

The
Economist



Economics briefs

Six big ideas

Six big economic ideas

A collection of briefs on the discipline's seminal papers

IT IS easy enough to criticise economists: too superior, too blinkered, too often wrong. Paul Samuelson, one of the discipline's great figures, once lampooned stockmarkets for predicting nine out of the last five recessions. Economists, in contrast, barely ever see downturns coming. They failed to predict the 2007-08 financial crisis.

Yet this is not the best test of success. Much as doctors understand diseases but cannot predict when you will fall ill, economists' fundamental mission is not to forecast recessions but to explain how the world works. During the summer of 2016, *The Economist* ran a series of briefs on important economic theories that did just that—from the Nash equilibrium, a cornerstone of game theory, to the Mundell-Fleming trilemma, which lays bare the trade-offs countries face in their management of capital flows, exchange rates and monetary policy; from the financial-instability hypothesis of Hyman Minsky to the insights of Samuelson and Wolfgang Stolper on trade and wages; from John Maynard Keynes's thinking on the fiscal multiplier to George Akerlof's work on information asymmetry. We have assembled these articles into this collection.

The six breakthroughs are adverts not just for the value of economics, but also for three other things: theory, maths and outsiders. More than ever, economics today is an empirical discipline. But theory remains vital. Many policy failures might have been avoided if theoretical insights had been properly applied. The trilemma was outlined in the 1960s, and the fiscal multiplier dates back to the 1930s; both illuminate the current struggles of the euro zone and the sometimes self-defeating pursuit of austerity. Nor is the body of economic theory complete. From "secular stagnation" to climate change, the discipline needs big thinkers as well as big data.

It also needs mathematics. Economic papers are far too formulaic; models should be a means, not an end. But the symbols do matter. The job of economists is to impose mathematical rigour on intuitions about markets, economies and people. Maths was needed to formalise most of the ideas in our briefs.

In economics, as in other fields, a fresh eye can also make a big difference. New ideas often meet resistance. Mr Akerlof's paper was rejected by several journals, one on the ground that if it was correct, "economics would be different". Recognition came slowly for many of our theories: Minsky stayed in relative obscurity until his death, gaining superstar status only once the financial crisis hit. Economists still tend to look down on outsiders. Behavioural economics has broken down one silo by incorporating insights from psychology. More need to disappear: like anthropologists, economists should think more about how individuals' decision-making relates to social mores; like physicists, they should study instability instead of assuming that economies naturally self-correct.

The
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to take part in "a severe contest between intelligence, which presses forward, and an unworthy, timid ignorance obstructing our progress."

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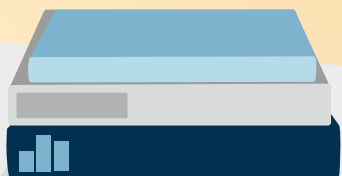
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Information asymmetry

Secrets and agents

George Akerlof's 1970 paper, "The Market for Lemons", is a foundation stone of information economics. The first in our series on seminal economic ideas

IN 2007 the state of Washington introduced a new rule aimed at making the labour market fairer: firms were banned from checking job applicants' credit scores. Campaigners celebrated the new law as a step towards equality—an applicant with a low credit score is much more likely to be poor, black or young. Since then, ten other states have followed suit. But when Robert Clifford and Daniel Shoag, two economists, recently studied the bans, they found that the laws left blacks and the young with fewer jobs, not more.

Before 1970, economists would not have found much in their discipline to help them mull this puzzle. Indeed, they did not think very hard about the role of information at all. In the labour market, for example, the textbooks mostly assumed that employers know the productivity of their workers—or potential workers—and, thanks to competition, pay them for exactly the value of what they produce.

You might think that research upending that conclusion would immediately be celebrated as an important breakthrough. Yet when, in the late 1960s, George Akerlof wrote "The Market for Lemons", which did

just that, and later won its author a Nobel prize, the paper was rejected by three leading journals. At the time, Mr Akerlof was an assistant professor at the University of California, Berkeley; he had only completed his PhD, at MIT, in 1966. Perhaps as a result, the American Economic Review thought his paper's insights trivial. The Review of Economic Studies agreed. The Journal of Political Economy had almost the opposite concern: it could not stomach the paper's implications. Mr Akerlof, now an emeritus professor at Berkeley and married to Janet Yellen, the chairman of the Federal Reserve, recalls the editor's complaint: "If this is correct, economics would be different."

In a way, the editors were all right. Mr Akerlof's idea, eventually published in the Quarterly Journal of Economics in 1970, was at once simple and revolutionary. Suppose buyers in the used-car market value good cars—"peaches"—at \$1,000, and sellers at slightly less. A malfunctioning used car—a "lemon"—is worth only \$500 to buyers (and, again, slightly less to sellers). If buyers can tell lemons and peaches apart, trade in both will flourish. In reality, buy-

ers might struggle to tell the difference: scratches can be touched up, engine problems left undisclosed, even odometers tampered with.

To account for the risk that a car is a lemon, buyers cut their offers. They might be willing to pay, say, \$750 for a car they perceive as having an even chance of being a lemon or a peach. But dealers who know for sure they have a peach will reject such an offer. As a result, the buyers face "adverse selection": the only sellers who will be prepared to accept \$750 will be those who know they are offloading a lemon.

Smart buyers can foresee this problem. Knowing they will only ever be sold a lemon, they offer only \$500. Sellers of lemons end up with the same price as they would have done were there no ambiguity. But peaches stay in the garage. This is a tragedy: there are buyers who would happily pay the asking-price for a peach, if only they could be sure of the car's quality. This "information asymmetry" between buyers and sellers kills the market.

Is it really true that you can win a Nobel prize just for observing that some people in markets know more than others? That was the question one journalist asked of Michael Spence, who, along with Mr Akerlof and Joseph Stiglitz, was a joint recipient of the 2001 Nobel award for their work on information asymmetry. His incredulity was understandable. The lemons paper was not even an accurate description of the used-car market: clearly not every used car sold is a dud. And insurers had long recognised that their customers might be the best judges of what risks they faced, and that those keenest to buy insurance were probably the riskiest bets.

Yet the idea was new to mainstream economists, who quickly realised that it made many of their models redundant. Further breakthroughs soon followed, as researchers examined how the asymmetry problem could be solved. Mr Spence's flagship contribution was a 1973 paper called "Job Market Signalling" that looked at the labour market. Employers may struggle to tell which job candidates are best. Mr Spence showed that top workers might signal their talents to firms by collecting gongs, like college degrees. Crucially, this only works if the signal is credible: if low-productivity workers found it easy to get a degree, then they could masquerade as clever types.

This idea turns conventional wisdom on its head. Education is usually thought to benefit society by making workers more productive. If it is merely a signal of talent, the returns to investment in education flow to the students, who earn a higher wage at the expense of the less able, and perhaps to universities, but not ▶▶

► to society at large. One disciple of the idea, Bryan Caplan of George Mason University, is currently penning a book entitled “The Case Against Education”. (Mr Spence himself regrets that others took his theory as a literal description of the world.)

Signalling helps explain what happened when Washington and those other states stopped firms from obtaining job-applicants’ credit scores. Credit history is a credible signal: it is hard to fake, and, presumably, those with good credit scores are more likely to make good employees than those who default on their debts. Messrs Clifford and Shoag found that when firms could no longer access credit scores, they put more weight on other signals, like education and experience. Because these are rarer among disadvantaged groups, it became harder, not easier, for them to convince employers of their worth.

Signalling explains all kinds of behaviour. Firms pay dividends to their shareholders, who must pay income tax on the payouts. Surely it would be better if they retained their earnings, boosting their share prices, and thus delivering their shareholders lightly taxed capital gains? Signalling solves the mystery: paying a dividend is a sign of strength, showing that a firm feels no need to hoard cash. By the same token, why might a restaurant deliberately locate in an area with high rents? It signals to potential customers that it believes its good food will bring it success.

Signalling is not the only way to overcome the lemons problem. In a 1976 paper Mr Stiglitz and Michael Rothschild, another economist, showed how insurers might “screen” their customers. The essence of screening is to offer deals which would only ever attract one type of punter.

