

Elements for a New Growth Narrative

Draft Report

With the backlash against globalisation, increased inequalities of income and opportunities, and the negative impact of growth on the environment, it is all the more urgent to advance the task set out in the Secretary-General's agenda, "21 for 21", to develop a "new narrative of growth" that puts people at the centre of economic policy.

This document summarises the personal views of NAEC partners. We invite comments on the present draft and contributions to the further development of the narrative.

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DISCLAIMER

The following text summarises the views of a number of thinkers who have contributed in a personal capacity to the debate stimulated by OECD Secretary-General Angel Gurría’s “21 for 21” proposal for consolidation and further transformation of the OECD: “Redefining the growth narrative to put the well-being of people at the centre of our efforts”.

It builds on “New Approaches to Economic Challenges: Towards a new narrative” presented at OECD Week in 2017.

The objective of this document is to receive feedback and comments from the different OECD Policy Committees that participate in the NAEC Group, of 13 September, and continue the dialogue with NAEC partners and thinkers outside the OECD.

The opinions expressed and the arguments employed herein do not necessarily reflect the official views of OECD member countries or any institution with which the contributors may be affiliated.

INTRODUCTION: ON AN EMPOWERING NARRATIVE

Gabriela Ramos

The OECD set up the New Approaches to Economic Challenges (NAEC) Initiative to examine the failures of our analytical frameworks that prevented us from avoiding the 2008 financial and economic crisis, and to establish the basis of a better way of analysing economic challenges and improving policy advice. Over the past few years, we have asked a wide range of leading thinkers from academic, private and public institutions to share with us their views regarding the shortcomings of our current analysis, to give answers to those people in our member countries who feel left behind by the globalisation process, and who witness increased inequalities of income and opportunities. Their frank views are presented in this document, and even though we do not agree with everything they say, the NAEC Seminars have been a source of reflection and inspiration.

Growing economic integration and connectedness is helping to improve living standards across the globe, but the traditional analytical models we use to study today's economy make too many assumptions that are at odds with the facts. The very name of these models, general equilibrium, shows that they assume that the economy is basically in balance until an outside shock upsets it. They assume that you can understand the economy by studying a representative agent whose expectations and decisions are rational, and that there are homogeneous outcomes. This view is essentially linear, and the policy advice it generates is tailored to a linear system where an action produces a fairly predictable reaction. It looks at aggregate outcomes and at average results. It concentrates on flows and does not fully consider stocks. It relies on quantitative economics, preventing it from benefiting from what other social sciences may be able to contribute, such as sociology, psychology, history.

Economic models that rely only on inputs such as GDP, income per capita, trade flows, resource allocation, productivity, representative agents, and so on can tell a part of the story and are necessary for historic and comparative purposes, but they fail to capture the distributional consequences of the policies we implement, and do not address the fact that the growth process has not benefited everybody. GDP and trade flows are a means to an end, and that end is the well-being of people. They have limits when being used as the only proxies for well-being. There is a need to measure better the impact of policies on people's lives. It is also important to capture the unintended consequences of those policies, often the consequence of working with a silo approach. Traditional indicators do not capture natural resource depletion, or incorporate upfront environmental damage as liabilities. On the contrary, they assume that, by growing the pie, you can always clean up after you grow, and that inequality of income and opportunities will diminish. This is not proven empirically. So we need to renew our analytical frameworks and the assumptions that we make, to better capture reality and improve our policy analysis.

To start with, we need different, more-granular information, data and analysis, and better metrics. We have to be able to check how policies will impact different income groups, communities, regions and firms by adopting this granularity. We need more comprehensive approaches that capture the complexity of the world economy and our societies, breaking out of our policy silos. We need to adopt the cross-disciplinary, horizontal cooperation that NAEC advocates. Many OECD member countries are experimenting with these approaches, and adopting a more integrated analysis, with better coordination among different policy communities.

We also need to deal with elements such as justice, trust or social cohesion that are difficult to measure in our traditional models. In fact these models are based on an ideology or narrative that claims that people are rational, take the best decisions according to the information they have to maximize utility, and that the accumulation of rational decisions will deliver the best outcome. Real people are not like that. Their lives are shaped by their hopes, aspirations, history, culture, tradition, family, friends, language, identity, the media, community and other influences. These elements are not relevant to macroeconomic models, but we need to listen to people, and incorporate their views in our reflection about more effective policies.

We also need a new narrative to integrate all these different, often conflicting influences. So what might such a new narrative look like? It should be based on the best facts and science available, and as Eric Beinhocker argues, could contain four stories: a new story of growth; a new story of inclusion; a new social contract; and a new idealism.

Idealism is important when many people feel – rightly or wrongly – that they played by the rules, but others in society haven't, and those others have been rewarded. In the Cato Institute's 2017 *Financial Regulation Survey* of US attitudes for example, "77% believe bankers would harm consumers if they thought they could make a lot of money doing so and get away with it".¹ People also feel that their political leaders and institutions are too remote from their concerns. The OECD's *Government at Glance 2017* reports that on average, less than half of OECD countries' citizens (42%) have trust in their national government, which represents a decline of three percentage points since 2007. And finally people feel at the mercy of big impersonal forces – globalisation, technology change, multinational corporations – over which they have no control. In our recent *Risk that matters* survey, people that were asked for their views, old and young expressed great concern about what the future would bring, and the inadequacy of the current protection frameworks to help them when confronting to the risk of losing their jobs, or falling ill.

A new narrative of growth, underpinned by the ideas shared by NAEC partners, and the policies it inspires, should be about how people's lives can be made more fulfilling; how they can fairly share in their nation's prosperity; how they can have more control over their destiny; how they can live with dignity and respect; how everyone has to play by the same rules; how the social contract can be rewritten for the 21st century to reflect the needs and duties of all stakeholders in the context of a digital economy; how economic and technological progress could benefit the majority and not just an elite; and how governments, corporations and banks can better serve society's interests.

However, we are living in an age where social prosperity has become decoupled from economic prosperity, as Denis Snower has rightly argued, and this disconnect is fuelling discontent. Material wealth will therefore not meet the challenges on its own. This is also embedded in the work that the OECD launched several years ago on a "well-being framework" to broaden the definition of well-being and incorporate non-material dimensions, including social connections, health, quality of jobs, quality of the environment, etc. Personal empowerment and social solidarity are central too. This implies a change in the role of governments and the goals of policy. The traditional policy toolkit is designed to correct market failures and to correct some of the imbalances afterwards through redistribution. It takes existing social and economic structures and institutions for granted.

A new approach would consider the direction of growth and not just the rate. It would focus on three divisions that shape advantage and opportunity: the division between advanced and backward groups, firms and places, where the nexus between inclusiveness and productivity is most manifest; between capital and labour; and between finance and the real economy. In this framework, questions of education, opportunity and so on would reappear in a new light. Identity, for example, is closely linked to jobs traditionally, but technological change is threatening this in many sectors, and undermining the sense of worth. This is compounded by wage compression due to globalisation for some. So if we want to put well-being at the centre of policy concerns, we have to tackle the change in expectations, the growing fear and uncertainty among many people that technological and economic trends are generating. We also need to understand better the impact of global interlinkages and connections, and the nature of trade and investment.

Unlike sociologists, we have tended to neglect this aspect of technological change, emphasizing the fact that new technologies have always boosted production and have been beneficial overall in the long term.

