Doughnut Economics by Kate Raworth

The Power of Pictures

Everybody's saying it: we need a new economic story, a narrative of our shared economic future that is fit for the twenty-first century. I agree. But

let's not forget one thing: the most powerful stories throughout history have been the ones told with pictures. If we want to rewrite economics, we need to redraw its pictures too because we stand little chance of telling a new story if we stick to the old illustrations. And if drawing new pictures sounds frivolous to you—like mere child's play—believe me it is not. Better still, let me prove it.

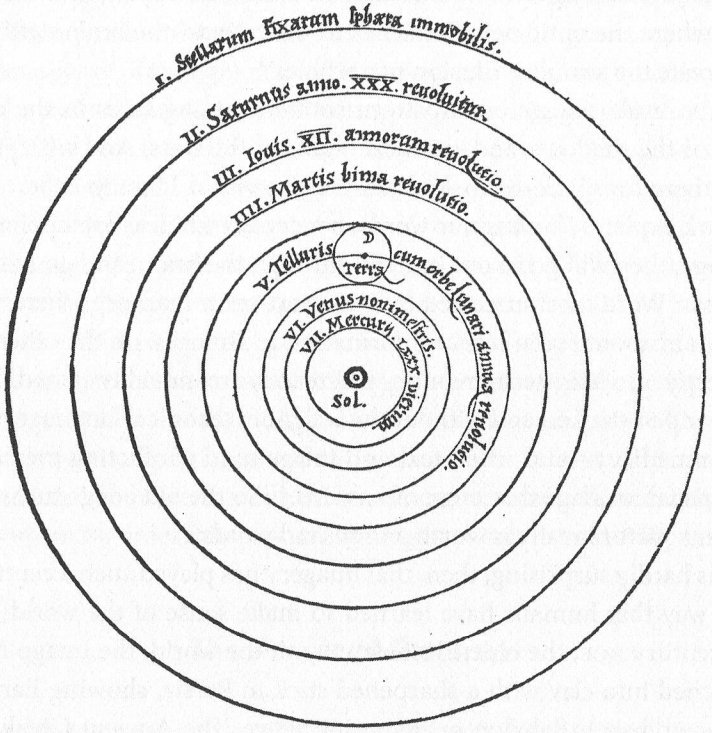
From prehistoric cave paintings to the map of the London Underground, images, diagrams and charts have long been at the heart of human story-telling. The reason why is simple: our brains are wired for visuals. 'Seeing comes before words. The child looks and recognizes before it speaks,' wrote the media theorist John Berger in the opening lines of his 1972 classic, *Ways of Seeing*.[23] Neuroscience has since confirmed the dominant role of visualisation in human cognition. Half of the nerve fibres in our brains are linked to our vision and, when our eyes are open, vision accounts for two-thirds of the electrical activity in the brain. It takes just 150 milliseconds for the brain to recognise an image and a mere 100 milliseconds more to attach a meaning to it.[24] Although we have blind spots in both of our eyes—where the optic nerve attaches to the retina—the brain deftly steps in to create the seamless illusion of a whole.[25]

As a result, we are born pattern-spotters, seeing faces in the clouds, ghosts in the shadows, and mythical beasts in the stars. And we learn best when there are pictures to look at. As the visual literacy expert Lynell Burmark explains, 'unless our words, concepts and ideas are hooked onto an image, they will go in one ear, sail through the brain, and go out of the other ear. Words are processed by our short-term memory where we can only retain about seven bits of information . . . Images, on the other hand, go directly into long-term memory where they are indelibly etched.'[26] With far fewer pen strokes, and without the weight of technical language, images have immediacy—and when text and image send conflicting messages, it is the visual message that most often wins.[27] So the old adage turns out to be true: a picture really is worth a thousand words.