Suppose a car insurer faces two different types of customer, high-risk and low-risk. They cannot tell these groups apart; only the customer knows whether he is a safe driver. Messrs Rothschild and Stiglitz showed that, in a competitive market, insurers cannot profitably offer the same deal to both groups. If they did, the premiums of safe drivers would subsidise payouts to reckless ones. A rival could offer a deal with slightly lower premiums, and slightly less coverage, which would peel away only safe drivers because risky ones prefer to stay fully insured. The firm, left only with bad risks, would make a loss. (Some worried a related problem would afflict Obamacare, which forbids American health insurers from discriminating against customers who are already unwell: if the resulting high premiums were to deter healthy, young customers from signing up, firms might have to raise premiums further, driving more healthy customers away in a so-called “death spiral”.)

The car insurer must offer two deals,

making sure that each attracts only the customers it is designed for. The trick is to offer one pricey full-insurance deal, and an alternative cheap option with a sizeable deductible. Risky drivers will balk at the deductible, knowing that there is a good chance they will end up paying it when they claim. They will fork out for expensive coverage instead. Safe drivers will tolerate the high deductible and pay a lower price for what coverage they do get.

This is not a particularly happy resolution of the problem. Good drivers are stuck with high deductibles—just as in Spence’s model of education, highly productive workers must fork out for an education in order to prove their worth. Yet screening is in play almost every time a firm offers its customers a menu of options.

Airlines, for instance, want to milk rich customers with higher prices, without driving away poorer ones. If they knew the depth of each customer’s pockets in advance, they could offer only first-class tickets to the wealthy, and better-value tickets to everyone else. But because they must offer everyone the same options, they must nudge those who can afford it towards the pricier ticket. That means deliberately making the standard cabin uncomfortable, to ensure that the only people who slum it are those with slimmer wallets.

Hazard undercuts Eden

Adverse selection has a cousin. Insurers have long known that people who buy insurance are more likely to take risks. Someone with home insurance will check their smoke alarms less often; health insurance encourages unhealthy eating and drinking. Economists first cottoned on to this phenomenon of “moral hazard” when Kenneth Arrow wrote about it in 1963.

Moral hazard occurs when incentives

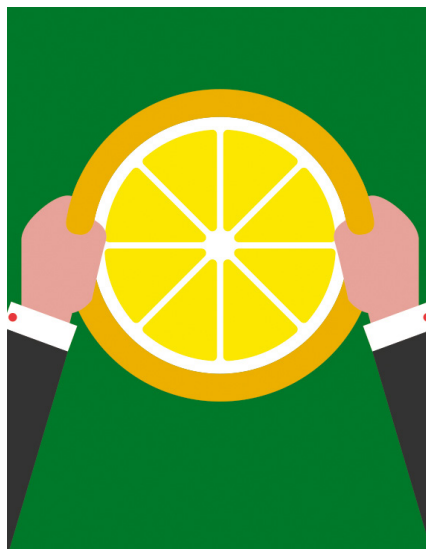
go haywire. The old economics, noted Mr Stiglitz in his Nobel-prize lecture, paid considerable lip-service to incentives, but had remarkably little to say about them. In a completely transparent world, you need not worry about incentivising someone, because you can use a contract to specify their behaviour precisely. It is when information is asymmetric and you cannot observe what they are doing (is your tradesman using cheap parts? Is your employee slacking?) that you must worry about ensuring that interests are aligned.

Such scenarios pose what are known as “principal-agent” problems. How can a principal (like a manager) get an agent (like an employee) to behave how he wants, when he cannot monitor them all the time? The simplest way to make sure that an employee works hard is to give him some or all of the profit. Hairdressers, for instance, will often rent a spot in a salon and keep their takings for themselves.

But hard work does not always guarantee success: a star analyst at a consulting firm, for example, might do stellar work pitching for a project that nonetheless goes to a rival. So, another option is to pay “efficiency wages”. Mr Stiglitz and Carl Shapiro, another economist, showed that firms might pay premium wages to make employees value their jobs more highly. This, in turn, would make them less likely to shirk their responsibilities, because they would lose more if they were caught and got fired. That insight helps to explain a fundamental puzzle in economics: when workers are unemployed but want jobs, why don’t wages fall until someone is willing to hire them? An answer is that above-market wages act as a carrot, the resulting unemployment, a stick.

And this reveals an even deeper point. Before Mr Akerlof and the other pioneers of information economics came along, the discipline assumed that in competitive markets, prices reflect marginal costs: charge above cost, and a competitor will undercut you. But in a world of information asymmetry, “good behaviour is driven by earning a surplus over what one could get elsewhere,” according to Mr Stiglitz. The wage must be higher than what a worker can get in another job, for them to want to avoid the sack; and firms must find it painful to lose customers when their product is shoddy, if they are to invest in quality. In markets with imperfect information, price cannot equal marginal cost.

The concept of information asymmetry, then, truly changed the discipline. Nearly 50 years after the lemons paper was rejected three times, its insights remain of crucial relevance to economists, and to economic policy. Just ask any young, black Washingtonian with a good credit score who wants to find a job. ■





Financial stability

Minsky's moment

The second article in our series on seminal economic ideas looks at Hyman Minsky's hypothesis that booms sow the seeds of busts

FROM the start of his academic career in the 1950s until 1996, when he died, Hyman Minsky laboured in relative obscurity. His research about financial crises and their causes attracted a few devoted admirers but little mainstream attention: this newspaper cited him only once while he was alive, and it was but a brief mention. So it remained until 2007, when the subprime-mortgage crisis erupted in America. Suddenly, it seemed that everyone was turning to his writings as they tried to make sense of the mayhem. Brokers wrote notes to clients about the “Minsky moment” engulfing financial markets. Central bankers referred to his theories in their speeches. And he became a posthumous media star, with just about every major outlet giving column space and airtime to his ideas. The Economist has mentioned him in at least 30 articles since 2007.

If Minsky remained far from the limelight throughout his life, it is at least in part because his approach shunned academic conventions. He started his university education in mathematics but made little use of calculations when he shifted to economics, despite the discipline's grow-

ing emphasis on quantitative methods. Instead, he pieced his views together in his essays, lectures and books, including one about John Maynard Keynes, the economist who most influenced his thinking. He also gained hands-on experience, serving on the board of Mark Twain Bank in St Louis, Missouri, where he taught.

Having grown up during the Depression, Minsky was minded to dwell on disaster. Over the years he came back to the same fundamental problem again and again. He wanted to understand why financial crises occurred. It was an unpopular focus. The dominant belief in the latter half of the 20th century was that markets were efficient. The prospect of a full-blown calamity in developed economies sounded far-fetched. There might be the occasional stockmarket bust or currency crash, but modern economies had, it seemed, vanquished their worst demons.

Against those certitudes, Minsky, an owlish man with a shock of grey hair, developed his “financial-instability hypothesis”. It is an examination of how long stretches of prosperity sow the seeds of the next crisis, an important lens for un-

derstanding the tumult of the past decade. But the history of the hypothesis itself is just as important. Its trajectory from the margins of academia to a subject of mainstream debate shows how the study of economics is adapting to a much-changed reality since the global financial crisis.

Minsky started with an explanation of investment. It is, in essence, an exchange of money today for money tomorrow. A firm pays now for the construction of a factory; profits from running the facility will, all going well, translate into money for it in coming years. Put crudely, money today can come from one of two sources: the firm's own cash or that of others (for example, if the firm borrows from a bank). The balance between the two is the key question for the financial system.

Minsky distinguished between three kinds of financing. The first, which he called “hedge financing”, is the safest: firms rely on their future cashflow to repay all their borrowings. For this to work, they need to have very limited borrowings and healthy profits. The second, speculative financing, is a bit riskier: firms rely on their cashflow to repay the interest on their borrowings but must roll over their debt to repay the principal. This should be manageable as long as the economy functions smoothly, but a downturn could cause distress. The third, Ponzi financing, is the most dangerous. Cashflow covers neither principal nor interest; firms are betting only that the underlying asset will appreciate by enough to cover their liabilities. If that fails to happen, they will be left exposed.