¹ Wall Street vs. The Regulators: Public Attitudes on Banks, Financial Regulation, Consumer Finance, and the Federal Reserve. Results from the Cato Institute 2017 Financial Regulation Survey <https://www.cato.org/survey-reports/wall-street-vs-regulators-public-attitudes-banks-financial-regulation-consumer>

We should look to other disciplines, to see how they capture notions such as empowerment. We could also build on tools the OECD already has, such as the Better Life Index, or the PISA exercise which has successfully broadened the definition of skills to include a wider range of socio-emotional skills and capabilities. But we would also have to rethink how we evaluate progress, and concentrate on defining what is valuable and how to assess it, rather than promoting market value as the main criterion for everything. We also have to refine and retool the metrics we already have, for example to measure income concentration, or take rents out of GDP calculations. This does not imply that we should not focus on producing higher rates of sustainable growth, with increases in the standard of living, or that we should not consider the role of markets in allocating resources efficiently, but it will require taking a hard look at the outcomes of the growth process, and ensuring that the benefits are shared fairly and the impacts on the environment are well accounted for.

Such changes could underpin efforts to value better the role of government and the aims of policy. If social prosperity is to be a guiding principle, then broad ambitions such as the SDGs have to be considered through specific policy interventions rather than broad intentions. This could for example be a target to provide quality early childcare and education to children from disadvantaged families, particularly from 0-3 years of age. But it will require not only focusing on access, but also affordability and quality. Succeeding in these missions would require reframing public-private partnerships away from picking winners to what Mariana Mazzucato calls “picking the willing” – companies or other actors who accept the idea of co-creation and shaping markets. In re-evaluating the role of the state, public investment in education, health, infrastructure, and the quality of governance is key.

Integrating these multiple critiques and proposals into a coherent synthesis ultimately means proposing a redefinition of the nature of well-being to balance economic, social and environmental capabilities. This requires theoretical debate, institutional change, new tools and methodologies, and leadership to mobilise and federate forces for change and present a picture of what that change could be. During the last six years, NAEC has contributed to this debate, and all across the OECD different committees, Ambassadors and OECD staff have promoted this open discussion of new ideas. It is important to take stock of where we are, and how we can take this effort to improve the OECD’s analytical frameworks to produce better results for people.

The present volume is an important contribution to that process. It starts by reviewing how the economy and business are changing. Jonathan Haskel and Stian Westlake describe how the rise of the intangible economy is impacting firms and workers, while Roberto Unger takes a longer-term approach to how the vanguard of the knowledge economy can be made more inclusive. This has profound implications for firms, discussed by William Lazonick and James Copland, and will be shaped by, and influence the interactions among markets, speculators and the state examined by William Janeway.

Economic thinking is changing too, and David Pilling takes up the theme of how GDP and well-being are not synonymous. Mariana Mazzucato criticises another fundamental of traditional thinking – the notion of market failure. Will Tracy sees complexity economics as the most pragmatic framework for understanding how the economic system itself operates, and how it interacts with other systems. Adopting a radically new approach implies a shift in the economic paradigm, similar to those analysed by Michael Jacobs that were provoked by major crises in the past, including the Great Depression or stagflation in the 1970s. Such fundamental shifts in the economy and economics have to be accompanied and guided by a change in policies and policymaking, ranging from the macroeconomic issues tackled by Olivier Blanchard to the role of government in innovation, and the roots of inequality exposed by Angus Deaton.

Denis Snower, George Akerlof and Robert Shiller conclude our volume by analysing the role narratives play in integrating thinking about economics into stories that shape attitudes and outcomes.

THE ECONOMY AND BUSINESS ARE CHANGING

The rise of the intangible economy

Prosperity in the old economy was based on companies and people making and buying things you could touch or feel like buildings, machinery, and vehicles, and on investors investing in these things. [Jonathan Haskel and Stian Westlake](#) show that the nature of the investment that businesses do has fundamentally changed. Finance is increasingly attracted to things you cannot touch or feel, such as research and development, design, organisational development, and other forms of “intangible” investments. Companies such as AirBnB with billions of dollars of market capitalisation do not actually “make” anything, and the profits from manufacturing a device like a smartphone represent only a small part of the value-added embedded in the product.

Intangible assets tend to behave differently from tangible ones because they have different economic properties, the 4S’s:

Scalability. Intangible assets can often be used over and over, in multiple places, with little or no reinvestment. A taxi is not scalable, the Uber algorithm is.

Sunkness. Once a firm makes an intangible investment, it is hard to sell it or recover its value. If a phone company such as Nokia goes bankrupt, it can sell its headquarters and other buildings. Microsoft’s Windows Mobile operating system was the most popular mobile system in the US in 2007, but it disappeared after it lost out to other systems including Android and iOS.

Synergies. Intangible assets are often especially valuable when combined with other intangibles and human capital. The whole price of two EpiPens used to administer around a dollar’s worth of drugs against anaphylactic shock rose from \$100 in 2007 to over \$600 in 2016 after intensive marketing and lobbying campaigns.

Spillovers. A firm making an intangible investment will not receive all (or perhaps any) of the returns. A tangible asset such as a warehouse or truck can be protected using guards and locks, but software or design features are can be imitated relatively easily without infringing intellectual property rules. Spillovers of intangibles increases the case for public investment in research and training as well as other publicly-funded intangibles such as procurement or publicly-run firms.

These features are readily identified with tech giants such as Google whose search algorithms, software, and data stores are worth far more than the computers they run on. However, even traditional businesses rely on more and more intangible assets, such as software, codified operating procedures, or brands. Fast food outlets may use highly sophisticated software to manage employee schedules so that they can rely on temporary and part-time contracts. Moreover, the rise of intangibles is a long-term trend that can be observed, for the US at least, since the early 20th century. Also, while the recent rise of intangibles is strongly linked to developments in IT, it can be argued that the converse is true as well: the intangible economy was a major influence on the development of IT. Lyon’s tea shops in the UK built a nationwide brand, and oversaw the development of the world’s first business computer, the 1951 Lyons Electronic Office.

The intangible economy is a major factor in what [the OECD](#) calls the “productivity-inclusiveness nexus” that is creating winners and losers at every scale from national regions to the global economy. OECD data

show that despite the slowdown in the growth of aggregate productivity, growth at the global frontier (that is, among the most productive firms) remained robust over the 2000s. At the same time, the rising productivity gap between the global frontier and other firms raises key questions about why seemingly non-rival technologies do not diffuse to all firms. The OECD analysis reveals a highly uneven process of technological diffusion, which is consistent with a model whereby global frontier technologies only diffuse to laggards once they are adapted to country-specific circumstances by the most productive firms. In Haskel and Westlake's framework, because intangibles are scalable and have synergies with one another, companies that have valuable intangibles will do better and better (and have more incentives to invest in more), while small and low-performing companies will not have the same incentives or capacity and will lag ever further behind.

There are implications for skills and employability too. People who are good at combining ideas, and who are open to new ideas, will do better in an economy where there are lots of synergies between different assets. Since intangible assets tend to be contested, this puts a premium on people who can make sense of the contestedness. It is not just a question of talent and education though. Socioeconomic status plays a role, offering an advantage to those with good political, legal, and social connections. People who live in cities (where ideas tend to combine easily with one another) also have an advantage over those from other areas, who risk being left further behind. The rise of the intangible economy may be part of the explanation of social and political phenomena too, such as the backlash against globalisation and a rejection of multilateralism. Places that are more connected, cosmopolitan tend to do better economically in an intangible economy, while left-behind places suffer from an alienation that is both economic and cultural.

The rise of intangibles may also be contributing to the fact that productivity growth and investment seem to have slowed down, even though you would expect them to grow at a period when interest rates are low and corporate profits are high. Some of this may simply be because of under-measurement of investment in accounting procedures that were not designed to reflect this kind of activity, whether national accounts of company accounts. The rate of growth of intangible investment has however slowed since 2009, and this would explain part of the slow-down in growth (and help explain why the slowdown has been mainly in total factor productivity). This may be due in part to the fact that the sunk costs of intangible investment make debt finance harder since there are fewer assets to salvage in case of default, while most businesses rely on debt finance. A shift to more equity finance seems necessary. This would require changes to taxes as well as significant institution-building.

