibility.

Even so, it is a moot question as to whether the crisis showed a lack of rationality. For government, the over-riding need is to be re-elected. This suggests a short-term perspective and requires maintaining a strong economy and avoiding recession. For households, especially US households, the downside to defaulting seemed to be fairly minor. So why not take a chance, live more comfortably and hope for the best? For individual salesmen of mortgages the incentives were to sell more and not take into account possible negative consequences for the bank. For banks, the expectation was that they were too big to be allowed to fail. A good understanding of macroeconomics is clearly not sufficient to avoid another crisis if such individual incentives, at variance with public welfare, remain. A major need is to realign private incentives in banking with public welfare. This will probably require new legislation.

6 Conclusions

To summarize, the financial crisis is not due to the failure of modern macroeconomics; a better understanding of macroeconomics might have prevented the crisis. The critics of modern macroeconomics, with their emphasis on the lack of realism of its assumptions, the need for complex models, and a return to the economics of Keynes, have missed the point. A macroeconomic theory is more likely to be useful if it is simple and purpose-built than if it is designed to be fit for all purposes, when it is likely to be far too complex and cumbersome to be useful. Nonetheless, because DSGE macroeconomic models are so stylized, it is necessary to take great care in interpreting their predictions, especially for policy purposes. Whilst Keynes made an outstanding contribution to macroeconomics, a return to Keynesian economics with its partial equilibrium structure would be a retrograde step in modelling the economy.

Macroeconomics needs to continue to evolve and, in the process, decide how to best incorporate aspects of the economy currently not well modelled. How to model the banking sector and take account of default risk are obvious priorities. Little is wrong with the theory of finance, but much is wrong with the way it has been implemented in practice. A major need is to realign private incentives in banking with public welfare in order to avoid costly bailouts as a result of banks being ‘too big to be allowed to fail’. This will probably require new legislation.

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