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**Economics**

## What went wrong with economics

**And how the discipline should change to avoid the mistakes of the past**

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OF ALL the economic bubbles that have been pricked, few have burst more spectacularly than the reputation of economics itself. A few years ago, the dismal science was being acclaimed as a way of explaining ever more forms of human behaviour, from drug-dealing to sumo-wrestling. Wall Street ransacked the best universities for game theorists and options

modellers. And on the public stage, economists were seen as far more trustworthy than politicians. John McCain joked that Alan Greenspan, then chairman of the Federal Reserve, was so indispensable that if he died, the president should “prop him up and put a pair of dark glasses on him.”

In the wake of the biggest economic calamity in 80 years that reputation has taken a beating. In the public mind an arrogant profession has been humbled. Though economists are still at the centre of the policy debate—think of Ben Bernanke or Larry Summers in America or Mervyn King in Britain—their pronouncements are viewed with more scepticism than before. The profession itself is suffering from guilt and rancour. In a recent lecture, Paul Krugman, winner of the Nobel prize in economics in 2008, argued that much of the past 30 years of macroeconomics was “spectacularly useless at best, and positively harmful at worst.” Barry Eichengreen, a prominent American economic historian, says the crisis has “cast into doubt much of what

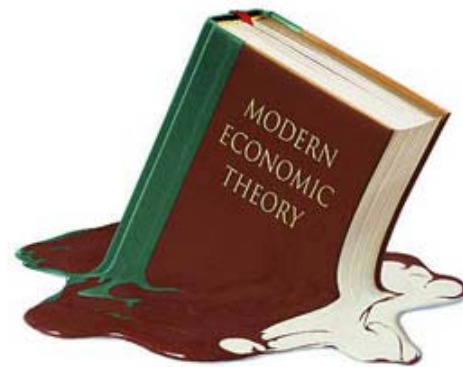


Illustration by Jon Berkerly

we thought we knew about economics.”

In its crudest form—the idea that economics as a whole is discredited—the current backlash has gone far too far. If ignorance allowed investors and politicians to exaggerate the virtues of economics, it now blinds them to its benefits. Economics is less a slavish creed than a prism through which to understand the world. It is a broad canon, stretching from theories to explain how prices are determined to how economies grow. Much of that body of knowledge has no link to the financial crisis and remains as useful as ever.

And if economics as a broad discipline deserves a robust defence, so does the free-market paradigm. Too many people, especially in Europe, equate mistakes made by economists with a failure of economic liberalism. Their logic seems to be that if economists got things wrong, then politicians will do better. That is a false—and dangerous—conclusion.

### **Rational fools**

These important caveats, however, should not obscure the fact that two central parts of the discipline—macroeconomics and financial economics—are now, rightly, being severely re-examined (see [article](#), [article](#)). There are three main critiques: that macro and financial economists helped cause the crisis, that they failed to spot it, and that they have no idea how to fix it.

The first charge is half right. Macroeconomists, especially within central banks, were too fixated on taming inflation and too cavalier about asset bubbles. Financial economists, meanwhile, formalised theories of the efficiency of markets, fuelling the notion that markets would regulate themselves and financial innovation was always beneficial. Wall Street's most esoteric instruments were built on these ideas.

But economists were hardly naive believers in market efficiency. Financial academics have spent much of the past 30 years poking holes in the “efficient market hypothesis”. A recent ranking of academic economists was topped by Joseph Stiglitz and Andrei Shleifer, two prominent hole-pokers. A newly prominent field, behavioural economics, concentrates on the consequences of irrational actions.

So there were caveats aplenty. But as insights from academia arrived in the rough and tumble of Wall Street, such delicacies were put aside. And absurd assumptions were added. No economic theory suggests you should value mortgage derivatives on the basis that house prices would

always rise. Finance professors are not to blame for this, but they might have shouted more loudly that their insights were being misused. Instead many cheered the party along (often from within banks). Put that together with the complacency of the macroeconomists and there were too few voices shouting stop.