Economies dominated by hedge financing—that is, those with strong cashflows and low debt levels—are the most stable. When speculative and, especially, Ponzi financing come to the fore, financial systems are more vulnerable. If asset values start to fall, either because of monetary tightening or some external shock, the most overstretched firms will be forced to sell their positions. This further undermines asset values, causing pain for even more firms. They could avoid this trouble by restricting themselves to hedge financing. But over time, particularly when the economy is in fine fettle, the temptation to take on debt is irresistible. When growth looks assured, why not borrow more? Banks add to the dynamic, lowering their credit standards the longer booms last. If defaults are minimal, why not lend more? Minsky's conclusion was unsettling. Economic stability breeds instability. Periods of prosperity give way to financial fragility.

With overleveraged banks and no-money-down mortgages still fresh in the mind after the global financial crisis, Minsky's insight might sound obvious. Of course, debt and finance matter. But for ▶▶

► decades the study of economics paid little heed to the former and relegated the latter to a sub-discipline, not an essential element in broader theories. Minsky was a maverick. He challenged both the Keynesian backbone of macroeconomics and a prevailing belief in efficient markets.

It is perhaps odd to describe his ideas as a critique of Keynesian doctrine when Minsky himself idolised Keynes. But he believed that the doctrine had strayed too far from Keynes's own ideas. Economists had created models to put Keynes's words to work in explaining the economy. None is better known than the IS-LM model, largely developed by John Hicks and Alvin Hansen, which shows the relationship between investment and money. It remains a potent tool for teaching and for policy analysis. But Messrs Hicks and Hansen largely left the financial sector out of the picture, even though Keynes was keenly aware of the importance of markets. To Minsky, this was an "unfair and naive representation of Keynes's subtle and sophisticated views". Minsky's financial-instability hypothesis helped fill in the holes.

His challenge to the prophets of efficient markets was even more acute. Eugene Fama and Robert Lucas, among others, persuaded most of academia and policymaking circles that markets tended towards equilibrium as people digested all available information. The structure of the financial system was treated as almost irrelevant. In recent years, behavioural economists have attacked one plank of efficient-market theory: people, far from being rational actors who maximise their gains, are often clueless about what they want and make the wrong decisions. But years earlier Minsky had attacked another: deep-seated forces in financial systems propel them towards trouble, he argued, with stability only ever a fleeting illusion.

Outside-in

Yet as an outsider in the sometimes cloistered world of economics, Minsky's influence was, until recently, limited. Investors were faster than professors to latch onto his views. More than anyone else it was Paul McCulley of PIMCO, a fund-management group, who popularised his ideas. He coined the term "Minsky moment" to describe a situation when debt levels reach breaking-point and asset prices across the board start plunging. Mr McCulley initially used the term in explaining the Russian financial crisis of 1998. Since the global turmoil of 2008, it has become ubiquitous. For investment analysts and fund managers, a "Minsky moment" is now virtually synonymous with a financial crisis.

Minsky's writing about debt and the dangers in financial innovation had the great virtue of according with experience.

But this virtue also points to what some might see as a shortcoming. In trying to paint a more nuanced picture of the economy, he relinquished some of the potency of elegant models. That was fine as far as he was concerned; he argued that generalisable theories were bunkum. He wanted to explain specific situations, not economics in general. He saw the financial-instability hypothesis as relevant to the case of advanced capitalist economies with deep, sophisticated markets. It was not meant to be relevant in all scenarios. These days, for example, it is fashionable to ask whether China is on the brink of a Minsky moment after its alarming debt growth of the past decade. Yet a country in transition from socialism to a market economy and with an immature financial system is not what Minsky had in mind.

Shunning the power of equations and models had its costs. It contributed to Minsky's isolation from mainstream theories. Economists did not entirely ignore debt, even if they studied it only sparingly. Some, such as Nobuhiro Kiyotaki and Ben Bernanke, who would later become chairman of the Federal Reserve, looked at how credit could amplify business cycles. Minsky's work might have complemented theirs, but they did not refer to it. It was as if it barely existed.

Since Minsky's death, others have started to correct the oversight, grafting his theories onto general models. The Levy Economics Institute of Bard College in New York, where he finished his career (it still holds an annual conference in his honour), has published work that incorpo-

rates his ideas in calculations. One Levy paper, published in 2000, developed a Minsky-inspired model linking investment and cashflow. A 2005 paper for the Bank for International Settlements, a forum for central banks, drew on Minsky in building a model of how people assess their assets after making losses. In 2010 Paul Krugman, a Nobel prize-winning economist who is best known these days as a New York Times columnist, co-authored a paper that included the concept of a "Minsky moment" to model the impact of deleveraging on the economy. Some researchers are also starting to test just how accurate Minsky's insights really were: a 2014 discussion paper for the Bank of Finland looked at debt-to-cashflow ratios, finding them to be a useful indicator of systemic risk.

Debtor's prism

Still, it would be a stretch to expect the financial-instability hypothesis to become a new foundation for economic theory. Minsky's legacy has more to do with focusing on the right things than correctly structuring quantifiable models. It is enough to observe that debt and financial instability, his main preoccupations, have become some of the principal topics of inquiry for economists today. A new version of the "Handbook of Macroeconomics", an influential survey that was first published in 1999, is in the works. This time, it will make linkages between finance and economic activity a major component, with at least two articles citing Minsky. As Mr Krugman has quipped: "We are all Minskyites now."

Central bankers seem to agree. In a speech in 2009, before she became head of the Federal Reserve, Janet Yellen said Minsky's work had "become required reading". In a 2013 speech, made while he was governor of the Bank of England, Mervyn King agreed with Minsky's view that stability in credit markets leads to exuberance and eventually to instability. Mark Carney, Lord King's successor, has referred to Minsky moments on at least two occasions.

Will the moment last? Minsky's own theory suggests it will eventually peter out. Economic growth is still shaky and the scars of the global financial crisis visible. In the Minskyan trajectory, this is when firms and banks are at their most cautious, wary of repeating past mistakes and determined to fortify their balance-sheets. But in time, memories of the 2008 turmoil will dim. Firms will again race to expand, banks to fund them and regulators to loosen constraints. The warnings of Minsky will fade away. The further we move on from the last crisis, the less we want to hear from those who see another one coming. ■





Tariffs and wages

An inconvenient iota of truth

The third in our series looks at the Stolper-Samuelson theorem

IN AUGUST 1960 Wolfgang Stolper, an American economist working for Nigeria's development ministry, embarked on a tour of the country's poor northern region, a land of "dirt and dignity", long ruled by conservative emirs and "second-rate British civil servants who didn't like business".

In this bleak commercial landscape one strange flower bloomed: Kaduna Textile Mills, built by a Lancashire firm a few years before, employed 1,400 people paid as little as £4.80 (\$6.36) a day in today's prices. And yet it required a 90% tariff to compete.

Skilled labour was scarce: the mill had found only six northerners worth training as foremen (three failed, two were "so-so", one was "superb"). Some employees walked ten miles to work, others carried the hopes of mendicant relatives on their backs. Many quit, adding to the cost of finding and training replacements. Those who stayed were often too tired, inexperienced or ill-educated to maintain the machines properly. "African labour is the worst paid and most expensive in the world," Stolper complained.

He concluded that Nigeria was not yet ready for large-scale industry. "Any indus-

try which required high duties impoverished the country and wasn't worth having," he believed. This was not a popular view among his fellow planners. But Stolper's ideas carried unusual weight. He was a successful schmoozer, able to drink like a fish. He liked "getting his hands dirty" in empirical work. And his trump card, which won him the respect of friends and the ear of superiors, was the "Stolper-Samuelson theorem" that bore his name.

The theorem was set out 20 years earlier in a seminal paper, co-authored by Paul Samuelson, one of the most celebrated thinkers in the discipline. It shed new light on an old subject: the relationship between tariffs and wages. Its fame and influence were pervasive and persistent, preceding Stolper to Nigeria and outlasting his death, in 2002, at the age of 89. Even today, the theorem is shaping debates on trade agreements like the Trans-Pacific Partnership (TPP) between America and 11 other Pacific-rim countries.

