

ECONOMICS

The
Economist

ECONOMICS

Making Sense of the Modern Economy

4th edition

Edited by Richard Davies

THE ECONOMIST IN ASSOCIATION WITH
PROFILE BOOKS LTD

Published by Profile Books Ltd
3 Holford Yard
Bevin Way
London WC1X 9HD
www.profilebooks.com

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Typeset in EcoType by MacGuru Ltd
info@macguru.org.uk

Printed and bound in Great Britain by Clays, St Ives plc

A CIP catalogue record for this book is available from the British Library

Paperback ISBN: 978 1 78125 234 5

e-book ISBN: 978 1 78283 043 6



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RICHARD DAVIES was *The Economist's* Economics Editor until July 2015, when he left to become special economics adviser to the UK Chancellor of the Exchequer, George Osborne. Before joining the newspaper, he worked at the Bank of England, where he managed teams covering international economics and the financial sector. He was a lead author of the bank's *Financial Stability Report*, covering the stability of the banking sector. He also worked on secondment at the Bank of Canada in Ottawa. He began his career as a microeconomist, working for a private-sector consultancy, and then as a government antitrust economist at the UK Competition Commission. His academic research has been published in the *Journal of Money, Credit and Banking* and the *Journal of Financial Stability*, and he has held a lectureship at Lincoln College, Oxford, where he taught economics.

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Introduction: the everyday science

LIFE'S BIGGEST PROBLEM is a simple one: we cannot do everything. Sometimes it is nature that holds us back. Millions of children dream of life as an astronaut, but the truth is that even the hardest working will find their physical and mental capabilities mean they fall short of NASA's requirements. Sometimes it is low income or wealth that stops us getting what we want: desires for the latest gadget, outfit or car are stymied when wages are meagre and credit scarce; buying a house is tough without a big deposit. Some face far fewer constraints, but in the end even those with the sharpest minds, rudest health and fattest wallets will run out of time. Whatever the reason, scarcity of natural and economic resources is unavoidable. Dealing with these shortages is a task every human shares.

Scarcity means that to do our best we must make decisions that involve trade-offs. Take education. Teenagers must decide whether a university degree and the debts that it will bring justify gains received in the distant future. Business is a game of trade-offs too. A shopkeeper deciding what to do with the monthly takings must choose between the comfort of a healthy cash cushion and the riskier choices – building up inventory or hiring new staff – needed to win more customers. Running a home means facing a series of finely balanced decisions: whether to spend or save, to work or take a holiday, to choose a fixed or floating-rate mortgage.

Economics is the study of trade-offs. A mongrel subject that has borrowed from hard disciplines like mathematics and physics, and from softer ones like history and psychology, it can be hard to pin down. As this book makes clear, what unifies economics is the problem of scarcity, the trade-offs scarcity forces us to make, and how

– when they work well – markets can help allocate scarce resources efficiently. The articles in this collection cover everyday puzzles, from how best to play the lottery to why people talk in quiet carriages. They also cover problems facing states, from whether fines or prison are the best way to deter crime to why we seem unable to avoid bank crashes. The common thread is why, when faced with a tricky trade-off, people make the choices they do and how they might make them more wisely.

Economies in crisis

Perhaps the most pressing global shortfall is a scarcity of income. In 2014 the value of output across the world – global gross domestic product (GDP) – was around \$75 trillion. With the world's population estimated at a little over 7 billion, each person would get around \$10,700 if GDP were divided up equally. Yet for many that amount is a dream. Around one in seven people live in extreme poverty. For those 1 billion, economic constraints are sharp: they survive on less than \$1.25 a day, or \$450 per year. At this level scarce resources become a constraint on life. In low-income countries 40% of recorded deaths are of children under the age of 15, whereas in advanced countries just 1% die so young. Poverty-stricken people lose their lives in avoidable ways, with AIDS, malaria, tuberculosis and diarrhoeal illness killing 6 million people in low-income countries in 2012.

Much of this is a problem of resource allocation. Extreme poverty often means a lack of food: of the 805 million undernourished people in 2012–14, 791 million live in developing countries. Their diet, short on calories and protein, saps energy, destroys muscles and makes them susceptible to disease. At the same time, those living in advanced countries throw away 222 million tonnes of food a year. The binned meals are worth an estimated \$400 billion, more than the entire food production of sub-Saharan Africa. If that money were sent to the world's poorest, it could provide \$400 a year or \$1.10 a day. Extreme poverty would be eradicated. If the global economy is a machine for allocating scarce resources, the economics of food suggest something is badly wrong with it.

Disparities are just as sharp within countries. Over the past 30 years, the incomes of the bottom tenth of workers has fallen by 5% in

America when adjusted for inflation. For the top tenth, real incomes have increased by 50%. Widening income inequality is not just a rich-world phenomenon. In emerging-market economies like India and Russia inequality is more acute. In China, the world's second largest economy, it is staggering: in 1980 the top tenth of workers earned 6.5 times the bottom tenth; by 2012 they earned 62 times as much. Of the G20 group of large economies, only Brazil has experienced falling income inequality over the past ten years.