### **Blindsided and divided**

The charge that most economists failed to see the crisis coming also has merit. To be sure, some warned of trouble. The likes of Robert Shiller of Yale, Nouriel Roubini of New York University and the team at the Bank for International Settlements are now famous for their prescience. But most were blindsided. And even worrywarts who felt something was amiss had no idea of how bad the consequences would be.

That was partly to do with professional silos, which limited both the tools available and the imaginations of the practitioners. Few financial economists thought much about illiquidity or counterparty risk, for instance, because their standard models ignore it; and few worried about the effect on the overall economy of the markets for all asset classes seizing up simultaneously, since few believed that was possible.

Macroeconomists also had a blindspot: their standard models assumed that capital markets work perfectly. Their framework reflected an uneasy truce between the intellectual heirs of Keynes, who accept that economies can fall short of their potential, and purists who hold that supply must always equal demand. The models that epitomise this synthesis—the sort used in many central banks—incorporate imperfections in labour markets (“sticky” wages, for instance, which allow unemployment to rise), but make no room for such blemishes in finance. By assuming that capital markets worked perfectly, macroeconomists were largely able to ignore the economy's financial plumbing. But models that ignored finance had little chance of spotting a calamity that stemmed from it.

What about trying to fix it? Here the financial crisis has blown apart the fragile consensus between purists and Keynesians that monetary policy was the best way to smooth the business cycle. In many countries short-term interest rates are near zero and in a banking crisis monetary policy works less well. With their compromise tool useless, both sides have retreated to their roots, ignoring the other camp's ideas. Keynesians, such as Mr Krugman, have become uncritical supporters of

fiscal stimulus. Purists are vocal opponents. To outsiders, the cacophony underlines the profession's uselessness.

Add these criticisms together and there is a clear case for reinvention, especially in macroeconomics. Just as the Depression spawned Keynesianism, and the 1970s stagflation fuelled a backlash, creative destruction is already under way. Central banks are busy bolting crude analyses of financial markets onto their workhorse models. Financial economists are studying the way that incentives can skew market efficiency. And today's dilemmas are prompting new research: which form of fiscal stimulus is most effective? How do you best loosen monetary policy when interest rates are at zero? And so on.

But a broader change in mindset is still needed. Economists need to reach out from their specialised silos: macroeconomists must understand finance, and finance professors need to think harder about the context within which markets work. And everybody needs to work harder on understanding asset bubbles and what happens when they burst. For in the end economists are social scientists, trying to understand the real world. And the financial crisis has changed that world.

from the print edition | Leaders

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The state of economics

## The other-worldly philosophers

Although the crisis has exposed bitter divisions among economists, it could still be good for economics. Our first article looks at the turmoil among macroeconomists. Our second (see article) examines the foundations of financial economics

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Illustration by Brett Ryder

ROBERT LUCAS, one of the greatest macroeconomists of his generation, and his followers are “making ancient and basic analytical errors all over the place”. Harvard's Robert Barro, another towering figure in the discipline, is “making truly boneheaded arguments”. The past 30 years of macroeconomics training at American and British universities were a “costly waste of time”.

To the uninitiated, economics has always been a dismal science. But all these attacks come from within the guild: from Brad DeLong of the University of California, Berkeley; Paul Krugman of Princeton and the *New York Times*; and Willem Buiter of the London School of Economics (LSE), respectively. The macroeconomic crisis of the past two years is also provoking a crisis of confidence in macroeconomics. In the last of

his Lionel Robbins lectures at the LSE on June 10th, Mr Krugman feared that most macroeconomics of the past 30 years was “spectacularly useless at best, and positively harmful at worst”.

These internal critics argue that economists missed the origins of the crisis; failed to appreciate its worst symptoms; and cannot now agree about the cure. In other words, economists misread the economy on the way up, misread it on the way down and now mistake the right way out.

On the way up, macroeconomists were not wholly complacent. Many of them thought the housing bubble would pop or the dollar would fall. But they did not expect the financial system to break. Even after the seizure in interbank markets in August 2007, macroeconomists misread the danger. Most were quite sanguine about the prospect of Lehman Brothers going bust in September 2008.