The paper was "remarkable", according to Alan Deardorff of the University of Michigan, partly because it proved something seemingly obvious to non-econo-

mists: free trade with low-wage nations could hurt workers in a high-wage country. This commonsensical complaint had traditionally cut little ice with economists. They pointed out that poorly paid labour is not necessarily cheap, because low wages often reflect poor productivity—as Kaduna Textile Mills showed. The Stolper-Samuelson theorem, however, found "an iota of possible truth" (as Samuelson put it later) in the hoary argument that workers in rich countries needed protection from "pauper labour" paid a pittance elsewhere.

To understand why the theorem made a splash, it helps to understand the pool of received wisdom it disturbed. Economists had always known that tariffs helped the industries sheltered by them. But they were equally adamant that free trade benefited countries as a whole. David Ricardo showed in 1817 that a country could benefit from trade even if it did everything better than its neighbours. A country that is better at everything will still be "most better", so to speak, at something. It should concentrate on that, Ricardo showed, importing what its neighbours do "least worse".

If bad grammar is not enough to make the point, an old analogy might. Suppose that the best lawyer in town is also the best typist. He takes only ten minutes to type a document that his secretary finishes in 20. In that sense, typing costs him less. But in the time he spent typing he could have been lawyering. And he could have done vastly more legal work than his secretary could do, even in twice the time. In that sense typing costs him far more. It thus pays the fast-typing lawyer to specialise in legal work and "import" typing.

In Ricardo's model, the same industry can require more labour in one country than in another. Such differences in labour requirements are one motivation for trade. Another is differences in labour supplies. In some nations, such as America, labour is scarce relative to the amount of land, capital or education the country has accumulated. In others the reverse is true. Countries differ in their mix of labour, land, capital, skill and other "factors of production". In the 1920s and 1930s Eli Heckscher and his student, Bertil Ohlin, pioneered a model of trade driven by these differences.

In their model, trade allowed countries like America to economise on labour, by concentrating on capital-intensive activities that made little use of it. Industries that required large amounts of elbow grease could be left to foreigners. In this way, trade alleviated labour scarcity.

That was good for the country, but was it good for workers? Scarcity is a source of value. If trade eased workers' rarity value, it would also erode their bargaining power. ▶▶

► It was quite possible that free trade might reduce workers' share of the national income. But since trade would also enlarge that income, it should still leave workers better off, most economists felt. Moreover, even if foreign competition depressed "nominal" wages, it would also reduce the price of importable goods. Depending on their consumption patterns, workers' purchasing power might then increase, even if their wages fell.

Working hypothesis

There were other grounds for optimism. Labour, unlike oil, arable land, blast furnaces and many other productive resources, is required in every industry. Thus no matter how a country's industrial mix evolves, labour will always be in demand. Over time, labour is also versatile and adaptable. If trade allows one industry to expand and obliges another to contract, new workers will simply migrate towards the sunlit industrial uplands and turn their backs on the sunset sectors. "In the long run the working class as a whole has nothing to fear from international trade," concluded Gottfried Haberler, an Austrian economist, in 1936.

Stolper was not so sure. He felt that Ohlin's model disagreed with Haberler even if Ohlin himself was less clear-cut. Stolper shared his doubts with Samuelson, his young Harvard colleague. "Work it out, Wolfie," Samuelson urged.

The pair worked it out first with a simple example: a small economy blessed with abundant capital (or land), but scarce labour, making watches and wheat. Subsequent economists have clarified the intuition underlying their model. In one telling, watchmaking (which is labour-intensive) benefits from a 10% tariff. When the tariff is repealed, watch prices fall by a similar amount. The industry, which can no longer break even, begins to lay off workers and vacate land. When the dust settles, what happens to wages and land rents? A layman might assume that both fall by 10%, returning the watchmakers to profit. A clever layman might guess instead that rents will fall by less than wages, because the shrinkage of watchmaking releases more labour than land.

Both would be wrong, because both ignore what is going on in the rest of the economy. In particular, wheat prices have not fallen. Thus if wages and rents both decrease, wheat growers will become unusually profitable and expand. Since they require more land than labour, their expansion puts more upward pressure on rents than on wages. At the same time, the watch industry's contraction puts more downward pressure on wages than on rents. In the push and pull between the two industries, wages fall disproportion-

ately—by more than 10%—while rents, paradoxically, rise a little.

This combination of slightly pricier land and much cheaper labour restores the *modus vivendi* between the two industries, halting the watchmakers' contraction and the wheat-farmers' expansion. Because the farmers need more land than labour, slightly higher rents deter them as forcefully as much lower wages attract them. The combination also restores the profits of the watchmakers, because the much cheaper labour helps them more than the slightly pricier land hurts them.

The upshot is that wages have fallen by more than watch prices, and rents have actually risen. It follows that workers are unambiguously worse off. Their versatility will not save them. Nor does it matter what mix of watches and wheat they buy.

Stolper, Samuelson and their successors subsequently extended the theorem to more complicated cases, albeit with some loss of crispness. One popular variation is to split labour into two—skilled and unskilled. That kind of distinction helps shed light on what Stolper later witnessed in Nigeria, where educated workers were vanishingly rare. With a 90% tariff, Kaduna Textile Mills could afford to train local foremen and hire technicians. Without it, Nigeria would probably have imported textiles from Lancashire instead. Free trade would thus have hurt the "scarce" factor.

In rich countries, skilled workers are abundant by international standards and unskilled workers are scarce. As globalisation has advanced, college-educated workers have enjoyed faster wage gains than their less educated countrymen, many of whom have suffered stagnant real earnings. On the face of it, this wage pattern

is consistent with the Stolper-Samuelson theorem. Globalisation has hurt the scarce "factor" (unskilled labour) and helped the abundant one.

But look closer and puzzles remain. The theorem is unable to explain why skilled workers have prospered even in developing countries, where they are not abundant. Its assumption that every country makes everything—both watches and wheat—may also overstate trade's dangers. In reality, countries will import some things they no longer produce and others they never made. Imports cannot hurt a local industry that never existed (nor keep hurting an industry that is already dead).

Some of the theorem's other premises are also questionable. Its assumption that workers will move from one industry to another can blind it to the true source of their hardship. Chinese imports have not squeezed American manufacturing workers into less labour-intensive industries; they have squeezed them out of the labour force altogether, according to David Autor of the Massachusetts Institute of Technology and his co-authors. The "China shock", they point out, was concentrated in a few hard-hit manufacturing localities from which workers struggled to escape. Thanks to globalisation, goods now move easily across borders. But workers move uneasily even within them.

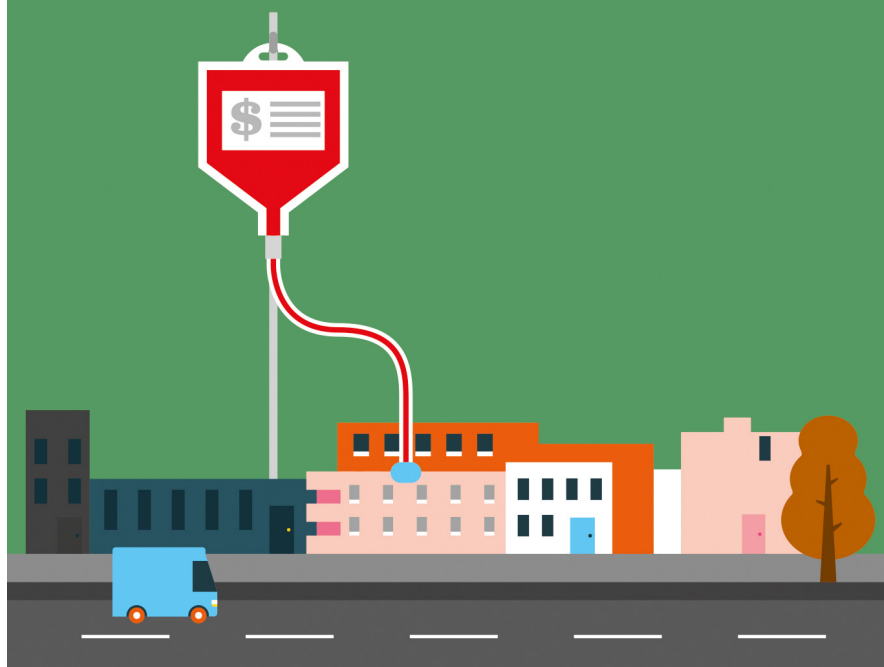
Grain men

Acclaim for the Stolper-Samuelson theorem was not instant or universal. The original paper was rejected by the *American Economic Review*, whose editors described it as "a very narrow study in formal theory". Even Samuelson's own textbook handled the proposition gingerly. After acknowledging that free trade could leave American workers worse off, he added a health warning: "Although admitting this as a slight theoretical possibility, most economists are still inclined to think that its grain of truth is outweighed by other, more realistic considerations," he wrote.