The world's wealth is even more concentrated. In America the richest 0.1% of families' share of wealth rose from 7% in the late 1970s to 22% in 2012. Just 160,000 families boast net assets of over \$20 million; the \$3.2 trillion they jointly own is around the size of Germany's economy. Differences in effort, talent and luck will always mean people end up unequal, but many worry that disparities are becoming entrenched. In America the vast wealth held by family foundations has created a new aristocracy that blends wealth with philanthropy and ensures that heirs to fortunes also inherit access to top-tier universities.

New economic dividing lines are cropping up. The major economic battle of the next decade may not be between rich and poor, but between the old and the young. The current cohort of retirees poses a major challenge. There are lots of them: between 1946 and 1965, 76 million babies were born in America, around 30 million more than in 1925-45 and 20 million more than in 1965-85. The same pattern appears in many rich countries. These baby-boomers, now between 49 and 69 years old, will be around for a long time – male life expectancy was less than 60 years in 1940, today is it close to 80. Many will receive pensions for more years than they worked.

Today's under-50s have been groomed to foot the bill. There is a commonly held view that state pensions are paid from a pot built up during a worker's years of toil, but in truth no such pot exists. They are "pay as you go" systems with pensioners' grants coming from taxes on people of working age. The tab will become increasingly painful: pensions have risen from 13% to 15% of public spending in Britain in 2009-14 as the baby boomers have started to retire. Unsustainably generous pension systems, from Britain to Brazil, will be tough to reform: because the over-65s tend to vote, chipping away

at their benefits can lose an election. Unless this changes the global pension bill will balloon.

Funding will be tough. Many workers' prospects are flaky at best. Across the OECD group of rich countries a 7% unemployment rate means there were 46 million unemployed workers in 2014. That is a benefits queue 50% bigger than the entire British workforce. In some countries things are worse: in Spain and Greece more than 20% are out of work. Across the rich world the number of long-term unemployed has almost doubled since 2007. Just as worrying is the rise in inactivity: the number of people out of work but not looking for it either. In America this trend has been marked, with those unfit to work jumping from 7 million to 9 million between 2007 and 2014.

For those with jobs life is hardly rosy. Meagre pay rises mean that inflation has eroded buying power. Between 2009 and 2013 inflation-adjusted pay fell or was flat in 21 of the 27 advanced countries assessed by the OECD. When inflation is taken into account, many rich-world countries are still far below their previous peaks in terms of income per head. Even those in countries that are growing have suffered: in Britain pay dropped by 8% between 2007 and 2014, with the median worker suffering the biggest drop in buying power since Victorian times. In America median workers' inflation-adjusted pay has hardly budged for 40 years.

Hoping it's a hangover

With any luck, some of these woes can be put down to a terrible economic hangover. History shows that recoveries from banking crashes take much longer than recoveries from normal recessions. Proponents of the hangover theory argue that, in the end, it will lift. This would mean sunnier times ahead: between 1992 and 2007 advanced economies expanded by an average of 3% per year – more than 55% in 15 years. Large emerging economies did even better, with Brazil, Russia, India and South Africa expanding by 90%. A return to such buoyant growth would cut joblessness and lift wages.

Others worry that that golden period will never return. Of the advanced economies only America, Britain and Canada are growing at anywhere near pre-crisis rates, and another 20 rich nations managed an average expansion of less than 1.5% in 2014. Performance has been

so bad for so long that many now worry that the rich world's debt hangover has morphed into something worse: a "secular stagnation" of low growth, rock-bottom interest rates and anaemic investment. Emerging markets have lost their vigour too. Apart from India, the BRICs' vim has gone. As China slows, fears of a property bubble and murky shadow banks are on the rise. Brazil and South Africa, with runaway inflation and hefty debts, are badly mismanaged. Russia has become a pariah, with Western sanctions locking it out of global finance and its own retaliation shutting it out of world trade. A return to the growth of the past seems a distant hope.

Despite all this, many are making big bets on a bright future. Governments are still spending more than they earn in taxes and are issuing debt to cover the shortfall. Firms are paying dividends despite dwindling profits, and some are selling bonds to fill the gap. Workers toiling on low wages are still managing to shop. Far from being stung by the experience of 2008, the world is taking on yet more debt: since 2007 it has grown by \$57 billion. The global debt-to-GDP ratio has risen by 17 percentage points, as household sectors in four-fifths of countries have piled up more debt. Even if growth returns to pre-crisis levels, paying these dues will be hard. If it does not, the future could be one of cuts – to state payouts, firms' dividends, workers' pay and the weekly shop. In a world living beyond its means the future need not be better than the past: it could be a lot worse.

Economics from the ashes

Can economics help? Many would say no. Ever since Thomas Carlyle dubbed it the "dismal science", economics has had fierce critics. Carlyle's objection had two prongs. First, he simply didn't like the way economists think, arguing that their obsession with questions of supply and demand meant a narrow view of life. Second, he found economists' predictions dismal. This argument – that economics is the wrong way to look at life's problems and its forecasts are inaccurate – is one that has strong currency today.