Leading firms, who already own considerable amounts of intangible assets, invest in their own intangibles because of the expected benefits from synergies and the likelihood of benefitting from spillovers from others' intangibles. This encourages high investment and high returns. For the laggards, it's the opposite. They have few intangibles to begin with, reducing the chance of exploiting synergies, and if they do invest, their more powerful competitors are likely to get the spillovers. The result is low investment and low returns on investment.

The futures of the knowledge economy

Roberto Unger looked more broadly and at the same time in more detail at the changes discussed by Haskel and Westlake and their implications for policy. The new form of production that has emerged in all the major economies in the world, the knowledge economy, is characterised not just by the accumulation of technology, knowledge and advanced practice, but by permanent innovation. It is not associated solely with the high technology industry. It appears in every sector of the economy: in knowledge-intensive services, and precision scientific agriculture, as well as in advanced manufacturing. In every sector of the economy however, it remains a fringe from which the vast majority of workers and firms continue to be excluded. This insular character of the new knowledge-intensive vanguards has become a source of both

economic stagnation and economic inequality. If the most advanced practice of production remains quarantined, how can we expect economic growth to accelerate? At the same time, this insular vanguard is a motor of inequality. The divisions between the advanced and backward parts of production have become deeper. The traditional devices for the moderation of inequality - compensatory and retrospective redistribution by tax and transfer (progressive taxation and social entitlements) and the defence of small business - are insufficient to master the vast inequalities resulting from these structural divisions in the economy.

The new practice of production has enormous potential. At a superficial level, it is characterised by the reconciliation of production at large scale and de-standardisation or customisation of products and services, as well as by the reconciliation of a great decentralisation of initiatives and the maintenance of coherence and momentum in the process of production. But it has also deeper attributes that remained limited and masked in its present confined state.

First, it holds the promise of relaxing what has been the most constant and universal regulator in economic life: the tendency to declining productivity at the margin. In the knowledge economy, there is the prospect of loosening or reversing this constraint, now that innovation, rather than being external to the process of production and episodic, becomes internal and perpetual. The second deeper attribute of the knowledge economy in its radical, disseminated and potential form is that it brings closer together productive activity and intellectual discovery. The best firms become like the best schools and now we can imagine a fundamental change in the relation of the worker to the machine. In Henry Ford's assembly line or in Adam Smith's pin factory, workers worked as if they were one of the machines, through repetitious movements. Now, even as technology becomes more advanced and flexible, we have the possibility of a different relation between the worker and the machine. Everything we have learned how to repeat, we express in a formula or an algorithm that we then embody in the physical contraption. The machine does for us whatever we have learned to repeat so that we can reserve our supreme resource – time – for the not yet repeatable. The combination of worker and machine becomes immensely more powerful than either of them apart.

A third, deeper, attribute of the knowledge economy is the transformation in the moral culture of production. The earlier forms of production including industrial mass production were characterised by command and control and the universalisation of a low level of trust. The new form of production requires a heightening of the level of discretion and trust allowed and required to all participants in productive activity: an accumulation of social capital, a fluid mixture of cooperation and competition in the same domains of activity.

The knowledge economy that exists today is not this knowledge economy. It is an insular vanguardism: the vanguardism of the exclusive fringes. Mass production, the prior advanced practice, was stereotypical in its organisational and technological core, and minimalist in its demands. It was like a kit that could be easily transported from one place to another. But industrial mass production has ceased to be the reliable shortcut to economic growth, first because it is no longer the vanguard. It is either a residue of what used to be the most advanced practice of production, a leftover, or a junior partner to the mega-firms that now command the controlling heights of the knowledge economy. They have discovered a way to commoditise or routinise part of the process of production. They retreat into an inner sanctum, a hyper-insularity and then they accord these routinised parts of their plans of production to firms and workers in distant parts of the world.

The second reason for the unreliability of conventional industrialisation as a path to convergence to the frontier of production is that it is subject to worldwide labour and tax arbitrage on a worldwide scale. The third reason is that the firms of the knowledge economy and their associates are increasingly able to out-

compete what traditional manufacturing can do: producing the same products and services better, at lower cost.

That road to economic growth no longer works. However, the alternative, which would be a radicalised and disseminated form of the knowledge economy, an inclusive rather than an exclusive vanguard seems to be inaccessible. If it is not established, even in the richest economies of the world with the most educated populations, how do we expect to establish it in the major developing economies? The solution to this dilemma is to break it on its second side and to find ways to turn the seemingly inaccessible task of establishing an inclusive form of the knowledge economy into a feasible job by breaking it up into pieces and into stages. That should now be the first object of discussion in political economy.

The goal of socially inclusive economic growth implies the reshaping of the relation between finance and the real economy. Under the present arrangement the production system is largely self-financed by the retained and reinvested earnings of firms. The vast sums of money in the banks and the stock markets are not used to finance the productive agenda of society. In fact, finance becomes a source of instability of crises that then contaminates and harms activity in the real economy.

We could make finance more useful by discouraging financial activity that has no plausible relation to the expansion of output or the rise of productivity. We can do it on the positive side by creating new channels to do on a large scale the undone work of venture capital, of investment in the creation of new assets in new ways. The government could establish funds to tap the sterilised productive potential of the vast amounts of savings accumulated in the pension systems of the world and to open new channels between the accumulated savings of society and the development of innovative production.

The radicalisation and the dissemination of innovation cannot flourish in a circumstance in which the returns to labour diminish and the majority of the labour force faces extreme economic insecurity in the form of precarious employment. We now see together with the insular form of the knowledge economy and its hyper-insularity a new putting-out system. Work increasingly is organised on a global scale in the form of decentralised networks of contractual arrangements. We must create a new legal regime alongside the traditional labour laws to protect, organise, and represent the mass of precarious employees. But this would only be a first step. No human being should be condemned to do the repetitious work that can be done by a machine, and in the future, economically dependent wage labour could be gradually superseded as the predominant form of free work by the high forms of free labour: cooperation or partnership and self-employment, real self-employment, not the precarious self-employment that is a disguised form of unprotected, precarious wage-work.

For the other goals to advance, the market order cannot remain fastened to a single version of itself. The familiar idea of economic rationality as the power to recombine factors of production within an unchanged framework of production and change gives way to an ability to innovate in the arrangements that compose the framework of production and exchange. Alternative regimes of contracts and properties, different ways of organising and decentralised access to resources and opportunities begin to coexist experimentally within the same market order.

The fundamental motivation driving change would be to make us bigger together, through permanent structural innovation. In ordinary political and economic life, there are two classes of activities: the ordinary moves that we make within a framework of arrangements and assumptions that we take for granted, and extraordinary moves by which from time to time we challenge and change parts of this framework. Our interest is to draw closer together these two classes of moves so that our ability to challenge and change pieces of the framework in economic and political life grows more continuously out

of the normal business, out of the normal moves within the framework. Then, we become more powerful, bigger.

The role of the firm

Corporate governance came under the spotlight following the failure of company boards to exercise due diligence before the 2008 financial crisis or Facebook's failure to protect users' privacy. Away from the headlines though, the past decade has seen significant changes in how companies are governed and, increasingly, in the very nature of the firm. The demand for change is coming from shareholders, and also from governments, customers, and civil society.

The OECD's guiding framework for looking at the issues remains the G20/OECD *Principles of Corporate Governance* endorsed in 2015. The Principles state that board members should act in the best interest of the company and the shareholders, but they also say that boards are expected to take due regard of, and deal fairly with, other stakeholder interests including those of employees, creditors, customers, suppliers and local communities. Responsible business practices can result in positive outcomes such as improved access to finance as portfolio managers take environmental and social issues more into account in their investment decisions. Indeed company sustainability is essentially derived from responsible business conduct, and underpins sustainable prosperity. So in practice there should be no contradiction between corporate sustainability and responsible business conduct.