It is hardly surprising, then, that imagery has played such a central role in the way that humans have learned to make sense of the world. In the sixth century BCE, the oldest known map of the world, the Imago Mundi, was etched into clay with a sharpened stick in Persia, showing Earth as a flat disc and with Babylon firmly at its centre. The Ancient Greek father of geometry, Euclid, mastered the analysis of circles, triangles, curves and

rectangles in two-dimensional space, creating a diagrammatic convention that Isaac Newton later used to lay out his groundbreaking laws of motion, and that is still used in maths classes worldwide today. Few people have heard of the Roman architect Marcus Vitruvius Pollio but Leonardo da Vinci's visual depiction of his theory of proportion is instantly recognised the world over in the image of Vitruvian Man, standing—naked and open armed—in a circle and square simultaneously. In 1837 when Charles Darwin first drew in his field notebook an irregular little diagram of a branching tree—with the words 'I think' jotted above it—he captured the crux of an idea that would turn into *The Origin of Species*.[28]

Across cultures and time, it is clear that people have long understood the power of imagery and its ability to overturn deeply held beliefs. Pictures stick in the mind's eye and wordlessly reshape our view of the world. No wonder Nicolaus Copernicus—who spent his life studying the motion of the planets—waited until he was on his deathbed before he dared to publish this one:



Copernicus's 1543 depiction of the universe, which showed Earth revolving around the sun.

By depicting the sun—not Earth—at the centre of our solar system, Copernicus's picture triggered an ideological revolution that would unravel church doctrine, threaten to upend papal power and transform humanity's understanding of the cosmos and our place in it. It is extraordinary what havoc a few concentric circles can unleash.

Think, then, of the circles, parabolas, lines and curves that make up the core diagrams in economics—those seemingly innocuous pictures depicting what the economy is, how it moves and what it is for. Never underestimate the power of such images: what we draw determines what we can and cannot see, what we notice and what we ignore, and so shapes all that follows. The images that we draw to describe the economy invoke the timeless truths of Euclid's maths and Newton's physics in their geometric simplicity. But in doing so, they slip swiftly into the back of our head, wordlessly whispering the deepest assumptions of economic theory that need never be put into words because they have been inscribed in the mind's eye. They present a very partial picture of the economy, smoothing over economic theory's own peculiar blind spots, enticing us to search for laws within their lines and sending us in pursuit of false goals. What's more, those images linger, like graffiti on the mind, long after the words have faded; they become stowaway intellectual baggage, lodged in your visual cortex without you even realising it is there. And—just like graffiti—it is very hard to remove. So if a picture is worth a thousand words, then, in economics at least, we should pay a great deal more attention to the pictures that we teach, draw and learn.

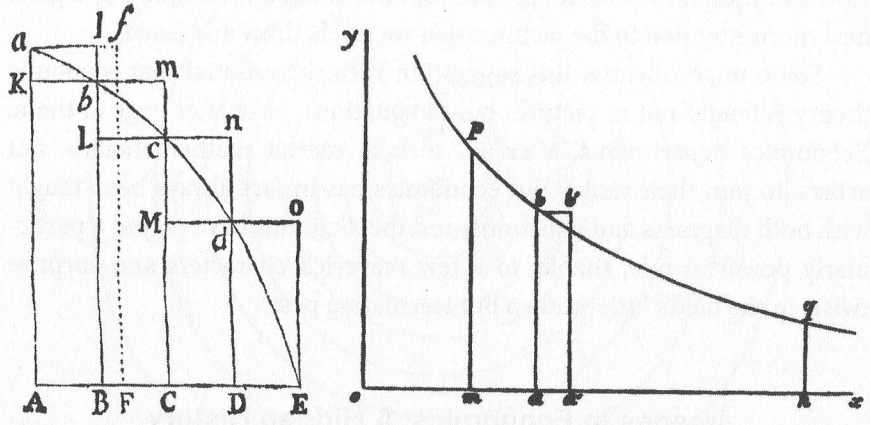
Some might dismiss this suggestion with the rebuttal that economic theory is taught not in pictures but in equations, page after page of them. Economics departments, after all, seek to recruit mathematicians, not artists, to join their ranks. But economics has in fact always been taught with both diagrams and equations, and the diagrams have played a particularly powerful role, thanks to a few maverick characters and surprise twists in the field's little-known but fascinating past.