Nor can economists now agree on the best way to resolve the crisis. They mostly overestimated the power of routine monetary policy (ie, central-bank purchases of government bills) to restore prosperity. Some now dismiss the power of fiscal policy (ie, government sales of its securities) to do the same. Others advocate it with passionate intensity.

Among the passionate are Mr DeLong and Mr Krugman. They turn for inspiration to Depression-era texts, especially the writings of John Maynard Keynes, and forgotten mavericks, such as Hyman Minsky. In the humanities this would count as routine scholarship. But to many high-tech economists it is a bit undignified. Real scientists, after all, do not leaf through Newton's “Principia Mathematica” to solve contemporary problems in physics.

They accuse economists like Mr DeLong and Mr Krugman of falling back on antiquated Keynesian doctrines—as if nothing had been learned in the past 70 years. Messrs DeLong and Krugman, in turn, accuse economists like Mr Lucas of not falling back on Keynesian economics—as if everything had been forgotten over the past 70 years. For Mr Krugman, we are living through a “Dark Age of macroeconomics”, in which the wisdom of the ancients has been lost.

What was this wisdom, and how was it forgotten? The history of macroeconomics begins in intellectual struggle. Keynes wrote the “General Theory of Employment, Interest and Money”, which was published in 1936, in an “unnecessarily controversial tone”, according to some readers. But it was a controversy the author had waged in his

own mind. He saw the book as a “struggle of escape from habitual modes of thought” he had inherited from his classical predecessors.

That classical mode of thought held that full employment would prevail, because supply created its own demand. In a classical economy, whatever people earn is either spent or saved; and whatever is saved is invested in capital projects. Nothing is hoarded, nothing lies idle.

Keynes appreciated the classical model's elegance and consistency, virtues economists still crave. But that did not stop him demolishing it. In his scheme, investment was governed by the animal spirits of entrepreneurs, facing an imponderable future. The same uncertainty gave savers a reason to hoard their wealth in liquid assets, like money, rather than committing it to new capital projects. This liquidity-preference, as Keynes called it, governed the price of financial securities and hence the rate of interest. If animal spirits flagged or liquidity-preference surged, the pace of investment would falter, with no obvious market force to restore it. Demand would fall short of supply, leaving willing workers on the shelf. It fell to governments to revive demand, by cutting interest rates if possible or by public works if necessary.

The Keynesian task of “demand management” outlived the Depression, becoming a routine duty of governments. They were aided by economic advisers, who built working models of the economy, quantifying the key relationships. For almost three decades after the second world war these advisers seemed to know what they were doing, guided by an apparent trade-off between inflation and unemployment. But their credibility did not survive the oil-price shocks of the 1970s. These condemned Western economies to “stagflation”, a baffling combination of unemployment and inflation, which the Keynesian consensus grasped poorly and failed to prevent.

The Federal Reserve, led by Paul Volcker, eventually defeated American inflation in the early 1980s, albeit at a grievous cost to employment. But victory did not restore the intellectual peace. Macroeconomists split into two camps, drawing opposite lessons from the episode.

The purists, known as “freshwater” economists because of the lakeside universities where they happened to congregate, blamed stagflation on restless central bankers trying to do too much. They started from the classical assumption that markets cleared, leaving no unsold goods or unemployed workers. Efforts by policymakers to smooth the economy's

natural ups and downs did more harm than good.

America's coastal universities housed most of the other lot, "saltwater" pragmatists. To them, the double-digit unemployment that accompanied Mr Volcker's assault on inflation was proof enough that markets could malfunction. Wages might fail to adjust, and prices might stick. This grit in the economic machine justified some meddling by policymakers.



Illustration by Brett Ryder

Mr Volcker's recession bottomed out in 1982. Nothing like it was seen again until last year. In the intervening quarter-century of tranquillity, macroeconomics also recovered its composure. The opposing schools of thought converged. The freshwater economists accepted a saltier view of policymaking. Their opponents adopted a more freshwater style of modelmaking. You might call the new synthesis brackish macroeconomics.