The question is how to achieve them. To answer that, participants at the NAEC-Corporate Governance Committee [Workshop](#) on corporate governance analysed how the nature of the firm is changing or should change, and whether maximising stakeholder value is the best way to achieve the best balance between the interests of all the stakeholders in companies, from the level of the individual shareholders, clients and workers to society as a whole.

Blanche Segrestin, from the Ecole des Mines in Paris introduced the first part of the debate, based on proposed changes to French company law outlined in the so-called Notat-Senard report to the French government on "[Entreprise et intérêt général](#)" – the firm and general interest – published in March 2018. Segrestin's argument can be summarised in five points:

1. Capitalism is undergoing a profound transformation, driven by digitalisation and financialisation.
2. Globalised corporations are becoming more powerful than some states.
3. Shareholding has become industrialised.
4. Management is increasingly passive.
5. There is a decoupling of shareholder interests from the long-term interests of the firm.

Jean-Baptiste Barféty, rapporteur of the Notat-Senard report and Jérôme Brouille from the French Treasury provided more details of the French proposals, notably the idea of creating something similar in French company law to the US benefit corporation. They also summarised the debates around the advantages and disadvantages of legal constraints that might be applied to including social purpose in company mission statements.

The overall feeling among delegates from other countries was that new instruments and theory may not be needed. Sustainable growth can be achieved within existing frameworks and traditional governance systems, as witnessed by the US or Scandinavian experience for example. Also, while profit is relatively easy to measure, questions arise as to who should define the best interest of the company, and how to measure and weight the interests of various stakeholders. Moreover, it may be difficult to include non-listed companies in any new disposition.

William Lazonick, Professor of Economics at the University of Massachusetts Lowell then gave his views on the “Innovative Enterprise and Sustainable Prosperity”, notably the notion of maximising shareholder value. For Lazonick, “sustainable prosperity” means stable and equitable economic growth. This requires real per capita productivity gains that can raise standards of living; employment and income that are not subject to boom and bust, over a working life of some four decades, with retirement income for two decades; and gains from growth shared fairly among those who contribute to it, at a point in time and over time (including equitable use of the planet’s resources).

Lazonick argues that the notion that the primary function of the stock market is to raise cash for companies for the purpose of investing in productive capabilities is not accurate. Compared with other sources of funds, stock markets in advanced countries have been insignificant suppliers of capital for corporations. In fact, the functions of the stock market go well beyond “cash” to include four other functions: “control,” “creation,” “combination,” and “compensation.” Specifically, the stock market enabled the separation of managerial control over the allocation of corporate resources from the ownership of the company’s shares.

Yet, assuming that the key function of the stock market is cash, economists known as agency theorists see this separation of control from ownership as the fundamental issue. Agency theorists view the business enterprise as a “market imperfection” that can be created by maximizing shareholder value (MSV).

The assumption that shareholders are the only actors who invest without a guaranteed return is erroneous, since taxpayers through government agencies and workers through business employers regularly make risky investments in productive capabilities. From this perspective, both the state and labour have economic claims on profits if and when they occur. The irony of MSV is that public shareholders typically never invest in the company’s value-creating capabilities. They invest in outstanding shares, hoping for a rise in price. Following MSV, executives fuel this hope by paying out cash as dividends and buybacks. Over 2007-2016, 461 S&P 500 companies spent \$4.0 trillion on buybacks (54.5% of profits) and \$2.9 trillion on dividends (39.3% of profits).

For corporate governance to act in favour of sustainable prosperity, government regulation must recognise the central role of corporate “retain-and-reinvest” regimes in the value-creation process. Such regulation would ban open-market repurchases and restrain stock-based executive pay.

Lazonick argues that government regulation should mandate seats on corporate boards to value creators, not value extractors. These board members would represent taxpayers and workers as well as financiers who actually invest in productive capabilities. Government regulation must recognize corporate “downsize-and-distribute” regimes as sources of predatory value extraction. Such regulation would exclude predatory value extractors from occupying executive positions and board seats.

James R. Copland, Senior Fellow and Director of Legal Policy at the Manhattan Institute for Policy Research presented the case for “Why the Shareholder Wealth Maximization Norm Makes Sense”. He agreed with Lazonick on a number of points, including that corporate decisions affect numerous stakeholders other than the owners of equity shares; and the principal purposes of publicly traded stock markets are about ownership and control. He also agreed that since the 1970s, the return of corporate earnings to shareholders on the part of publicly traded corporations, including through share buybacks, has increased; and that publicly traded corporations have generally been more aligned with shareholder wealth maximization than in the earlier post-war period.

However, it is not wholly accurate to think of corporations as “owned” by shareholders. The more appropriate conception is to view corporations as a “nexus of contracts.” Suppliers, customers, employees, retirees, lenders, and borrowers all have contractual protections entitling them to precise shares of corporate earnings, and equity shareholders are entitled only to a corporation’s “residual earnings”.

To protect their interests, equity shareholders have three principal mechanisms: corporate-law fiduciary duties of loyalty and care; voting rights; and the ability to sell their shares (at least in publicly traded companies). The shareholder wealth maximization norm is embedded in the fiduciary duty of care. In modern-day corporate law in the United States, courts afford business leaders significant leeway in enforcing the duty of care under the business judgment rule.

Given the business judgment rule, the duty of care most commonly is applied in “change of control” or takeovers. Unlike the single-factor MSV, a multi-factor standard governing the duty of care would greatly inhibit the ability of courts to stop incumbent directors and managers from blocking value-creating bids on corporate control. This would effectively lock in equity capital—increasing the cost of capital to fund new ventures.

Corporations do not have to accept a shareholder wealth maximization norm, and non-profit corporations are commonplace. But the predominance of the form of the conventional business corporation ought to make us highly dubious about altering the traditional form of equity ownership shareholder wealth maximization norm.

In terms of policy, elected officials can and should consider more than economic efficiency and profits in setting policy agendas. There is little reason to delegate these important public choices to the leaders of publicly traded corporations. Attempting to reorient corporate purposes strikes at the very core of the reasons why equity ownership has assumed its role as the preeminent form of organizing large commercial enterprises. This form of corporate organization has generated tremendous wealth since these debates began nearly a century ago—lifting billions worldwide out of absolute poverty.

The three-player game: markets, speculators and the state

[Bill Janeway](#) describes doing business in the innovation economy as a three-player game. The dynamic and unstable configuration of political, economic and financial forces has led to the emergence of a world in which state investment in fundamental research induces financial speculation to fund construction of transformational technological infrastructure, whose exploitation, in turn, raises living standards for everyone dependent on the productivity of the market economy. But the three-player game is also responsible for a world in which bubbles and crashes in the financial system spill over and liquidate both the employed and their employers, generating appeals to the political process for redress and relief.

The innovation economy evolves and progresses by trial and error (and error and error) in a world in which the second law of thermodynamics holds. Time’s arrow moves in only one direction and nobody can ever know at the time of decision what the full consequences of our actions will be. Consequently, the kind of investment that drives the frontier of technological possibilities outwards depends on sources of finance that are not focused exclusively on immediate, quantifiable, economic value. Bubbles however solve a coordination problem in time. Investors will not finance a disruptive, revolutionary startup unless they are confident that all the capital necessary to get from startup to established business will be available. A bubble is a state where the price of the financial asset is separated from any concern with the underlying cash flows. This provides that kind of assurance and transforms new technologies into a new economy. Darwinian forces ultimately select lasting applications, so despite all their wasteful excess bubbles have been necessary drivers of economic progress.

Innovation is marked by inescapable, irreducible uncertainty that is beyond the reach of measurement. Not only is there no scientific basis for calculating the probabilities of possible outcomes, but these outcomes themselves cannot be fully enumerated. This Knightian uncertainty makes it impossible to allocate capital on traditional assessments of risk and expected return. This applies in particular to the primary research

that can give rise to new industries or reshape existing ones. In a context where returns are so far beyond quantification, the state can play a critical role in advancing primary research through its political mandate, without being bound by forecasts of profitability. The origins of today's semiconductors, microcomputers and internet are to be found in programmes funded by the US Department of Defense, and the state itself has played a direct role in building the network infrastructure that embodies the new economy.