Images in Economics: A Hidden History

Many of the founding fathers of economics used imagery to express their seminal ideas. When in 1758 the French economist François Quesnay published his *Tableau Économique*—with its zigzagging lines depicting

the flow of money as it circulated between landowners, labourers and merchants—he effectively drew up the first quantified economic model. In the 1780s, the British political economist William Playfair began to invent new ways of presenting data, using what every schoolchild now knows as graphs, bar charts and pie charts. With these tools, he powerfully visualised the political issues of his day, such as the sharply rising price of wheat for the day labourer and England's shifting balance of trade with the rest of the world. A century later, the British economist William Stanley Jevons drew a picture depicting what he called 'the law of demand', plotting incremental changes in price and quantity along a curve in order to show that, as the price of a thing falls, people will want to buy more of it. Aspiring to make his theory seem as scientific as physics, he intentionally drew it in a style that closely resembled Newton's depiction of the laws of motion. And that demand curve still features in the first diagram encountered by the novice student today.

The first half of twentieth-century economics was dominated by Alfred Marshall's 1890 book, *Principles of Economics*, the master text used to teach most students. In its preface, Marshall mused on the relative merits of using equations versus diagrams to elucidate the text. Mathematical equations, he believed, were most useful 'in helping a person to write down quickly,



On the motion of bodies / Isaac Newton, 1687

On the law of demand / William Stanley Jevons, 1871

Aspiring to make economics seem as scientific as physics, Jevons drew his theories in the style of Newton's diagrams of the laws of motion.

shortly and exactly, some of his thoughts for his own use . . . But when a great many symbols have to be used, they become very laborious to any one but the writer himself.' The value of diagrams, he believed, was far greater. 'The argument in the text is never dependent upon them; and they may be omitted,' he wrote, 'but experience seems to show that they give a firmer grasp of many important principles than can be got without their aid; and that there are many problems of pure theory, which no one who has once learnt to use diagrams will willingly handle in any other way.'[29]

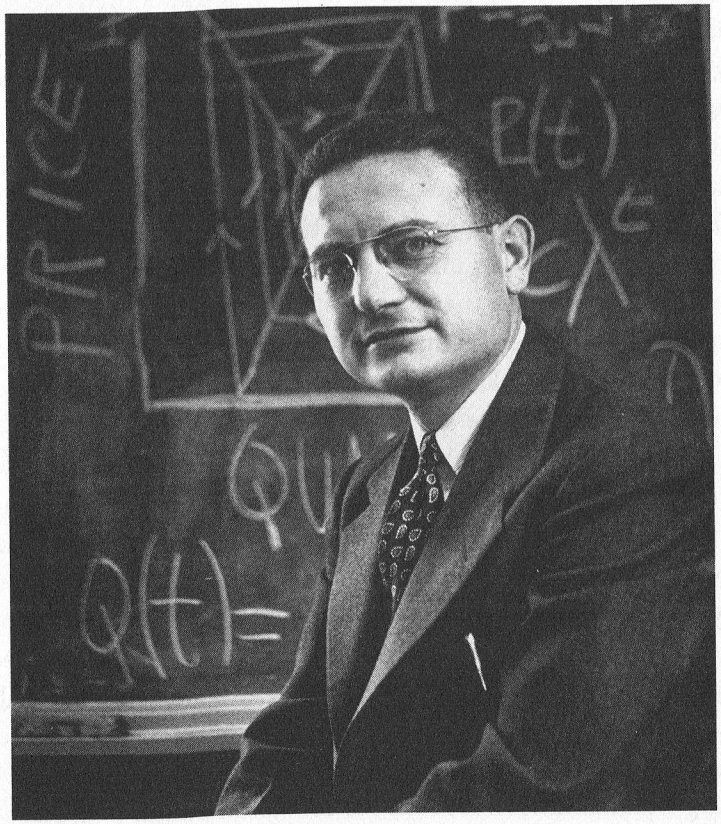
It was Paul Samuelson, however, who decisively placed imagery at the heart of economic thought in the second half of the twentieth century. Known as the father of modern economics, Samuelson spent his seven-decade career at the Massachusetts Institute of Technology (MIT), and on his death in 2009, he was heralded as 'one of the giants on whose shoulders every contemporary economist stands'.[30] He was enamoured of equations and diagrams, and he profoundly influenced the use of both in economic theory and teaching. But, crucially, he believed they were suited to very different audiences: in short, equations were for the specialists; pictures for the masses.