The articles in this book show why Carlyle was wrong. Written between 2012 and 2015, they are grouped into three parts. Part 1 looks at the economics of money and the role – both good and evil – that banks play in the modern economy. Part 2 investigates the changing

world of work, covering the rise of the megafirm, the problem of low pay and inequality. Part 3 considers the economic challenges of the future, and asks whether robots and innovation can help overcome the grinding rise in health-care and education costs. (Note that the titles of some articles have been edited for clarity.)

Readers should find some reasons for optimism. The articles make clear that those at the cutting edge of economics understand the world better than ever before. And many more stand to gain from this knowledge, with a rush of new economists in the pipeline. In America, 36,540 new economists graduated in 2013, 15% more than in 2008. In Britain, government statistics show a 25% increase in economics students over the same period, despite the fact that the overall number of university students fell by 2%. In China there are close to 1 million students enrolled in economics courses.

Those opting to study economics are demanding change. From Britain to India, groups of students are pushing for reform and a redesign of the economics curriculum to better capture the realities of modern life. Economics is a subject that has a history of evolution and change, suggesting these reformers are likely to have an impact. The magpie subject will steal a little less from mathematics, a little more from history and philosophy.

It is crucial that economics evolves and improves. Despite poor economic performance, economists have become far more powerful over the past 20 years. Central banks led the charge, with a move to make them independent of political control sweeping the globe. And economists have come to regulate huge chunks of the corporate world, overseeing not just banking but also water, energy and telecoms markets. Fiscal decisions are always a mixture of politics and economics, but the balance is tipping in economists' favour, with many countries setting up independent bodies to oversee their budgets in an attempt to prevent pre-election splurges. The quiet rise of the technocrat economist shows no signs of slowing.

Economics is extending into new areas. The economics of charity is one example. As charities compete for scarce donor funding, many are being asked to calculate the impact of their work and are turning to economists to help them. Health care is another. In Britain, the National Institute for Clinical Excellence, an independent group,

decides whether the National Health Service should pay for recently invented drugs. Its decisions are based on a quantitative analysis of the trade-off between spending more cash and the number of extra days a patient might live. With economic hands on myriad policy decisions, many of them in areas not typically regarded as being relevant to economics, it is important to understand what economists are up to and whether they are any good.

The rise of economics extends far beyond public policy. The smartphone has allowed a new assortment of firms to flower, many of them run on economic principles. The world's best-known search engine, Google, runs 3.5 billion searches per day, with each one of them selling adverts using a lightning-quick auction designed by its chief economist. By auctioning its adverts Google makes sure it finds the right price. Upstarts like Uber, a firm that is revolutionising taxi markets, are pricing specialists too: by rapidly adjusting its prices, Uber attracts more drivers during periods of acute scarcity (Friday nights). In the world of information technology, economists' obsession with supply and demand can prove highly lucrative.

Smartphones give their users new economic roles. An eBay user can become an online shopkeeper overnight; Airbnb "hosts" can suddenly find themselves acting as mini hoteliers. This brings unfamiliar trade-offs: how to set the right reserve price for an auction, or how to set room-rental rates to balance returns and occupancy. Since dealing with these new choices can be tough, the new firms, often designed by economists, guide their users towards the best choices. Easy to access and nudged towards efficiency by the world's leading economists, these new markets are major reasons for optimism.

New markets are not the only reason for hope. Better measurement of GDP means the role that important activities – including the arts, and research and development (R&D) – play in economic growth can be identified more accurately. Understanding the economy better should lead to improved policies. An economic approach to crime is prioritising fines over prison, helping to deter criminals and keep the prison bill down. The privatisation of state-owned infrastructure, including ports, has resulted in huge efficiency gains. Clever use of internet search data can help identify cities at risk of acute unemployment long before official statistics do, helping policymakers

to react quickly. And the use of robots in manufacturing can provide a huge productivity boost.

But any optimism about economics must be tempered by frustration. In a resource-stretched world there are many natural constraints we can do little about. But the biggest hurdles are not a lack of land, water or time: they are man-made. Japan's 780% tariff on rice imports cripples trade and protects inefficient producers. The EU's tariffs on food imports are worse: by penalising processed foods such as canned fruit or refined coffee and chocolate, rich EU countries ensure that African nations export mainly low-value-added raw foodstuffs. The world's largest economy, America, is a land of protectionism and public-sector unionisation, keeping foreigners and outsiders in their place. The economic giant of the future, China, has fattened itself by subsidising heavy industry and distorting its exchange rate.

All this means that the problems the world faces are not of pure economics, but of political economy. Taken on its own, economics is in good shape, moving on from the 2008 crash, reinventing itself and offering great gains to those at its cutting edge. The problem is that economic lessons are not learned. The global economy is not as economists would have it; it is a system of entrenched interests, powerful lobby groups and distorted markets. This often results in prices that are too high, and a supply of goods that is too low. In other words, things are scarcer than they need to be. If economics is the study of trade-offs, understanding the modern economy means admitting a nasty truth: that the toughest trade-offs are man-made.