### **Pinches of salt**

Brackish macroeconomics flowed from universities into central banks. It underlay the doctrine of inflation-targeting embraced in New Zealand, Canada, Britain, Sweden and several emerging markets, such as Turkey. Ben Bernanke, chairman of the Fed since 2006, is a renowned contributor to brackish economics.

For about a decade before the crisis, macroeconomists once again appeared to know what they were doing. Their thinking was embodied in a new genre of working models of the economy, called "dynamic stochastic general equilibrium" (DSGE) models. These helped guide deliberations at several central banks.

Mr Buitter, who helped set interest rates at the Bank of England from 1997 to 2000, believes the latest academic theories had a profound influence there. He now thinks this influence was baleful. On his blog, Mr Buitter argues that a training in modern macroeconomics was a "severe handicap" at the onset of the financial crisis, when the central bank had to "switch gears" from preserving price stability to safeguarding financial stability.



Modern macroeconomists worried about the prices of goods and services, but neglected the prices of assets. This was partly because they had too much faith in financial markets. If asset prices reflect economic fundamentals, why not just model the fundamentals, ignoring the shadow they cast on Wall Street?

It was also because they had too little interest in the inner workings of the financial system. "Philosophically speaking," writes Perry Mehrling of Barnard College, Columbia University, economists are "materialists" for whom "bags of wheat are more important than stacks of bonds." Finance is a veil, obscuring what really matters. As a poet once said, "promises of payment/Are neither food nor raiment".

In many macroeconomic models, therefore, insolvencies cannot occur. Financial intermediaries, like banks, often don't exist. And whether firms finance themselves with equity or debt is a matter of indifference. The Bank of England's DSGE model, for example, does not even try to incorporate financial middlemen, such as banks. "The model is not, therefore, directly useful for issues where financial intermediation is of first-order importance," its designers admit. The present crisis is, unfortunately, one of those issues.

The bank's modellers go on to say that they prefer to study finance with specialised models designed for that purpose. One of the most prominent was, in fact, pioneered by Mr Bernanke, with Mark Gertler of New York University. Unfortunately, models that include such financial-market complications "can be very difficult to handle," according to Markus Brunnermeier of Princeton, who has handled more of these difficulties than most. Convenience, not conviction, often dictates the choices economists make.

Convenience, however, is addictive. Economists can become seduced by their models, fooling themselves that what the model leaves out does not matter. It is, for example, often convenient to assume that markets are "complete"—that a price exists today, for every good, at every date, in every contingency. In this world, you can always borrow as much as you want at the going rate, and you can always sell as much as you want at the going rate.

Before the crisis, many banks and shadow banks made similar assumptions. They believed they could always roll over their short-term debts or sell their mortgage-backed securities, if the need arose. The financial crisis made a mockery of both assumptions. Funds dried up, and markets thinned out. In his anatomy of the crisis Mr

Brunnermeier shows how both of these constraints fed on each other, producing a “liquidity spiral”.

What followed was a furious dash for cash, as investment banks sold whatever they could, commercial banks hoarded reserves and firms drew on lines of credit. Keynes would have interpreted this as an extreme outbreak of liquidity-preference, says Paul Davidson, whose biography of the master has just been republished with a new afterword. But contemporary economics had all but forgotten the term.

### **Fiscal fisticuffs**

The mainstream macroeconomics embodied in DSGE models was a poor guide to the origins of the financial crisis, and left its followers unprepared for the symptoms. Does it offer any insight into the best means of recovery?

In the first months of the crisis, macroeconomists reposed great faith in the powers of the Fed and other central banks. In the summer of 2007, a few weeks after the August liquidity crisis began, Frederic Mishkin, a distinguished academic economist and then a governor of the Fed, gave a reassuring talk at the Federal Reserve Bank of Kansas City's annual symposium in Jackson Hole, Wyoming. He presented the results of simulations from the Fed's FRB/US model. Even if house prices fell by a fifth in the next two years, the slump would knock only 0.25% off GDP, according to his benchmark model, and add only a tenth of a percentage point to the unemployment rate. The reason was that the Fed would respond “aggressively”, by which he meant a cut in the federal funds rate of just one percentage point. He concluded that the central bank had the tools to contain the damage at a “manageable level”.