Samuelson's first major work was the book of his doctoral dissertation, *Foundations of Economic Analysis*. Published in 1947, it was aimed at the hard-core theorist and was unapologetically mathematical: equations, he believed, should be the mother tongue of professional economists, serving to cut through muddled thinking and replace it with scientific precision. He wrote his second book, however, for an utterly different audience and only thanks to a twist of fate.

At the end of the Second World War, US college enrolments ballooned as hundreds of thousands of ex-servicemen returned home in search of the education that they had missed and the jobs that they desperately needed. Many opted to study engineering—essential for post-war construction—and were required to learn a little economics along the way. Samuelson was, at the time, a 30-year-old professor at MIT and a self-declared 'whippersnapper go-getter in esoteric theory'. But his departmental boss, Ralph Freeman, had a problem on his hands: 800 engineering students at MIT had started a year-long compulsory course in economics, and it was not going well. Samuelson recalled the conversation that took place when Freeman turned up at his office one day and closed the door behind him. 'They hate it,' Freeman confessed. 'We've tried everything. They still hate

it . . . Paul, will you go on half time for a semester or two? Write a text the students will like. If they like it, yours will be good economics. Leave out whatever you like. Be as short as you wish. Whatever you come up with, that will be a vast improvement on where we are.'[31]

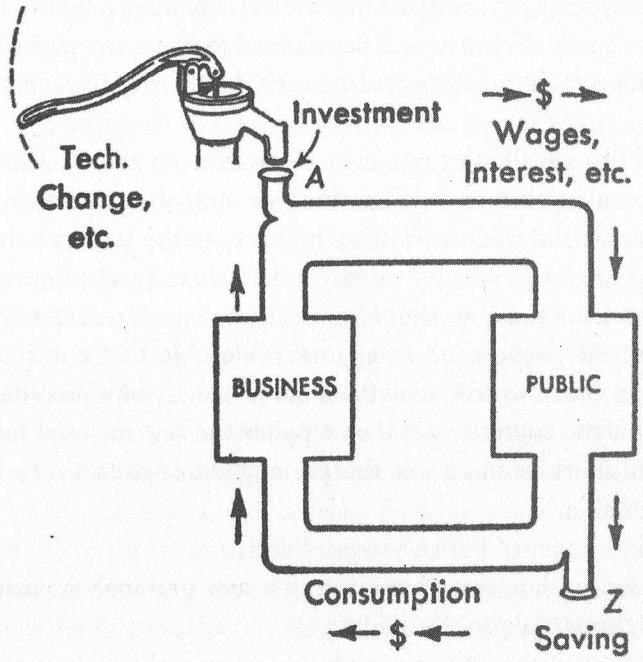
It was, said Samuelson, an offer he couldn't refuse, and the text that he wrote over the next three years—titled simply *Economics*—became the 1948 textbook classic that shot him to lifelong fame. Fascinatingly, the strategy he chose in writing it followed right in the footsteps of the medieval Roman Catholic Church. Before the advent of the printing press, the Church had used two quite distinct methods to spread its doctrine. The learned few—monks, priests and scholars—were required to read the Bible in Latin, writing out its verses line by line. In contrast, the illiterate



Paul Samuelson: the man who drew economics.

masses were taught the Bible's stories in pictures, painted as frescoes on church walls and illuminated in stained-glass windows. It turned out to be a highly successful mass communications strategy. Samuelson was just as smart: setting aside the specialist's equations, he fully embraced diagrams, graphs and charts to create his one-stop-shop economics course for the masses. And since his primary audience was a cohort of engineers, he adopted a visual style that they would have found familiar, drawn in the tradition of mechanical engineering and fluid mechanics. Here, for example, is an image from the first edition of his textbook, showing how income circulates round the economy, with new investments topping it up. It evolved to become his most famous diagram—known as the Circular Flow—and was clearly based on the metaphor of water flowing through plumbed pipes.[32]