In recent years, the digital revolution has taken on a life of its own, and is no longer dependent on the sponsorship of the state, but rather is attacking the authority of the state at multiple levels along multiple dimensions. We have to extend our understanding both of speculation and of the diminished role of the state in order to grasp the radical reconfiguration of the three player game. The three player game is also responsible for a world in which bubbles and crashes in the financial system spill over and liquidate both the employed and their employers, generating appeals to the political process for redress and relief. This is a world where "malefactors of great wealth", to borrow Theodore Roosevelt's expression, are able to exploit the political process in order to preserve and protect their exploitation of the market economy.

There are two overlapping sets of institutions, the market and the political process, that have come to compete in the allocation of resources and the distribution of the income and wealth. These two institutions are bound together by the fact that those who accumulate power in one may use that power to establish a position in the other, just as those who lose in one may appeal to the other for redress. Reciprocal rent-seeking can be seen and observed at least as often as productive collaboration, even though the "Chicago economics" largely succeeded in delegitimising the state as an economic actor.

The same technologies that unequivocally increased the efficiency with which resources are allocated around the world challenge the political system's ability to buffer the increased flows that they enable. However, even while international trade and migration are targets of populist outrage, the primary engine of economic and social disruption has come from within from the maturation of the digital revolution, that itself has been the result of the most productive collaboration in history between state investment and financial speculation. Specifically, the decline in manufacturing jobs has continued at a rapid pace, but automation not trade deals has been responsible for the vast majority of the job losses in manufacturing.

The need now is for responsive but responsible amendment of established regulatory frameworks for the provision of services in the real physical economy and in the terms of employment of those who deliver them. The digitalisation of work and its management by algorithm is driving a radical liberalisation of labour markets to unsustainable extremes, threatening to recreate Marx's reserve army of labour for the post-industrial world. Contrariwise, the formation of guilds of Uber drivers and Facebook friend collectives among Walmart employees may be the first signs of an endogenous response within the market economy to the ultimate commoditisation of labour by algorithm.

The digital revolution that has largely driven the reconfiguration of the game is barely half done. It will continue to generate a multitude of losers as well as a select set of winners. Once again it has taken years just to deploy the transformational fixed and mobile broadband networks, just as it took years to construct the railways and the electricity grids of previous technologically-driven new economies. The layers of abstraction required to insulate users from the complexity of the network infrastructure are just now becoming demonstrably available by way of increasingly thick and rich clouds of computing resources and the mobile apps that provide access to them.

As with previous revolutions, it will take years to realise the full economic and social consequences of digitalisation. While the speed at which infant innovations can be deployed globally has undoubtedly accelerated, defining the inventions that will become economically significant is likely to be subject to the same latency constrained by the human imagination that delayed introduction of previous disruptors.

The time it takes to build the infrastructure and the time it takes to learn what to do with it puts the current productivity puzzle into perspective. The OECD's *The Best versus the Rest* defined how the best adapting to new technologies have maintained continuity in the growth of productivity while the gap with the laggards has increased. New technologies never get themselves installed and used as a single homogeneous wave. Contemporary observers might well have remarked that electric dynamos were to be seen everywhere but in the productivity statistics. Prior to the availability of the "just plug it in" network if you wanted to take advantage of electricity you had to buy your own generators you had to hire your own electrical engineers from a tiny supply. Henry Ford could do that but the rest the rest of the manufacturing sector had to wait.

Today if you want to exploit the unique attributes of the digital economy, above all its generation and capture of data available to be mined for actionable information by the new technologies of machine learning, you have to build and manage your own data farms and hire your own data sense scientists. Amazon and Microsoft and Google are now competing to offer analytics in the cloud, machine learning in the cloud, and artificial intelligence in the cloud. I think we can rely on productivity growth to improve as the rest gain access through cloud services to these tools of the maturing digital economy.

But that will not be enough to level the playing field. Value is moving from software to data. Software has been largely commoditised through open source availability of tools and the basic applications and application infrastructure required, and of course by its incorporation in cloud resources. At the frontier of machine learning, more data is valued above better algorithms, because it is more data that makes algorithms better, thus enabling more valued services and consequently the generation of yet more data. So there's an organic engine of positive feedback that means the best can continue to accelerate, increasing market share and profit potential. Already there's evidence of this phenomenon in the fact that the digital platform and aggregation companies are the most valuable companies in the world and dominate the markets they serve. However, this is also contributing to income inequality with the productivity of these superstar firms showing up in relative interfirm compensation versus the lagging rest.

Sooner or later modes of regulatory response are to be expected. Loss of authority by those charged with directing the state will always undermine the confidence of participants in the markets of financial capitalism.

ECONOMIC THINKING IS CHANGING

Shocks are not “exogenous”. They are in the very nature of the global social-political-economic-environmental system, and to fully understand this “system of systems” we cannot depend on our traditional models and tools based on general equilibrium and rational expectations. Economic models that rely on inputs such as GDP, income per capita, trade flows, resource allocation, productivity, representative agents, and so on can tell a part of the story, but they fail to capture the distributional consequences of the policies we make, and do not address the perception that the growth process only benefits a few. Nor do they capture important dimensions such as justice, trust or social cohesion. In fact these models are based on an ideology or narrative that claims that people are rational, take the best decisions according to the information they have to maximise utility, and that the accumulation of rational decisions will deliver the best outcome.

Weaknesses of traditional models Richard Bookstaber points to four characteristics of human experience that manifest themselves in crises and that cannot be addressed well by the methods of traditional economics.

Computational irreducibility. You may be able to reduce the behaviour of a simple system to a mathematical description that provides a shortcut to predicting its future behaviour, the way a map shows that following a road gets you to a town without having to physically travel the road first. Unfortunately, for many systems, you only know what is going to happen by faithfully reproducing the path the system takes to its end point, through simulation and observation, with no chance of getting to the final state before the system itself.

Emergence. Emergent phenomena occur when the overall effect of individuals’ actions is qualitatively different from what each of the individuals is doing. You cannot anticipate the outcome for the whole system on the basis of the actions of its individual members because the large system will show properties its individual members do not have. For example, some people pushing others in a crowd may lead to nothing or it may lead to a stampede.

Non-ergodicity. The mechanical processes that drive our physical world are ergodic, as are many biological processes. We can predict how a ball will move when struck without knowing how it got into its present position – the past doesn’t matter. But the past matters in social processes and you cannot simply extrapolate it to know the future. The dynamics of a financial crisis are not reflected in the pre-crisis period for instance because financial markets are constantly innovating, so the future may look nothing like the past.

Radical uncertainty. This describes surprises—outcomes or events that are unanticipated, that cannot be put into a probability distribution because they are outside our list of things that might occur. As Keynes put it, “There is no scientific basis to form any calculable probability whatever. We simply do not know.” Economists also talk about “Knightian uncertainty”, after Frank Knight, who distinguished between risk, for example gambling in a casino where we don’t know the outcome but can calculate the odds; and what he called “true uncertainty” where we can’t know everything that would be needed to calculate the odds.

GDP and well-being are not synonyms

On a more fundamental level, there is also a problem with what we are measuring and modelling and why. GDP is often taken as a proxy of how well an economy and the people contributing to it are doing. Before GDP was invented by Simon Kuznets in the 1930s governments did have some objective data about the

state of the economy on which to base policy. In the 17th century already, William Petty established the bases of national accounting, essentially for tax purposes, although his *Political Arithmetick* also has many other lessons that are still relevant today, for example on how “a small Country and few People, by its Situation, Trade, and Policy, may be equivalent in Wealth and Strength, to a far greater People and Territory”.