Since his presentation, the Fed has cut its key rate by five percentage points to a mere 0-0.25%. Its conventional weapons have proved insufficient to the task. This has shaken economists' faith in monetary policy. Unfortunately, they are also horribly divided about what comes next.

Mr Krugman and others advocate a bold fiscal expansion, borrowing their logic from Keynes and his contemporary, Richard Kahn. Kahn pointed out that a dollar spent on public works might generate more than a dollar of output if the spending circulated repeatedly through the economy, stimulating resources that might otherwise have lain idle.

Today's economists disagree over the size of this multiplier. Mr Barro

thinks the estimates of Barack Obama's Council of Economic Advisors are absurdly large. Mr Lucas calls them "schlock economics", contrived to justify Mr Obama's projections for the budget deficit. But economists are not exactly drowning in research on this question. Mr Krugman calculates that of the 7,000 or so papers published by the National Bureau of Economic Research between 1985 and 2000, only five mentioned fiscal policy in their title or abstract.

Do these public spats damage macroeconomics? Greg Mankiw, of Harvard, recalls the angry exchanges in the 1980s between Robert Solow and Mr Lucas—both eminent economists who could not take each other seriously. This vitriol, he writes, attracted attention, much like a bar-room fist-fight. But he thinks it also dismayed younger scholars, who gave these macroeconomic disputes a wide berth.



Illustration by Brett Ryder

By this account, the period of intellectual peace that followed in the 1990s should have been a golden age for macroeconomics. But the brackish consensus also seems to leave students cold. According to David Colander, who has twice surveyed the opinions of economists in the best American PhD programmes, macroeconomics is often the least popular class. "What did you learn in macro?" Mr Colander asked a group of Chicago students. "Did you do the dynamic stochastic general equilibrium model?" "We learned a lot of junk like that," one replied.

### **It takes a model to beat a model**

The benchmark macroeconomic model, though not junk, suffers from some obvious flaws, such as the assumption of complete markets or frictionless finance. Indeed, because these flaws are obvious, economists are well aware of them. Critics like Mr Buiter are not telling them anything new. Economists can and do depart from the benchmark. That, indeed, is how they get published. Thus a growing number of cutting-edge models incorporate one or two financial frictions. And economists like Mr Brunnermeier are trying to fit their small, "blackboard" models of the crisis into a larger macroeconomic frame.

But the benchmark still matters. It formalises economists' gut instincts about where the best analytical cuts lie. It is the starting point to which the theorist returns after every ingenious excursion. Few economists really believe all its assumptions, but few would rather start anywhere else.

Unfortunately, it is these primitive models, rather than their sophisticated descendants, that often exert the most influence over the world of policy and practice. This is partly because these first principles endure long enough to find their way from academia into policymaking circles. As Keynes pointed out, the economists who most influence practical men of action are the defunct ones whose scribblings have had time to percolate from the seminar room to wider conversations.

These basic models are also influential because of their simplicity. Faced with the "blooming, buzzing confusion" of the real world, policymakers often fall back on the highest-order principles and the broadest presumptions. More specific, nuanced theories are often less versatile. They shed light on whatever they were designed to explain, but little beyond.

Would economists be better off starting from somewhere else? Some think so. They draw inspiration from neglected prophets, like Minsky, who recognised that the "real" economy was inseparable from the financial. Such prophets were neglected not for what they said, but for the way they said it. Today's economists tend to be open-minded about content, but doctrinaire about form. They are more wedded to their techniques than to their theories. They will believe something when they can model it.

Mr Colander, therefore, thinks economics requires a revolution in technique. Instead of solving models "by hand", using economists' powers of deduction, he proposes simulating economies on the computer. In this line of research, the economist specifies simple rules of thumb by which agents interact with each other, and then lets the computer go to work, grinding out repeated simulations to reveal what kind of unforeseen patterns might emerge. If he is right, then macroeconomists, like zombie banks, must write off many of their past intellectual investments before they can make progress again.