His picture-rich textbook was a hit, and what worked for the engineers turned out to work for the rest too. *Economics* was soon adopted by university professors across the country, and then overseas. It became America's



Samuelson's 1948 Circular Flow diagram, which depicted income flowing round the economy as if it were water flowing round plumbed pipes.

bestselling textbook—across all subjects—for nearly 30 years. Translated into more than forty languages, it sold four million copies worldwide over a span of 60 years, providing generations of students with all they needed to know of Econ 101.[33] With each new edition came more pictures: the 70 diagrams in the first edition had multiplied to almost 250 diagrams by the 11th edition in 1980. Samuelson deeply understood and relished this influence over the college freshman's mind as a blank slate. 'I don't care who writes a nation's laws—or crafts its advanced treatises—so long as I can write its economics textbooks,' he declared in later years. 'The first lick is the privileged one, impinging on the beginner's tabula rasa at its most impressionable state.'[34]

A Long Struggle of Escape

Paul Samuelson was not alone in appreciating the extraordinary influence wielded by those who determine how we begin. His teacher and mentor, Joseph Schumpeter, also realised that the ideas handed down to us can be very hard to shake off, but he was determined to do so, to make way for his own insights. As Schumpeter wrote in his 1954 *History of Economic Analysis*,

> In practice we all start our own research from the work of our predecessors, that is, we hardly ever start from scratch. But suppose we did start from scratch, what are the steps we should have to take? Obviously, in order to be able to posit to ourselves any problems at all, we should first have to visualize a distinct set of coherent phenomena as a worthwhile object of our analytic effort. In other words, analytic effort is of necessity preceded by a preanalytic cognitive act that supplies the raw material for the analytic effort. In this book, this pre-analytic cognitive act will be called Vision.

He was clear, however, that creating a new pre-analytic vision could never be an impartial process, adding:

> The first task is to verbalize the vision or to conceptualize it . . . in a more or less orderly schema or picture . . . It should be perfectly clear that there is a wide gate for ideology to enter into this process. In fact, it enters on the very ground floor, into the preanalytic cognitive act of which we have been speaking. Analytic work begins with material provided by our vision of things, and this vision is ideological almost by definition.[35]

Other thinkers have used different words to make a similar point. Schumpeter's concept of pre-analytic vision was inspired by the ideas of sociologist Karl Mannheim whose observation in the late 1920s that 'every point of view is particular to a social situation' led him to popularise the notion that we each have a 'worldview' which acts as the lens through which we interpret the world. In the 1960s, Thomas Kuhn turned scientific research upside down by pointing out that 'scientists work from models acquired through education . . . often without quite knowing or needing to know what characteristics have given these models the status of community paradigms'.[36] In the 1970s, sociologist Erving Goffmann introduced the concept of 'framing'—in the sense that each of us views the world through a mental picture frame—to show that the way we make sense out of our jumble of experience delineates what we can then see.[37]

Pre-analytic vision. Worldview. Paradigm. Frame. These are cousin concepts. What matters more than the one you choose to use is to realise that you have one in the first place, because then you have the power to question and change it. In economics, that's an open invitation to look afresh at the mental models we employ in describing and understanding the economy. But it is no easy thing to do, as Keynes discovered. Coming up with his groundbreaking theory in the 1930s was, he admitted, 'a struggle of escape from habitual modes of thought and expression . . . The difficulty lies not in the new ideas, but in the old ones which ramify, for those of us brought up as most of us have been, into every corner of our minds.'[38]

The possibility of shaking off old mental models is enticing, but the quest for new ones comes with caveats. First, always remember that 'the map is not the territory', as the philosopher Alfred Korzybski put it: every model can only ever be a model, a necessary simplification of the world, and one that should never be mistaken for the real thing. Second, there is no correct pre-analytic vision, true paradigm or perfect frame out there to be discovered. In the deft words of the statistician George Box, 'All models are wrong, but some are useful.'[39] Rethinking economics is not about finding

the correct one (because it doesn't exist); it's about choosing or creating one that best serves our purpose—reflecting the context we face, the values we hold, and the aims we have. As humanity's context, values and aims continually evolve, so too should the way that we envision the economy.