What did Stolper think? A veteran of economic practice as well as principles, he was not a slave to formalism or blind to "realistic considerations". Indeed, in Nigeria, Stolper discovered that he could "suspend theory" more easily than some of his politically minded colleagues (perhaps because theory was revealed to them, but written by him).

He was nonetheless sure that his paper was worth the fuss. He said he would give his left eye to produce another one like it. By the paper's 50th anniversary, he had indeed lost the use of that eye, he pointed out wistfully. The other side of the bargain was, however, left unfulfilled: he never did write another paper as good. Not many people have. ■





Fiscal multipliers

Where does the buck stop?

Fiscal stimulus, an idea championed by John Maynard Keynes, has gone in and out of fashion

AT THE height of the euro crisis, with government-bond yields soaring in several southern European countries and defaults looming, the European Central Bank and the healthier members of the currency club fended off disaster by offering bail-outs. But these came with conditions, most notably strict fiscal discipline, intended to put government finances back on a sustainable footing. Some economists argued that painful budget cuts were an unfortunate necessity. Others said that the cuts might well prove counterproductive, by lowering growth and therefore government revenues, leaving the affected countries even poorer and more indebted.

In 2013 economists at the IMF rendered their verdict on these austerity programmes: they had done far more economic damage than had been initially predicted, including by the fund itself. What had the IMF got wrong when it made its earlier, more sanguine forecasts? It had dramatically underestimated the fiscal multiplier.

The multiplier is a simple, powerful and hotly debated idea. It is a critical element of Keynesian macroeconomics. Over the

past 80 years the significance it has been accorded has fluctuated wildly. It was once seen as a matter of fundamental importance, then as a discredited notion. It is now back in vogue again.

The idea of the multiplier emerged from the intense argument over how to respond to the Depression. In the 1920s Britain had sunk into an economic slump. The first world war had left prices higher and the pound weaker. The government was nonetheless determined to restore the pound to its pre-war value. In doing so, it kept monetary policy too tight, initiating a spell of prolonged deflation and economic weakness. The economists of the day debated what might be done to improve conditions for suffering workers. Among the suggestions was a programme of public investment which, some thought, would put unemployed Britons to work.

The British government would countenance no such thing. It espoused the conventional wisdom of the day—what is often called the “Treasury view”. It believed that public spending, financed through borrowing, would not boost overall economic activity, because the supply of savings in the

economy available for borrowing is fixed. If the government commandeered capital to build new roads, for instance, it would simply be depriving private firms of the same amount of money. Higher spending and employment in one part of the economy would come at the expense of lower spending and employment in another.

As the world slipped into depression, however, and Britain’s economic crisis deepened, the voices questioning this view grew louder. In 1931 Baron Kahn, a British economist, published a paper espousing an alternative theory: that public spending would yield both the primary boost from the direct spending, but also “beneficial repercussions”. If road-building, for instance, took workers off the dole and led them to increase their own spending, he argued, then there might be a sustained rise in total employment as a result.

Kahn’s paper was in line with the thinking of John Maynard Keynes, the leading British economist of the day, who was working on what would become his masterpiece, “The General Theory of Employment, Interest and Money”. In it, Keynes gave a much more complete account of how the multiplier might work, and how it might enable a government to drag a slumping economy back to health.

Keynes was a singular character, and one of the great thinkers of the 20th century. He looked every inch a patrician figure, with his tweed suits and walrus moustache. Yet he was also a free spirit by the standards of the day, associating with the artists and writers of the Bloomsbury Group, whose members included Virginia Woolf and E.M. Forster. Keynes advised the government during the first world war and participated in the Versailles peace conference, which ended up extracting punitive reparations from Germany. The experience was dispiriting for Keynes, who wrote a number of scathing essays in the 1920s, pointing out the risks of the agreement and of the post-war economic system more generally.

Frustrated by his inability to change the minds of those in power, and by a deepening global recession, Keynes set out to write a magnum opus criticising the economic consensus and laying out an alternative. He positioned the “General Theory” as a revolutionary text—and so it proved.

The book is filled with economic insights. Yet its most important contribution is the reasoning behind the proposition that when an economy is operating below full employment, demand rather than supply determines the level of investment and national income. Keynes supposed there was a “multiplier effect” from changes in investment spending. A bit of additional money spent by the govern- ▶▶

ment, for instance, would add directly to a nation's output (and income). In the first instance, this money would go to contractors, suppliers, civil servants or welfare recipients. They would in turn spend some of the extra income. The beneficiaries of that spending would also splash out a bit, adding still more to economic activity, and so on. Should the government cut back, the ill effects would multiply in the same way.

Keynes thought this insight was especially important because of what he called "liquidity preference". He reckoned that people like to have some liquid assets on hand if possible, in case of emergency. In times of financial worry, demand for cash or similarly liquid assets rises; investors begin to worry more about the return of capital rather than the return on capital. Keynes posited that this might lead to a "general glut": a world in which everyone tries to hold more money, depressing spending, which in turn depresses production and income, leaving people still worse off.

In this world, lowering interest rates to stimulate growth does not help very much. Nor are rates very sensitive to increases in government borrowing, given the glut of saving. Government spending to boost the economy could therefore generate a big rise in employment for only a negligible increase in interest rates. Classical economists thought public-works spending would "crowd out" private investment; Keynes saw that during periods of weak demand it might "crowd in" private spending, through the multiplier effect.

Keynes's reasoning was affirmed by the economic impact of increased government expenditure during the second world war. Massive military spending in Britain and America contributed to soaring economic growth. This, combined with the determination to prevent a recurrence of the Depression, prompted policymakers to adopt Keynesian economics, and the multiplier, as the centrepiece of the post-war economic order.

Other economists picked up where Keynes left off. Alvin Hansen and Paul Samuelson constructed equations to predict how a rise or fall in spending in one part of the economy would propagate across the whole of it. Governments took it for granted that managing economic demand was their responsibility. By the 1960s Keynes's intellectual victory seemed complete. In a story in *Time* magazine, published in 1965, Milton Friedman declared (in a quote often attributed to Richard Nixon), "We are all Keynesians now."

But the Keynesian consensus fractured in the 1970s. Its dominance was eroded by the ideas of Friedman himself, who linked

variations in the business cycle to growth (or decline) in the money supply. Fancy Keynesian multipliers were not needed to keep an economy on track, he reckoned. Instead, governments simply needed to pursue a policy of stable money growth.

An even greater challenge came from the emergence of the "rational expectations" school of economics, led by Robert Lucas. Rational-expectations economists supposed that fiscal policy would be undermined by forward-looking taxpayers. They should understand that government borrowing would eventually need to be repaid, and that stimulus today would necessitate higher taxes tomorrow. They should therefore save income earned as a result of stimulus in order to have it on hand for when the bill came due. The multiplier on government spending might in fact be close to zero, as each extra dollar is almost entirely offset by increased private saving.

Rubbing salt in

The economists behind many of these criticisms clustered in colleges in the Midwest of America, most notably the University of Chicago. Because of their proximity to America's Great Lakes, their approach to macroeconomics came to be known as the "freshwater" school. They argued that macroeconomic models had to begin with equations that described how rational individuals made decisions. The economic experience of the 1970s seemed to bear out their criticisms of Keynes: governments sought to boost slow-growing economies with fiscal and monetary stimulus, only to find that inflation and interest rates rose even as unemployment remained high.