Despite the centuries separating them, Petty and Kuznets, like economists today, were responding to a similar need to understand a changing situation. Petty’s concern was that although money rather than barter was starting to dominate economic transactions, national wealth was still counted as it had been for centuries in terms of gold and silver. In Kuznets’ time, the US government’s role in the economy was growing after the Great Depression, but its interventions were being guided by a sketchy set of indicators such as freight car loadings or stock price indices.

The beauty of GDP was that it included so many different things in a single figure. The main criticism was, and still is, that it is not a measure of well-being since production can increase while leaving most people no better off in any way. However, in a report to the US Senate in 1934 Kuznets observed that: *Economic welfare cannot be adequately measured unless the personal distribution of income is known. And no income measurement undertakes to estimate the reverse side of income, that is, the intensity and unpleasantness of effort going into the earning of income. The welfare of a nation can, therefore, scarcely be inferred from a measurement of national income as defined above.*²

In [The growth delusion](#) David Pilling points out another problem with GDP: it measures only activities for which money changes hands. Thus, much of the work undertaken at home, traditionally performed by women, is not included. This is not just a methodological issue, it has political consequences. The Stiglitz-Sen-Fitoussi Commission was set up to look beyond GDP because people do not recognise their own lives in the official statistics. That creates a gap in perception that could damage democracy because people lose trust in facts and the experts who produce them.

However, it’s probably impossible to design a single GDP-like figure for a wider application that would reflect the many different aspects in any meaningful way, and including them in GDP would damage its usefulness as a measure of output. A suite of indicators is more appropriate in these cases. Canada has adopted such an approach and the OECD’s Better Life Index follows this logic to allow citizens to establish their own measure of well-being. Users “weigh” 11 topics – community, education, environment, governance, health, housing, income, jobs, life satisfaction, safety, and work-life balance – to generate their own Index from a collection of 20 indicators.

But even if growth is what is being measured, a single figure may be misleading or too vague. Bigger doesn’t always mean better. We should measure the output of a health service for example not in money spent but in lives saved and health improved. Some 80 percent of advanced economies are made up of services, as opposed to manufactured goods. But GDP finds it difficult to measure services from year to year, let alone country to country.

Criticising growth and how it is measured should not be confused with being anti-growth. But we need to grow differently. We need to grow in a way that minimises the strain on the planet and maximises well-being. One of the optimistic aspects of the way the economy is changing is that this is becoming easier.

² National Income, 1929-1932: [Letter from the Acting Secretary of Commerce Transmitting in Response to Senate Resolution No. 220 \(72nd Cong.\) a Report on National Income, 1929-32](#), p.

7. Kuznets’ authorship is acknowledged on p. 11.

Wikipedia, for example, provides all human knowledge for free. We can think of that as “growth,” even though it has no negative impact on the environment and makes no direct contribution to GDP.

Competition as the motor for the economy and society

A defining feature of traditional economics is the strong emphasis on competition, the mechanism by which the “Invisible Hand” would do its work if people and firms were left to their own devices. In a laissez-faire situation the system was supposed to self-organise into a socially satisfactory state. Inequalities and excessive profits would be limited by competition. But economists have never been able to show that this reasoning was justified empirically or theoretically. Like all complex systems the socio-economic system has a tendency to pass through periods of upheaval which are far from socially desirable. An important part of the problem is that the idea that firms enjoy a competitive environment is a myth, as Adam Smith already pointed out. The fact that anti-trust and competition law has led to the massive administrative structure to control and prevent monopolies appearing is evidence that the system does not tend to self-organise in the way which theory has claimed

Yet, one can think of the 20th century as the era in which the idea of competition reached its peak. Much of the emphasis was on making economies more “efficient” and “competitive”. For firms and companies the most obvious route was to diminish labour costs and this, as we have observed, meant keeping wages down. However, such policies were myopic. As wages stagnated, inequality grew and even in the countries that did well in aggregate, inequality worsened. This could have been offset by surplus countries allowing wages to rise, becoming less competitive in the process but finally handing some of the gains from economic expansion to the lower end of the income distribution. The surplus countries would have purchased more from the countries that export to them and, in the process, would have moved towards a trade balance or deficit and would have stimulated the economies of the deficit countries. In Europe, this would have avoided violating the Maastricht limits on surpluses.

To have changed course in this way would have signified moving from a competitive to a more cooperative stance. It has been forcefully argued by some economists that the future evolution of the world’s economies will be one where coordination and cooperation replace “competitiveness” as the leitmotif, though such opinions are far from those of the majority. But this shift would mean looking beyond the short-term mercantilist gains from being increasingly competitive to the longer-term benefits for society in terms of removing distributional unfairness. Using the lessons from the recent literature on the evolution of cooperation might help to understand better how certain problems which seemed insurmountable in the standard literature have been solved.

The failure of market failure

In a similar vein, Mariana Mazzucato rejects the mainstream discourse where ‘market failure’ is used to explain why suboptimal outcomes occur and how they can be improved, and to provide a rationale for government intervention to ‘correct’ these failures, as long as this does not entail government failures outweighing the benefits. The orthodox policy conclusion is that markets generally produce positive outcomes which increase welfare, and so should be allowed to operate with as little interference as possible. Many of the policy prescriptions which follow favour those in economic power, giving orthodoxy a powerful grip on public discourse. But markets are not the simple structures set out in economics textbooks; and ‘market failure’ is not a helpful concept for tackling major problems like climate change. These idealised theories assume away many of capitalism’s key features, or treat them as ‘imperfections’ rather than structural, systemic characteristics. They ignore evidence on how different economies actually function, and why they perform well or badly. They explain none of the key problems of Western capitalism over recent decades.

We need a richer characterisation of markets and businesses. It is not helpful to think of markets as pre-existing, abstract institutions which firms, investors and households ‘enter’ to do business, and which require them, once there, to behave in particular ways. Markets are concrete and differentiated outcomes arising from different circumstances. A theory of how capitalist economies work must include at its centre the dynamics of innovation, understanding both the specific nature of the public and private investments needed and the turbulent, non-equilibrium outcomes that result. This requires a more dynamic and accurate understanding of how innovation occurs than is provided by the orthodox economic theories of imperfect competition.

Recognising the role of the public sector as a driver of innovation in a range of fields is central to this approach. As Keynes’ argued, private investment is both too volatile and too procyclical. Creating expectations about future growth is a crucial role for government, and not just during downturns. The new technologies in the Apple iPhone, for example, were developed with government support. The interdependence of private enterprise and the public sector; of market and non-market activities has to be recognised. This has implications for the role of taxation as the means by which economic actors pay the public sector for its contribution to the productive process.

Complexity economics

Janeway’s reference to the three-body problem illustrates a strand of thinking that looks to the theory of complex systems to understand the interactions within the economy, and of the economy with other systems. [Will Tracy](#) outlined how a complexity approach could be useful in thinking about the future of work. The Santa Fe Institute, where Tracy works, starts from the proposition that the economy is not necessarily in equilibrium. Economic agents constantly change their actions and strategies in response to the outcome they mutually create. This further changes the outcome, which requires them to adjust afresh. Economics has largely avoided this nonequilibrium view in the past, but it allows us to see patterns or phenomena not visible to equilibrium analysis that emerge probabilistically, last for some time and dissipate.

Where equilibrium economics emphasizes order, determinacy, deduction, and stasis, complexity economics emphasizes contingency, indeterminacy, sense-making, and openness to change. In this framework historical time becomes important, and a solution is no longer necessarily a set of mathematical conditions, but a pattern, a set of emergent phenomena, a set of changes that may induce further changes, a set of existing entities creating novel entities.