There may be no perfect frame waiting to be found, but, argues the cognitive linguist George Lakoff, it is absolutely essential to have a compelling alternative frame if the old one is ever to be debunked. Simply rebutting the dominant frame will, ironically, only serve to reinforce it. And without an alternative to offer, there is little chance of entering, let alone winning, the battle of ideas.

Lakoff has for years drawn attention to the power of verbal framing in shaping political and economic debate. He points, by way of example, to the notion of 'tax relief' widely used by US conservatives: in just two words, it frames tax as an affliction, a burden to be lifted by a heroic rescuer. How should progressives respond? Certainly not by arguing 'against tax relief', because repeating that phrase merely strengthens the frame (who could be against relief, after all?). But, says Lakoff, progressives too often try to set out their own views on tax with lengthy explanations, precisely because no concise alternative frame has been developed.[40] They desperately need an alternative two-word phrase to encapsulate their view and counter the other. In fact the frame of 'tax justice'—which instantly invokes community, fairness and accountability—has been fast gaining traction internationally as global scandals over tax havens and corporate tax avoidance have hit the headlines. Having a powerful way to frame the matter has no doubt helped to channel public outrage and mobilise widespread demand for change.[41]

Just as Lakoff's work has revealed the power of *verbal* framing in political and economic debate, this book aims to reveal the power of *visual* framing and to use it to transform twenty-first-century economic thinking. I only realised just how powerful visual framing can be in 2011 when I first drew the Doughnut and was taken aback by the international response to it. In the arena of sustainable development, it soon became an iconic image that was used by activists, governments, corporations and academics alike to change the terms of debate. In 2015, insiders to the UN process of negotiating the Sustainable Development Goals—the 17 globally agreed goals for charting human progress—told me that, in late-night meetings to hammer out the final text, the image of the Doughnut was

there on the table as a reminder of the big-picture goals they were aiming for. Many people told me that the Doughnut made visible the way that they had always thought about sustainable development; they had just never seen it drawn before. What struck me most was the impact that the image had in fostering new ways of thinking: it helped to reinvigorate old debates and instigate new ones, while offering a positive vision of an economic future worth striving for.

Visual frames, it gradually dawned on me, matter just as much as verbal ones. That realisation drove me to look back at the images that had dominated my own economic education, and I saw for the first time just how powerfully they summed up and reinforced the mindset I had been taught. At the heart of mainstream economic thinking is a handful of diagrams that have wordlessly but powerfully framed the way we are taught to understand the economic world—and they are all out of date, blinkered, or downright wrong. They may lie hidden from view, but they deeply frame the way we think about economics in the classroom, in government, in the boardroom, in the media and in the street. If we want to write a new economic story, we must draw new pictures that leave the old ones lying in the pages of last century's textbooks.

What, then, if you have never studied economics, never laid your eyes on its most powerful pictures? For starters, don't kid yourself that you are immune to their influence: no one is. Those diagrams so strongly frame the way that economists, politicians and journalists talk about the economy that we all end up invoking them with our words even if we have never seen them with our eyes. But at the same time, as an economic novice, consider yourself lucky that Paul Samuelson never got that first lick of your *tabula rasa*. The fact that you have never sat through an economics lecture may just turn out to be a distinct advantage after all: you've less baggage to offload, less graffiti to scrub out. Every now and then, being untutored can be an intellectual asset—and this is one of those moments.

Seven Ways to Think Like a Twenty-First-Century Economist

Whether you consider yourself an economic veteran or novice, now is the time to uncover the economic graffiti that lingers in all of our minds and, if you don't like what you find, scrub it out; or, better still, paint

it over with new images that far better serve our needs and times. The rest of this book proposes seven ways to think like a twenty-first-century economist, revealing for each of those seven ways the spurious image that has occupied our minds, how it came to be so powerful and the damaging influence it has had. But the time for mere critique is past, which is why the focus here is on creating new images that capture the essential principles to guide us now. The diagrams in this book aim to summarise that leap from old to new economic thinking. Taken together, they set out—quite literally—a new big picture for the twenty-first-century economist. So here is a whirlwind tour of the ideas and images at the heart of Doughnut Economics.