Freshwater economists declared victory. In an article published in 1979 and entitled "After Keynesian Economics", Robert Lucas and Tom Sargent, both eventual Nobel-prize winners, wrote that the flaws in

Keynesian economic models were "fatal". Keynesian macroeconomic models were "of no value in guiding policy".

These attacks, in turn, prompted the emergence of "New Keynesian" economists, who borrowed elements of the freshwater approach while retaining the belief that recessions were market failures that could be fixed through government intervention. Because most of them were based at universities on America's coasts, they were dubbed "saltwater" economists. The most prominent included Stanley Fischer, now the vice-chairman of the Federal Reserve; Larry Summers, a former treasury secretary; and Greg Mankiw, head of George W. Bush's Council of Economic Advisers. In their models fiscal policy was all but neutered. Instead, they argued that central banks could and should do the heavy lifting of economic management: exercising a deft control that ought to cancel out the effects of government spending—and squash the multiplier.

Yet in Japan since the 1990s, and in most of the rich world since the recession that followed the global financial crisis, cutting interest rates to zero has proved inadequate to revive flagging economies. Many governments turned instead to fiscal stimulus to get their economies going. In America the administration of Barack Obama succeeded in securing a stimulus package worth over \$800 billion.

As a new debate over multipliers flared, freshwater types stood their ground. John Cochrane of the University of Chicago said of Keynesian ideas in 2009: "It's not part of what anybody has taught graduate students since the 1960s. They are fairy tales that have been proved false. It is very comforting in times of stress to go back to the fairy tales we heard as children, but it doesn't make them less false."

The practical experience of the recession gave economists plenty to study, however. Scores of papers have been published since 2008 attempting to estimate fiscal multipliers. Most suggest that, with interest rates close to zero, fiscal stimulus carries a multiplier of at least one. The IMF, for instance, concluded that the (harmful) multiplier for fiscal contractions was often 1.5 or more.

Even as many policymakers remain committed to fiscal consolidation, plenty of economists now argue that insufficient fiscal stimulus has been among the biggest failures of the post-crisis era. Mr Summers and Antonio Fatas suggest, for example, that austerity has substantially reduced growth, leading to levels of public debt that are higher than they would have been had enthusiastic stimulus been used to revive growth. Decades after its conception, Keynes's multiplier remains as relevant, and as controversial, as ever. ■





Game theory

Prison breakthrough

The fifth of our series on seminal economic ideas looks at the Nash equilibrium

JOHN NASH arrived at Princeton University in 1948 to start his PhD with a one-sentence recommendation: “He is a mathematical genius”. He did not disappoint. Aged 19 and with just one undergraduate economics course to his name, in his first 14 months as a graduate he produced the work that would end up, in 1994, winning him a Nobel prize in economics for his contribution to game theory.

On November 16th 1949, Nash sent a note barely longer than a page to the Proceedings of the National Academy of Sciences, in which he laid out the concept that has since become known as the “Nash equilibrium”. This concept describes a stable outcome that results from people or institutions making rational choices based on what they think others will do. In a Nash equilibrium, no one is able to improve their own situation by changing strategy: each person is doing as well as they possibly can, even if that does not mean the optimal outcome for society. With a flourish of elegant mathematics, Nash showed that every “game” with a finite number of players, each with a finite number of options to choose from, would have at least

one such equilibrium.

His insights expanded the scope of economics. In perfectly competitive markets, where there are no barriers to entry and everyone’s products are identical, no individual buyer or seller can influence the market: none need pay close attention to what the others are up to. But most markets are not like this: the decisions of rivals and customers matter. From auctions to labour markets, the Nash equilibrium gave the dismal science a way to make real-world predictions based on information about each person’s incentives.

One example in particular has come to symbolise the equilibrium: the prisoner’s dilemma. Nash used algebra and numbers to set out this situation in an expanded paper published in 1951, but the version familiar to economics students is altogether more gripping. (Nash’s thesis adviser, Albert Tucker, came up with it for a talk he gave to a group of psychologists.)

It involves two mobsters sweating in separate prison cells, each contemplating the same deal offered by the district attorney. If they both confess to a bloody murder, they each face ten years in jail. If

one stays quiet while the other snitches, then the snitch will get a reward, while the other will face a lifetime in jail. And if both hold their tongue, then they each face a minor charge, and only a year in the clink (see diagram).

There is only one Nash-equilibrium solution to the prisoner’s dilemma: both confess. Each is a best response to the other’s strategy; since the other might have spilled the beans, snitching avoids a lifetime in jail. The tragedy is that if only they could work out some way of co-ordinating, they could both make themselves better off.

The example illustrates that crowds can be foolish as well as wise; what is best for the individual can be disastrous for the group. This tragic outcome is all too common in the real world. Left freely to plunder the sea, individuals will fish more than is best for the group, depleting fish stocks. Employees competing to impress their boss by staying longest in the office will encourage workforce exhaustion. Banks have an incentive to lend more rather than sit things out when house prices shoot up.

Crowd trouble

The Nash equilibrium helped economists to understand how self-improving individuals could lead to self-harming crowds. Better still, it helped them to tackle the problem: they just had to make sure that every individual faced the best incentives possible. If things still went wrong—parents failing to vaccinate their children against measles, say—then it must be because people were not acting in their own self-interest. In such cases, the public-policy challenge would be one of information.

Nash’s idea had antecedents. In 1838 August Cournot, a French economist, theorised that in a market with only two competing companies, each would see the disadvantages of pursuing market share by boosting output, in the form of lower prices and thinner profit margins. Unwittingly, Cournot had stumbled across an example of a Nash equilibrium. It made sense for each firm to set production levels based on the strategy of its competitor; consumers, however, would end up with less stuff and higher prices than if full-blooded competition had prevailed.

Another pioneer was John von Neumann, a Hungarian mathematician. In 1928, the year Nash was born, von Neumann outlined a first formal theory of games, showing that in two-person, zero-sum games, there would always be an equilibrium. When Nash shared his finding with von Neumann, by then an intellectual demigod, the latter dismissed the result as “trivial”, seeing it as little more than an extension of his own, earlier proof.

In fact, von Neumann’s focus on two-person, zero-sum games left only a very ▶▶

► narrow set of applications for his theory. Most of these settings were military in nature. One such was the idea of mutually assured destruction, in which equilibrium is reached by arming adversaries with nuclear weapons (some have suggested that the film character of Dr Strangelove was based on von Neumann). None of this was particularly useful for thinking about situations—including most types of market—in which one party's victory does not automatically imply the other's defeat.

Even so, the economics profession initially shared von Neumann's assessment, and largely overlooked Nash's discovery. He threw himself into other mathematical pursuits, but his huge promise was undermined when in 1959 he started suffering from delusions and paranoia. His wife had him hospitalised; upon his release, he became a familiar figure around the Princeton campus, talking to himself and scribbling on blackboards. As he struggled with ill health, however, his equilibrium became more and more central to the discipline. The share of economics papers citing the Nash equilibrium has risen sevenfold since 1980, and the concept has been used to solve a host of real-world policy problems.

One famous example was the American hospital system, which in the 1940s was in a bad Nash equilibrium. Each individual hospital wanted to snag the brightest medical students. With such students particularly scarce because of the war, hospitals were forced into a race whereby they sent out offers to promising candidates earlier and earlier. What was best for the individual hospital was terrible for the collective: hospitals had to hire before students had passed all of their exams. Students hated it, too, as they had no chance to consider competing offers.

Despite letters and resolutions from all manner of medical associations, as well as the students themselves, the problem was only properly solved after decades of tweaks, and ultimately a 1990s design by Elliott Peranson and Alvin Roth (who later won a Nobel economics prize of his own). Today, students submit their preferences and are assigned to hospitals based on an algorithm that ensures no student can change their stated preferences and be sent to a more desirable hospital that would also be happy to take them, and no hospital can go outside the system and nab a better employee. The system harnesses the Nash equilibrium to be self-reinforcing: everyone is doing the best they can based on what everyone else is doing.