Mr Krugman, by contrast, thinks reform is more likely to come from within. Keynes, he observes, was a "consummate insider", who understood the theory he was demolishing precisely because he was once convinced by it. In the meantime, he says, macroeconomists

should turn to patient empirical spadework, documenting crises past and present, in the hope that a fresh theory might later make sense of it all.

Macroeconomics began with Keynes, but the word did not appear in the journals until 1945, in an article by Jacob Marschak. He reviewed the profession's growing understanding of the business cycle, making an analogy with other sciences. Seismology, for example, makes progress through better instruments, improved theories or more frequent earthquakes. In the case of economics, Marschak concluded, "the earthquakes did most of the job."

Economists were deprived of earthquakes for a quarter of a century. The Great Moderation, as this period was called, was not conducive to great macroeconomics. Thanks to the seismic events of the past two years, the prestige of macroeconomists is low, but the potential of their subject is much greater. The furious rows that divide them are a blow to their credibility, but may prove to be a spur to creativity.

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## Financial economics

# Efficiency and beyond

**The efficient-markets hypothesis has underpinned many of the financial industry's models for years. After the crash, what remains of it?**

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IN 1978 Michael Jensen, an American economist, boldly declared that “there is no other proposition in economics which has more solid empirical evidence supporting it than the efficient-markets hypothesis” (EMH). That was quite a claim. The theory's origins went back to the beginning of the century, but it had come to prominence only a decade or so before. Eugene Fama, of the University of Chicago, defined its essence: that the price of a financial asset reflects all available information that is relevant to its value.



Illustration by Brett Ryder

From that idea powerful conclusions were drawn, not least on Wall Street. If the EMH held, then markets would price financial assets broadly correctly. Deviations from equilibrium values could not last for long. If the price of a share, say, was too low, well-informed investors would buy it and make a killing. If it looked too dear, they could sell or short it and make money that way. It also followed that bubbles could not form—or, at any rate, could not last: some wise investor would spot them and pop them. And trying to beat the market was a fool's errand for almost everyone. If the information was out there, it was already in the price.

On such ideas, and on the complex mathematics that described them, was founded the Wall Street profession of financial engineering. The

engineers designed derivatives and securitisations, from simple interest-rate options to ever more intricate credit-default swaps and collateralised debt obligations. All the while, confident in the theoretical underpinnings of their inventions, they reassured any doubters that all this activity was not just making bankers rich. It was making the financial system safer and the economy healthier.

That is why many people view the financial crisis that began in 2007 as a devastating blow to the credibility not only of banks but also of the entire academic discipline of financial economics. That verdict is too simple. Granted, financial economists helped to start the bankers' party, and some joined in with gusto. But even when the EMH still seemed fresh, economists were picking holes in it. A strand of sceptical thought, behavioural economics, has been booming. There are even signs of a synthesis between the EMH and the sceptics. Academia thus moved on, even if Wall Street did not. Nonetheless, the extent to which politicians and regulators trying to reform finance can trust financial economists is an open question.

The EMH, to be sure, has loyal defenders. "There are models, and there are those who use the models," says Myron Scholes, who in 1997 won the Nobel prize in economics for his part in creating the most widely used model in the finance industry—the Black-Scholes formula for pricing options. Mr Scholes thinks much of the blame for the recent woe should be pinned not on economists' theories and models but on those on Wall Street and in the City who pushed them too far in practice.

Financial firms plugged in data that reflected a "view of the world that was far more benign than it was reasonable to take, emphasising recent inputs over more historic numbers," says Mr Scholes.

"Apparently, a lot of the models used for structured products were pretty good, but the inputs were awful." Indeed, the vast majority of derivative contracts and securitisations have performed exactly as their models said they would. It was the exceptions that proved disastrous.

Mr Scholes knows whereof he speaks. Long-Term Capital Management (LTCM), a hedge fund he founded with, among others, Robert Merton, a fellow Nobel laureate, skidded off the road in 1998. Since then, he has been pointing out dangers ignored or underestimated in the finance industry, such as the risk that liquid markets can dry up far faster than is typically assumed. (That did not stop Platinum Grove, the latest hedge fund in which he is involved, taking a big hit during the recent meltdown.)