First, change the goal. For over 70 years, economics has been fixated on GDP, or national output, as its primary measure of progress. That fixation has been used to justify extreme inequalities of income and wealth coupled with unprecedented destruction of the living world. For the twenty-first century, a far bigger goal is needed: meeting the human rights of every person within the means of our life-giving planet. And that goal is encapsulated in the concept of the Doughnut. The challenge now is to create economies—local to global—that help to bring all of humanity into the Doughnut's safe and just space. Instead of pursuing ever-increasing GDP, it is time to discover how to thrive in balance.

Second, see the big picture. Mainstream economics depicts the whole economy with just one, extremely limited image, the Circular Flow diagram. Its limitations have, furthermore, been used to reinforce a neoliberal narrative about the efficiency of the market, the incompetence of the state, the domesticity of the household and the tragedy of the commons. It is time to draw the economy anew, embedding it within society and within nature, and powered by the sun. This new depiction invites new narratives—about the power of the market, the partnership of the state, the core role of the household and the creativity of the commons.

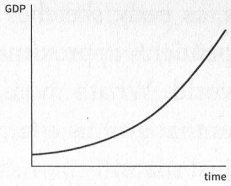
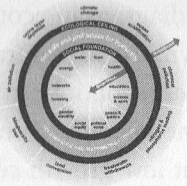
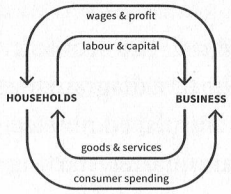
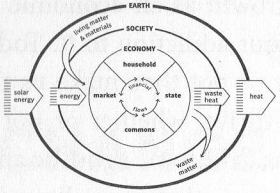
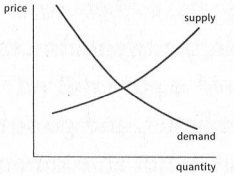
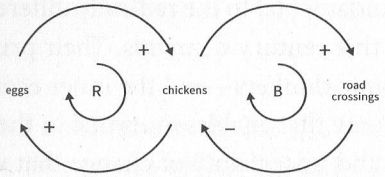
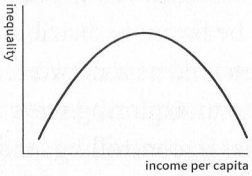
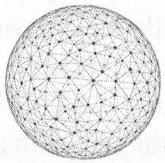
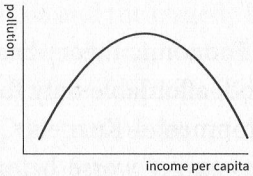
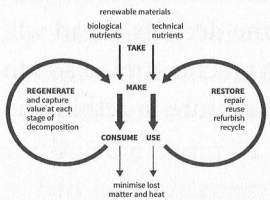
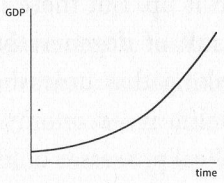
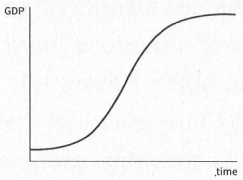
Third, nurture human nature. At the heart of twentieth-century economics stands the portrait of rational economic man: he has told us that we are self-interested, isolated, calculating, fixed in taste and dominant over nature—and his portrait has shaped who we have become. But human

nature is far richer than this, as early sketches of our new self-portrait reveal: we are social, interdependent, approximating, fluid in values and dependent upon the living world. What's more, it is indeed possible to nurture human nature in ways that give us a far greater chance of getting into the Doughnut's safe and just space.

Fourth, get savvy with systems. The iconic criss-cross of the market's supply and demand curves is the first diagram that every economics student encounters, but it is rooted in misplaced nineteenth-century metaphors of mechanical equilibrium. A far smarter starting point for understanding the economy's dynamism is systems thinking, summed up by a simple pair of feedback loops. Putting such dynamics at the heart of economics opens up many new insights, from the boom and bust of financial markets to the self-reinforcing nature of economic inequality and the tipping points of climate change. It's time to stop searching for the economy's elusive control levers and start stewarding it as an ever-evolving complex system.