Other policy applications include the British government's auction of 3G mobile-telecoms operating licences in 2000. It called in game theorists to help design the auction using some of the insights of the

The prisoner's dilemma

		Prisoner B	
		Confess	Keep quiet
Prisoner A	Confess	Both go to jail for ten years	Prisoner B gets life imprisonment, A goes free
	Keep quiet	Prisoner A gets life imprisonment, B goes free	Both go to jail for one year

Nash equilibrium, and ended up raising a cool £22.5 billion (\$35.4 billion)—though some of the bidders' shareholders were less pleased with the outcome. Nash's insights also help to explain why adding a road to a transport network can make journey times longer on average. Self-interested drivers opting for the quickest route do not take into account their effect of lengthening others' journey times, and so can gum up a new shortcut. A study published in 2008 found seven road links in London and 12 in New York where closure could boost traffic flows.

Game on

The Nash equilibrium would not have attained its current status without some refinements on the original idea. First, in plenty of situations, there is more than one possible Nash equilibrium. Drivers choose which side of the road to drive on

as a best response to the behaviour of other drivers—with very different outcomes, depending on where they live; they stick to the left-hand side of the road in Britain, but to the right in America. Much to the disappointment of algebra-toting economists, understanding strategy requires knowledge of social norms and habits. Nash's theorem alone was not enough.

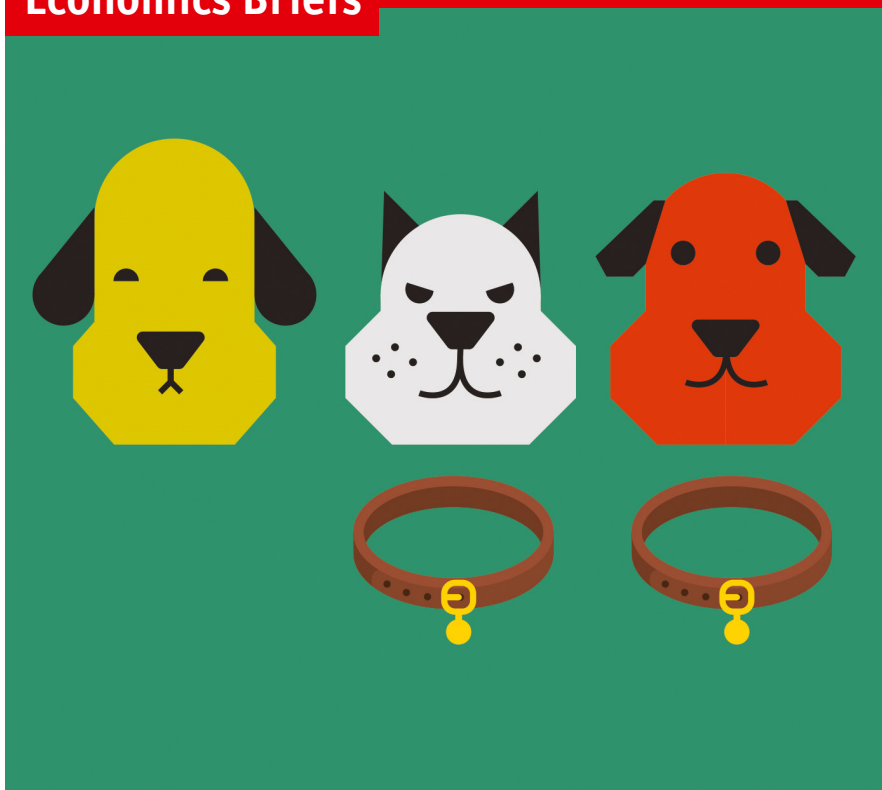
A second refinement involved accounting properly for non-credible threats. If a teenager threatens to run away from home if his mother separates him from his mobile phone, then there is a Nash equilibrium where she gives him the phone to retain peace of mind. But Reinhard Selten, a German economist who shared the 1994 Nobel prize with Nash and John Harsanyi, argued that this is not a plausible outcome. The mother should know that her child's threat is empty—no matter how tragic the loss of a phone would be, a night out on the streets would be worse. She should just confiscate the phone, forcing her son to focus on his homework.

Mr Selten's work let economists whittle down the number of possible Nash equilibria. Harsanyi addressed the fact that in many real-life games, people are unsure of what their opponent wants. Economists would struggle to analyse the best strategies for two lovebirds trying to pick a mutually acceptable location for a date with no idea of what the other prefers. By embedding each person's beliefs into the game (for example that they correctly think the other likes pizza just as much as sushi), Harsanyi made the problem solvable. A different problem continued to lurk. The predictive power of the Nash equilibrium relies on rational behaviour. Yet humans often fall short of this ideal. In experiments replicating the set-up of the prisoner's dilemma, only around half of people chose to confess. For the economists who had been busy embedding rationality (and Nash) into their models, this was problematic. What is the use of setting up good incentives, if people do not follow their own best interests?

All was not lost. The experiments also showed that experience made players wiser; by the tenth round only around 10% of players were refusing to confess. That taught economists to be more cautious about applying Nash's equilibrium. With complicated games, or ones where they do not have a chance to learn from mistakes, his insights may not work as well.

The Nash equilibrium nonetheless boasts a central role in modern microeconomics. Nash died in a car crash in 2015; by then his mental health had recovered, he had resumed teaching at Princeton and he had received that joint Nobel—in recognition that the interactions of the group contributed more than any individual. ■





The Mundell-Fleming trilemma

Two out of three ain't bad

A fixed exchange rate, monetary autonomy and the free flow of capital are incompatible, according to the last in our series of big economic ideas

HILLEL THE ELDER, a first-century religious leader, was asked to summarise the Torah while standing on one leg. "That which is hateful to you, do not do to your fellow. That is the whole Torah; the rest is commentary," he replied. Michael Klein, of Tufts University, has written that the insights of international macroeconomics (the study of trade, the balance-of-payments, exchange rates and so on) might be similarly distilled: "Governments face the policy trilemma; the rest is commentary."

The policy trilemma, also known as the impossible or inconsistent trinity, says a country must choose between free capital mobility, exchange-rate management and monetary autonomy (the three corners of the triangle in the diagram). Only two of the three are possible. A country that wants to fix the value of its currency and have an interest-rate policy that is free from outside influence (side C of the triangle) cannot allow capital to flow freely across its borders. If the exchange rate is fixed but the country is open to cross-border capital flows, it cannot have an independent monetary policy (side A). And if a country chooses free capital mobility and wants monetary

autonomy, it has to allow its currency to float (side B).

To understand the trilemma, imagine a country that fixes its exchange rate against the US dollar and is also open to foreign capital. If its central bank sets interest rates above those set by the Federal Reserve, foreign capital in search of higher returns would flood in. These inflows would raise demand for the local currency; eventually the peg with the dollar would break. If interest rates are kept below those in America, capital would leave the country and the currency would fall.

Where barriers to capital flow are undesirable or futile, the trilemma boils down to a choice: between a floating exchange rate and control of monetary policy; or a fixed exchange rate and monetary bondage. Rich countries have typically chosen the former, but the countries that have adopted the euro have embraced the latter. The sacrifice of monetary-policy autonomy that the single currency entailed was plain even before its launch in 1999.

In the run up, aspiring members pegged their currencies to the Deutschmark. Since capital moves freely within Europe, the

trilemma obliged would-be members to follow the monetary policy of Germany, the regional power. The head of the Dutch central bank, Wim Duisenberg (who subsequently became the first president of the European Central Bank), earned the nickname "Mr Fifteen Minutes" because of how quickly he copied the interest-rate changes made by the Bundesbank.

This monetary serfdom is tolerable for the Netherlands because its commerce is closely tied to Germany and business conditions rise and fall in tandem in both countries. For economies less closely aligned to Germany's business cycle, such as Spain and Greece, the cost of losing monetary independence has been much higher: interest rates that were too low during the boom, and no option to devalue their way out of trouble once crisis hit.