Economics can take advantage of findings from studies of other complex systems, even if they seem far removed from the concerns of economists. For example, the puzzle as to why the hearts of all mammals beat around the same number of times during an average lifespan was solved using network analysis of the respiratory system. The techniques developed for this problem have been applied to densely packed social networks, showing relationships between for example city size and innovative capacity. Network approaches can also be used to think about the future of work. If your job is likely to be replaced but all of the jobs nearby with similar skill sets are not going to be replaced you are not so worried. Conversely, you might have a job where your job seems very safe but there are a number of jobs with very nearby skill sets in a network mapping sense that are unambiguously going to be replaced. As a result we should expect a flood of people from those nearby skill jobs into your job, and even though your job might be safe the reality or the experienced outcome will be that that is a very difficult position to be in.

Arguably the most important difference in the mindset between complexity economics and traditional economics is phase transitions and dynamic disequilibrium. An everyday example of this would be cream being poured into coffee. We could perhaps come up with one number that to define the drink after it's

perfectly mixed, maybe some number that represents the colour, and we could come up with a binary scheme that represents the initial state, but the middle position in which it's in a dynamic state is very difficult to explain numerically. The coffee is a one-directional phase transition, but in many phase transitions of interest to economists, actors can go back and forth between states, for example between a bull and a bear market. In this case, behavioural traits, the tendency of individuals in that market to interpret news in one way or another, is a function of the system state.

The state transitions where complexity science has the most to offer are situations in which what happens during the dynamic disequilibrium can impact the state that you eventually transition into. This is perhaps one of the more salient differences between complexity economics and traditional economics. A good example of this would be to think about the economic transition in Russia compared to what happened in Estonia or China as they faced similar challenges.

The ways in which we adapt can also significantly impact which phase we will eventually transition into. Adaptation helps explain phenomena that more orthodox approaches struggle to cope with, such as the Easterlin paradox, whereby after a certain point, significantly increasing GDP per capita does not really impact happiness. The hypotheses to explain this that gain the most traction are either a hedonic treadmill approach where we say people are adjusting to what they used to have and they always want something more; or a social status comparative where we say it's partially what you consume but it's also whether or not you have more status than your neighbour and that status is zero-sum. But in both of those scenarios what's happening is that people are adapting. People are saying I'm in a new situation, and given this new situation that I'm in now, I need more, I need a different facet of consumption to obtain my previous level of happiness.

Our systems are not smooth surfaces where we can take one best guess and then do local search to get to a local optimum. They are places with lots of local optima you can get stuck on where you need to do some experimentation. When something works, try it somewhere else, which is how you would search a more rugged topology.

For businesses, feedback is one of the most salient aspects, particularly for network-based business models. The more I get of one type of person participating in the model, the more value I am able to deliver either to that person or to someone on the other side of the model. The more value I am able to deliver, the more people want to participate. The more people participate, the more value I deliver, and this creates a virtuous cycle.

Inequality can also be considered in this framework. At some periods we have low-skilled workers suffering the most and high-skilled workers gaining the most, but there are also interstitial periods, phase transitions perhaps, where it's actually lower-skilled and higher-skilled workers who do better compared to the middle. The ability to flip between these different regimes suggests some interdependencies or episodic linkages with other things that are going on in the economy.

Classical economic theory is based on the assumption that all agents are identical, while in reality agents are not identical and firms are not identical. It is often those differences that allow for different rates of adaptation, and those different rates of adaptation in turn allow for disequilibrium period behaviours to affect the state that we eventually transition into. One of the ways in which we're most concerned with this heterogeneity in the economy is in the relationships between individuals and the way in which they either exchange or transfer information between each other. There is a very deep structure to networks and we can think about it being in between the system level macro structure, and the individual level very micro structure. There is a mid-tier mezzo level granularity at which we can mathematically understand things about the relationships between agents, and once we do that we can have different measures of a node's

importance. Community structure tends to be very important in understanding how you have clusters of nodes whose edges are very tightly coupled to each other, but they're not so connected to other groups. This can in a very real sense impact what happens during that dynamic disequilibrium period and what type of a phase you eventually transition into.

Many of new technologies don't just change the work that is done, they also change our capacity to do different types of intellectual work. The traditional approach to economics is this idea that we can basically treat firms and organizations as individuals and say the firm maximises something much like the individual is maximizing it. In reality organisations process information collectively and the way in which they structure themselves unambiguously impacts the efficacy of the decisions that the organisation is going to make.

In turn that is going to have a very significant impact on how the economy responds to changes like technology. We can think about artefacts and how different artefacts impact our ability to think. If I give you a map of a new city and you use that map to explore the city and then I take the map away, you are going to be better off finding your way through the city for having had the map. This stands in contrast to things like a GPS or a calculator where if I give you a GPS and you really rely on the GPS to get around the city and then I take the GPS away you are arguably less well-off than if you just explored the city for the same amount of time without the GPS. So we're at this phase transition on some level where increasingly the technologies that we use are technologies that are making us as individuals less able to solve the tasks that we are now outsourcing today to the technologies themselves.

Paradigm shifts

For an approach to economics based on complexity and systems thinking to become part of the orthodoxy would require a paradigm shift. [Michael Jacobs](#) examined to what extent the economic and political conditions today offer parallels with the two previous periods of shifts in the politico-economic paradigms. A politico-economic paradigm generally encompasses: a set of political/economic goals, or problems needing to be addressed, which are regarded as most important for society and in policymaking; a general analytical/theoretical framework for understanding the way economies and societies work; a public narrative and language which describes simply and justifies the goals and analytical framework; and a set of principal economic and social policies which will achieve the goals/overcome the problems, based on the analytical framework.

Thomas Kuhn's theory of paradigm shifts in the natural sciences argues that change occurs when two conditions are met: a critical mass in the number or importance of "anomalies" which contradict the dominant paradigm; and the successful development of an alternative theory that better explains the prevailing evidence. Imre Lakatos built on these ideas, arguing that changes in science could be seen in terms of "research programmes" that are either "progressive" or "degenerating". Progressive programmes advance new theories and adopt ideas that better explain reality. In contrast, degenerating programmes persist with old theories and ideas, despite their failure to explain the available evidence, and, in doing so, eventually abdicate their previous role as a progressive programme. The inherent uncertainty of economic prediction and the deeply political nature of policymaking makes it easier for degenerating programmes to retain their incumbency advantage. Path dependency is further strengthened by the influence of vested interests, which help to shape the interpretation of external shocks and lend support to degenerating over progressive programmes. Peter Hall argued that economic policy can exhibit three 'orders' of change, increasing in their magnitude: adjustment of an existing policy; a change in the policy; a change in the goals of policy altogether. In Hall's conception, it is the third order of change which corresponds to a paradigm shift in the politico-economic orthodoxy.

The pattern of change is characterised by six steps: the prevailing orthodoxy dominates economic policy and debate; economic shocks and crises occur; policy prescription fail; orthodox theory and discourse are increasingly questioned; an alternative theoretical and policy approach has been developed in the meantime; as breakdown occurs, this increasingly becomes the new orthodoxy; a new government is elected and new policies are pursued. The paradigm shift itself occurs at different levels.

At the academic level (the weakest level), new theories are developed, or old ones rearticulated which seek to explain the economy better and justify and propose new policies. These theories do not need to become hegemonic in academic circles, but they do need to inform and influence the general conceptual framework and narratives used in public policy and debate, through organised channels. Public narratives and debate have a stronger influence than academic theory, and operate through an ecosystem of public intellectuals, think tanks and journalists who articulate and proselytise the new goals, frameworks, policies and narratives. Politics is the decisive level. Political parties adopting the new approach are elected to government and implement the policies.

If the economic shocks and crises of the last decade are the precursors to a new shift in the politico-economic paradigm, it is clear we are, at best, in its very earliest stages. In most countries mainstream economic policy has not yet undergone any significant change, and there is little consensus on what, if anything, ought to replace it. It is true that a number of governments are now talking about new approaches, but the very disparate nature of these efforts suggests that it would as yet be premature to describe this as a “paradigm shift”.