Fifth, design to distribute. In the twentieth century, one simple curve—the Kuznets Curve—whispered a powerful message on inequality: it has to get worse before it can get better, and growth will (eventually) even it up. But inequality, it turns out, is not an economic necessity: it is a design failure. Twenty-first-century economists will recognise that there are many ways to design economies to be far more distributive of the value that they generate—an idea best represented as a network of flows. It means going beyond redistributing income to exploring ways of redistributing wealth, particularly the wealth that lies in controlling land, enterprise, technology, knowledge and the power to create money.

Sixth, create to regenerate. Economic theory has long portrayed a 'clean' environment as a luxury good, affordable only for the well-off. This view was reinforced by the Environmental Kuznets Curve, which once again whispered that pollution has to get worse before it can get better and growth will (eventually) clean it up. But there is no such law: ecological degradation is simply the result of degenerative industrial design. This century needs economic thinking that unleashes regenerative design in order to create a circular—not linear—economy and to restore humans as full participants in Earth's cyclical processes of life.

Seven Ways to Think:	From Twentieth-Century Economics	To Twenty-First-Century Economics
1. Change the Goal	 GDP	 the Doughnut
2. See the Big Picture	 self-contained market	 embedded economy
3. Nurture Human Nature	 rational economic man	 social adaptable humans
4. Get Savvy with Systems	 mechanical equilibrium	 dynamic complexity
5. Design to Distribute	 growth will even it up again	 distributive by design
6. Create to Regenerate	 growth will clean it up again	 regenerative by design
7. Be Agnostic about Growth	 growth addicted	 growth agnostic

Seventh, be agnostic about growth. One diagram in economic theory is so dangerous that it is never actually drawn: the long-term path of GDP growth. Mainstream economics views endless economic growth as a must, but nothing in nature grows forever, and the attempt to buck that trend is raising tough questions in high-income but low-growth countries. It may not be hard to give up having GDP growth as an economic goal, but it is going to be far harder to overcome our addiction to it. Today we have economies that need to grow, whether or not they make us thrive; what we need are economies that make us thrive, whether or not they grow. That radical flip in perspective invites us to become agnostic about growth and to explore how economies that are currently financially, politically and socially addicted to growth could learn to live with or without it.

These seven ways of thinking like a twenty-first-century economist don't lay out specific policy prescriptions or institutional fixes. They promise no immediate answers for what to do next, and they are not the whole answer. But I am convinced that they are fundamental to the radically different way of thinking about economics that this century demands. Their principles and patterns will equip new economic thinkers—and the inner economist in us all—to start creating an economy that enables everyone in the house to prosper. Given the speed, scale and uncertainty of change that we face in coming years, it would be foolhardy to attempt to prescribe now all the policies and institutions that will be fit for the future: the coming generation of thinkers and doers will be far better placed to experiment and discover what works as the context continually changes. What we can do now—and must do well—is bring together the best of the emerging ideas, and so create a new economic mindset that is never set but always evolving.

The task for economic thinkers in the decades ahead will be to bring these seven ways of thinking together in practice and to add to them many more. We have barely set out on this adventure in rethinking economics. Join the crew.

one

CHANGE THE GOAL

from GDP to the Doughnut

Once a year, the leaders of the world's most powerful countries meet to discuss the global economy. In 2014, for instance, they met in Brisbane, Australia, where they discussed global trade, infrastructure, jobs and financial reform, stroked koalas for the cameras, and then rallied behind one overriding ambition. 'G20 leaders pledge to grow their economies by 2.1%', trumpeted the global news headlines—adding that this was more ambitious than the 2.0 percent that they had initially intended to target.[1]

How did it come to this? The G20's pledge was announced just days after the Intergovernmental Panel on Climate Change warned that the world faces 'severe, pervasive and irreversible' damage from rising greenhouse gas emissions. But the summit's Australian host, then–Prime Minister Tony Abbott, had been determined to stop the meeting's agenda from being 'cluttered' by climate change and other issues that could distract from his top priority of economic growth, otherwise known as GDP growth.[2] Measured as the market value of goods and services produced within a nation's borders in a year, GDP (Gross Domestic Product) has long been used as the leading indicator of economic health. But in the context of