He has also been “criticising for years” the “value-at-risk” (VAR) models used by institutional investors to work out how much capital they need to set aside as insurance against losses on risky assets. These models mistakenly assume that the volatility of asset prices and the correlations between prices are constant, says Mr Scholes. When, say, two types of asset were assumed to be uncorrelated, investors felt able to hold the same capital as a cushion against losses on both, because they would not lose on both at the same time. However, as Mr Scholes discovered at LTCM and as the entire finance industry has now learnt for itself, at times of market stress assets that normally are uncorrelated can suddenly become highly correlated. At that point the capital buffer implied by VAR turns out to be woefully inadequate.

Even as financial engineers were designing all sorts of clever products on the assumption that markets were efficient, academic economists were focusing more on how markets fall short. Even before the 1987 stockmarket crash gave them their first real-world reminder of markets' capriciousness, some of them were examining the flaws in the theory.

In 1980 Sanford Grossman and Joseph Stiglitz, another subsequent winner of a Nobel prize, pointed out a paradox. If prices reflect all information, then there is no gain from going to the trouble of gathering it, so no one will. A little inefficiency is necessary to give informed investors an incentive to drive prices towards efficiency. For Mr Scholes, it is the belief that markets tend to return prices to their efficient equilibrium when they move away from it that gives the EMH its continuing relevance.

Economists also began to study “institutional frictions” in markets. For instance, the EMH's devotees had assumed that smart investors would be able to trade against less well-informed “noise traders” and overwhelm them by driving prices to reflect true value. But it became clear that there were limits to their ability to arbitrage folly away. Andrei Shleifer, a Harvard economist, among others, pointed out that it could be too costly for informed investors to borrow enough to bet against the noise traders. Once it is admitted that prices can move away from fundamentals for a long time, informed investors may do best by riding the trend rather than fighting it. The trick then is to get out just before momentum shifts the other way. But in this world, rational investors may contribute to bubbles rather than preventing them.

In the early years of the EMH, researchers spent little time worrying about the workings of financial institutions—a weakness of



macroeconomics too. In 2000, in his presidential address to the American Finance Association, Franklin Allen, of the University of Pennsylvania's Wharton School, asked: "Do financial institutions matter?" Lay people, he said, "might be surprised to learn that institutions play little role in financial theory." Indeed they might. Mr Allen's explanation was partly that the dominant theories had been shaped at a time when America, especially, was spared financial crises.

In the past decade or so, financial economists have been paying more attention to institutional questions, such as how bankers should be paid. Many of these researchers broadly accept the EMH, but see their role as uncovering sources of inefficiency that can be addressed to make markets more efficient.

However, a second branch of financial economics is far more sceptical about markets' inherent rationality. Behavioural economics, which applies the insights of psychology to finance, has boomed in the past decade. In particular, behavioural economists have argued that human beings tend to be too confident of their own abilities and tend to extrapolate recent trends into the future, a combination that may contribute to bubbles. There is also evidence that losses can make investors extremely, irrationally risk-averse—exaggerating price falls when a bubble bursts.

Behavioural economists were among the first to sound the alarm about trouble in the markets. Notably, Robert Shiller of Yale gave an early warning that America's housing market was dangerously overvalued. This was his second prescient call. In the 1990s his concerns about the bubblyness of the stockmarket had prompted Alan Greenspan, then chairman of the Federal Reserve, to wonder if the heady share prices of the day were the result of investors' "irrational exuberance". The title of Mr Shiller's latest book, "Animal Spirits" (written with George Akerlof, of the University of California, Berkeley), is taken from John Maynard Keynes's description of the quirky psychological forces shaping markets. It argues that macroeconomics, too, should draw lessons from psychology.

"In some ways, we behavioural economists have won by default, because we have been less arrogant," says Richard Thaler of the University of Chicago, one of the pioneers of behavioural finance.