As with many big economic ideas, the trilemma has a complicated heritage. For a generation of economics students, it was an important outgrowth of the so-called Mundell-Fleming model, which incorporated the impact of capital flows into a more general treatment of interest rates, exchange-rate policy, trade and stability.

The model was named in recognition of research papers published in the early 1960s by Robert Mundell, a brilliant young Canadian trade theorist, and Marcus Fleming, a British economist at the IMF. Building on his earlier research, Mr Mundell showed in a paper in 1963 that monetary policy becomes ineffective where there is full capital mobility and a fixed exchange rate. Fleming's paper had a similar result.

If the world of economics remained unshaken, it was because capital flows were small at the time. Rich-world currencies were pegged to the dollar under a system of fixed exchange rates agreed at Bretton Woods, New Hampshire, in 1944. It was only after this arrangement broke down in the 1970s that the trilemma gained great policy relevance.

Perhaps the first mention of the Mundell-Fleming model was in 1976 by Rudiger Dornbusch of the Massachusetts Institute of Technology. Dornbusch's "overshooting" model sought to explain why the newish regime of floating exchange rates had proved so volatile. It was Dornbusch who helped popularise the Mundell-Fleming model through his bestselling textbooks (written with Stanley Fischer, now vice-chairman of the Federal Reserve) and his influence on doctoral students, such as Paul Krugman and Maurice Obstfeld. The use of the term "policy trilemma", as applied to international macroeconomics, was coined in a paper published in 1997 by Mr Obstfeld, who is now chief economist of the IMF, and Alan Taylor, now of the University of California, Davis.

But to fully understand the provi- ►►

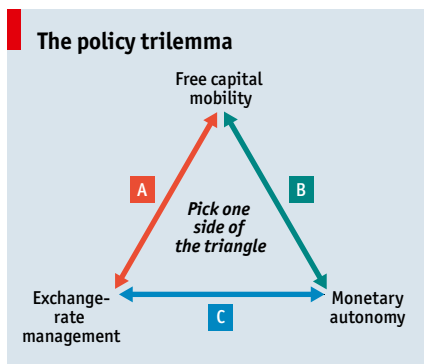
► dence—and the significance—of the trilemma, you need to go back further. In “A Treatise on Money”, published in 1930, John Maynard Keynes pointed to an inevitable tension in a monetary order in which capital can move in search of the highest return:

This then is the dilemma of an international monetary system—to preserve the advantages of the stability of local currencies of the various members of the system in terms of the international standard, and to preserve at the same time an adequate local autonomy for each member over its domestic rate of interest and its volume of foreign lending.

This is the first distillation of the policy trilemma, even if the fact of capital mobility is taken as a given. Keynes was acutely aware of it when, in the early 1940s, he set down his thoughts on how global trade might be rebuilt after the war. Keynes believed a system of fixed exchange rates was beneficial for trade. The problem with the interwar gold standard, he argued, was that it was not self-regulating. If large trade imbalances built up, as they did in the late 1920s, deficit countries were forced to respond to the resulting outflow of gold. They did so by raising interest rates, to curb demand for imports, and by cutting wages to restore export competitiveness. This led only to unemployment, as wages did not fall obligingly when gold (and thus money) was in scarce supply. The system might adjust more readily if surplus countries stepped up their spending on imports. But they were not required to do so.

Instead he proposed an alternative scheme, which became the basis of Britain’s negotiating position at Bretton Woods. An international clearing bank (ICB) would settle the balance of transactions that gave rise to trade surpluses or deficits. Each country in the scheme would have an overdraft facility at the ICB, proportionate to its trade. This would afford deficit countries a buffer against the painful adjustments required under the gold standard. There would be penalties for overly lax countries: overdrafts would incur interest on a rising scale, for instance. Keynes’s scheme would also penalise countries for hoarding by taxing big surpluses. Keynes could not secure support for such “creditor adjustment”. America opposed the idea for the same reason Germany resists it today: it was a country with a big surplus on its balance of trade. But his proposal for an international clearing bank with overdraft facilities did lay the ground for the IMF.

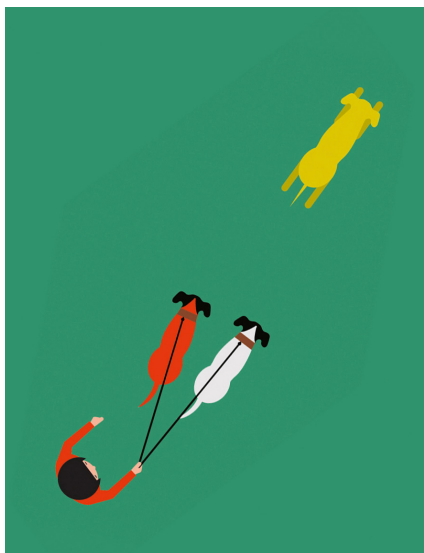
Fleming and Mundell wrote their papers while working at the IMF in the context of the post-war monetary order that Keynes had helped shape. Fleming had been in contact with Keynes in the 1940s while he worked in the British civil ser-



vice. For his part, Mr Mundell drew his inspiration from home.

In the decades after the second world war, an environment of rapid capital mobility was hard for economists to imagine. Cross-border capital flows were limited in part by regulation but also by the caution of investors. Canada was an exception. Capital moved freely across its border with America in part because damming such flows was impractical but also because US investors saw little danger in parking money next door. A consequence was that Canada could not peg its currency to the dollar without losing control of its monetary policy. So the Canadian dollar was allowed to float from 1950 until 1962.

A Canadian, such as Mr Mundell, was better placed to imagine the trade-offs other countries would face once capital began to move freely across borders and currencies were unfixed. When Mr Mundell won the Nobel prize in economics in 1999, Mr Krugman hailed it as a “Canadian Nobel”. There was more to this observation than mere drollery. It is striking how many academics working in this area have been Canadian. Apart from Mr Mundell, Ronald McKinnon, Harry Gordon Johnson and Jacob Viner have made big contributions.



But some of the most influential recent work on the trilemma has been done by a Frenchwoman. In a series of papers, H el ene Rey, of the London Business School, has argued that a country that is open to capital flows and that allows its currency to float does not necessarily enjoy full monetary autonomy.

Ms Rey’s analysis starts with the observation that the prices of risky assets, such as shares or high-yield bonds, tend to move in lockstep with the availability of bank credit and the weight of global capital flows. These co-movements, for Ms Rey, are a reflection of a “global financial cycle” driven by shifts in investors’ appetite for risk. That in turn is heavily influenced by changes in the monetary policy of the Federal Reserve, which owes its power to the scale of borrowing in dollars by businesses and householders worldwide. When the Fed lowers its interest rate, it makes it cheap to borrow in dollars. That drives up global asset prices and thus boosts the value of collateral against which loans can be secured. Global credit conditions are relaxed.

Conversely, in a recent study Ms Rey finds that an unexpected decision by the Fed to raise its main interest rate soon leads to a rise in mortgage spreads not only in America, but also in Canada, Britain and New Zealand. In other words, the Fed’s monetary policy shapes credit conditions in rich countries that have both flexible exchange rates and central banks that set their own monetary policy.

Rey of sunshine

A crude reading of this result is that the policy trilemma is really a dilemma: a choice between staying open to cross-border capital or having control of local financial conditions. In fact, Ms Rey’s conclusion is more subtle: floating currencies do not adjust to capital flows in a way that leaves domestic monetary conditions unsullied, as the trilemma implies. So if a country is to retain its monetary-policy autonomy, it must employ additional “macroprudential” tools, such as selective capital controls or additional bank-capital requirements to curb excessive credit growth.

What is clear from Ms Rey’s work is that the power of global capital flows means the autonomy of a country with a floating currency is far more limited than the trilemma implies. That said, a flexible exchange rate is not anything like as limiting as a fixed exchange rate. In a crisis, everything is suborned to maintaining a peg—until it breaks. A domestic interest-rate policy may be less powerful in the face of a global financial cycle that takes its cue from the Fed. But it is better than not having it at all, even if it is the economic-policy equivalent of standing on one leg. ■



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