Illustration by Brett Ryder

Those who denied that prices could get out of line, or ever have bubbles, “look foolish”. Mr Scholes, however, insists that the efficient-market paradigm is not dead: “To say something has failed you have to have something to replace it, and so far we don't have a new paradigm to replace efficient markets.” The trouble with behavioural economics, he adds, is that “it really hasn't shown in aggregate how it affects prices.”

Yet EMH-ers and behaviouralists are increasingly asking the same questions and drawing on each other's ideas. For instance, Mr Thaler concedes that in some ways the events of the past couple of years have strengthened the EMH. The hypothesis has two parts, he says: the “no-free-lunch part and the price-is-right part, and if anything the first part has been strengthened as we have learned that some investment strategies are riskier than they look and it really is difficult to beat the market.” The idea that the market price is the right price, however, has been badly dented.

Mr Thaler also says that only some of the recent problems were behavioural. Many were due to things that are open to non-behavioural economics, “like better risk analysis, how we identify hidden correlations.” It will be no surprise if, thanks to the catalytic power of the bubble and market meltdown, the distinctions between the two camps disappear and a new paradigm emerges.

One economist leading the effort to define that new paradigm is Andrew Lo, of the Massachusetts Institute of Technology, who sees merit in both the rational and behavioural views. He has tried to reconcile them in the “adaptive markets hypothesis”, which supposes that humans are neither fully rational nor psychologically unhinged. Instead, they work by making best guesses and by trial and error. If one investment strategy fails, they try another. If it works, they stick with it. Mr Lo borrows heavily from evolutionary science. He does not see markets as efficient in Mr Fama's sense, but thinks they are fiercely competitive. Because the “ecology” changes over time, people make mistakes when adapting. Old strategies become obsolete and new ones are called for.

The finance industry is in the midst of a transformative period of evolution, and financial economists have a huge agenda to tackle. They should do so quickly, given the determination of politicians to overhaul the regulation of financial markets.

One task, also of interest to macroeconomists, is to work out what

central bankers should do about bubbles—now that it is plain that they do occur and can cause great damage when they burst. Not even behaviouralists such as Mr Thaler would want to see, say, the Fed trying to set prices in financial markets. He does see an opportunity, however, for governments to “lean into the wind a little more” to reduce the volatility of bubbles and crashes. For instance, when guaranteeing home loans, Freddie Mac and Fannie Mae, America's giant mortgage companies, could be required to demand higher down-payments as a proportion of the purchase price, the higher house prices are relative to rents.

Another priority is to get a better understanding of systemic risk, which Messrs Scholes and Thaler agree has been seriously underestimated. A lot of risk-managers in financial firms believed their risk was perfectly controlled, says Mr Scholes, “but they needed to know what everyone else was doing, to see the aggregate picture.” It turned out that everyone was doing very similar things. So when their VAR models started telling them to sell, they all did—driving prices down further and triggering further model-driven selling.

Several countries now expect to introduce a systemic-risk regulator. Financial economists may have useful advice to offer. Many of them see information as crucial. Data should be collected from individual firms and aggregated. The overall data should then be published. That would be better, they think, than a system based solely on the micromanagement of individual institutions deemed systemically significant. Mr Scholes favours relying less on VAR to calculate capital reserves against losses. Instead, each category of asset should have its own risk-capital reserves, which could not be shared with other assets, even if prices had not been correlated in the past. As experience shows, correlations can change suddenly.

Financial economists also need better theories of why liquid markets suddenly become illiquid and of how to manage the risk of “moral hazard”—the danger that the existence of government regulation and safety nets encourages market participants to take bigger risks than they might otherwise have done. The sorry consequences of letting Lehman Brothers fail, which was intended to discourage moral hazard, showed that the middle of a crisis is not the time to get tough. But when is?

Mr Lo has a novel idea for future crises: creating a financial equivalent of the National Transport Safety Board, which investigates every civil-aviation crash in America. He would like similar independent, after-

the-fact scrutiny of every financial failure, to see what caused it and what lessons could be learned. Not the least of the difficulties in the continuing crisis is working out exactly what went wrong and why—and who, including financial economists, should take the blame.

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