However, beneath this there are some signs of an emerging transition, at several levels. First, debate in the economic policy community, both among academics and in international institutions and think tanks, has begun to change. Modern economics is more pluralist than a generation ago. In recent years the Nobel Memorial Prize in Economic Sciences has frequently been awarded to practitioners working outside the neoliberal orthodoxy. In the English-speaking world, many of the most prominent economists contributing to public debate are trenchant critics of neoliberal theory and policy. This is much less true, however, in other countries. At the same time, no overarching “alternative” paradigm has yet emerged and there has been little effort to articulate a shared alternative view which might incorporate and bind together elements of the new pluralism.

This is partly because there are significant differences of approach between different kinds of heterodox academic economists. Second, at the level of institutions within civil society, there is increasing interest in the idea of a significant shift in approach to economic policy. Three of the major international leaders in economic thought and practice – the OECD, the World Bank, and the World Economic Forum – have become committed over recent years to a new narrative of ‘sustainable, inclusive growth’, based on an acceptance that the neoliberal model has generated both rising inequality and unsustainable environmental impact. At present it would be hard to say that the consensus has gone much beyond an acceptance of the failures of the dominant model and a set of new, broader objectives for economic policy; but the OECD ‘New Approaches to Economic Challenges’ initiative is now seeking a more coherent theoretical and policy response. At the level of political parties and governments, it is hard to discern any significant paradigmatic transition in progress.

The parallels between present economic conditions, and those in the two periods of the 20th century when major paradigm shifts occurred, are however striking. There is certainly no guarantee that we will see a paradigm shift in economic thought and policy in the coming years. But the evidence that major reform is required is powerful, and there are clearly dynamics in academic economics, within economic institutions and civil society, tending in that direction.

SO POLICIES AND POLICYMAKING HAVE TO CHANGE TOO

Rethinking macro stabilisation

Previous major crises, from the Great Depression to the stagflation of the 1970s, profoundly changed both macroeconomics and macroeconomic policy. The Great Financial Crisis has forced macroeconomists to (re)discover the role and the complexity of the financial sector, and the importance of financial developments, but for Olivier Blanchard, the lessons should go well beyond this, and force us to question the presumption that economies are self-stabilising, and to consider whether temporary shocks can have permanent effects.

The Great Depression led to the Keynesian revolution, a worry about destabilising processes, a focus on aggregate demand and the crucial role of stabilisation policies, and to tighter constraints on the financial system. The stagflation of the 1970s led instead to the partial rejection of the Keynesian model, a more benign view of economic fluctuations and the self-stabilising properties of the economy, a focus on simple policy rules, and a more relaxed attitude to the financial system.

There are three lessons from the last ten years.

The centrality of finance

Minsky warned for decades about the consequences of build-ups in financial risk. Financial crises were endemic in emerging market countries, and Japan's "lost decades" after the bursting of the bubble were there for all to see. Yet, prevailing macroeconomic paradigms largely ignored the possibility of financial developments as drivers of economic performance. In macroeconomic models, the role of the financial system was often reduced to the determination of a yield curve and stock prices, based mostly on the expectation hypothesis with fixed term premiums.

But despite all the research since the crisis, at least two issues crucial for policy remain unresolved.

First, granting that asset price or credit bursts and their interaction with excessive leverage are crucial in understanding financial crises, what is the relative importance of different mechanisms? One mechanism is that financial intermediaries lose capital and respond by cutting back lending thereby choking off economic activity. Another is that excessive indebtedness coupled with declining asset values lead consumers and businesses to retrench and cutback on consumption and investment.

If the second channel is the most important, measures that write off existing debts are crucial to the resolution of financial crisis. If the key issue is impairment of intermediaries, then such debt writedowns may be highly counterproductive by substantially reducing the regulatory capital of intermediaries and leading them to scale back lending.

Second, the issue of the relative roles of solvency versus liquidity in precipitating a crisis is still not settled. Official sector accounts of the crisis in the United States suggest that the problems at the major institutions were primarily problems of liquidity rather than solvency. On the other hand, there were substantial reasons to doubt the solvency of some of the largest banks as early as the summer of 2008.

The question of how to deal, in the midst of a generalised crisis, with institutions that are suddenly recognized to be in trouble, remains open.

The nature of fluctuations

By the time of the crisis, macroeconomics had largely converged to a view in which the economy was constantly hit by many demand or supply shocks, most of them small, each with their own propagation mechanism, largely linear, with the economy ultimately returning to potential after any given shock. Vector auto-regressions (VARs) were thought of as capturing the reduced form of these dynamics. Dynamic stochastic general equilibrium (DSGE) models could be constructed to fit and interpret the reduced form, and to give a deeper structural interpretation to the observed dynamics.

In a world of regular fluctuations, optimal policy takes the form of stable feedback rules. Before the crisis, the focus had been nearly exclusively on monetary policy, and the best reaction function of the interest rate to inflation and to the output gap. Fiscal policy was ignored as a stabilisation tool, although, inconsistently, policy makers still let existing automatic stabilisers function, no matter how accidental and unadapted they were. Macroprudential policies were not the subject of mainstream discussions.

The financial crisis does not fit this image of fluctuations, in a number of dimensions. The relevant image is plate tectonics and earthquakes, rather than regular random shocks. Financial crises are characterised by non-linearities and positive feedback whereby shocks are strongly amplified rather than damped as they propagate. The quintessential example is bank runs. Liquidity is intrinsically associated with multiple equilibria or at least with large effects of small shocks. And rather than returning to the status quo when the shock ends, financial crises are followed by long periods of depressed output.

These evolutions have led to a revival of the hysteresis discussion, i.e. whether temporary shocks have persistent or even permanent effects on potential output.

Some of the issues are specific to financial crises, but some apply to all fluctuations. Another nonlinearity has come from the interaction between public debt and the banking system, a mechanism known as “doom loops”. This played a central role early in the euro crisis. Higher public debt leads to worries about public debt restructuring, decreasing the value of the bonds held by financial institutions, leading in turn to a decrease in their capital, worries about their health, and the expectation that the state may have to bail them out and be itself in trouble as a result.

In contrast to the standard pre-crisis view, nonlinearities like this can amplify initial shocks, potentially leading to implosive paths, leading to strong policy challenges.

Low interest rates/secular stagnation

We are in an environment of low nominal and real interest rates, and may be for the foreseeable future. An environment that interacts with the first two factors, and forces a rethinking not only of monetary, but also of fiscal and financial policies. Interest rates lower than growth rates have implications, not only for monetary policy but also for fiscal and financial policies.

So far, the focus has been primarily on monetary policy, and the effective lower bound. While central banks have explored and used other tools, the binding lower bound on short term nominal interest rates (zero, or slightly negative) limited the scope of monetary policy to sustain demand during the recovery. The limits of monetary policy imply a larger role for other policies, in particular fiscal policy. If the interest rate is below the growth rate, could this be a signal that the economy is dynamically inefficient, in which case larger public debt is actually not only feasible, but also desirable? If the economy is dynamically efficient, but the safe rate is below the growth rate, can the state still issue debt without ever paying it back, and if it can, should it do so?

Low interest rates also have implications for financial regulation and macro prudential policy. The main issue is the relation between low interest rates and risk taking. It has been argued that a combination of human nature, leading to reach for yield, and of agency issues, lead to more risk taking when interest rates are low. Also, by inflating asset values and reducing debt service costs, low rates may also lead to high leverage.

Implications for monetary policy

The crisis forced central banks to change monetary policy to deal with the emergency, and the question is how many of the instruments they used should remain in place. In an environment of low neutral rates and higher perceived risks, the main challenge facing monetary policy is how to deal with the liquidity trap, both ex-ante and ex-post. Should the inflation target be increased? Should central banks adopt a price level or a nominal GDP target? Can the scope for negative nominal interest rates be widened? The issue must be tackled now even in countries where the constraint is not currently binding.

There is also the question of whether and how monetary policy should concern itself with financial stability. Monetary policy can be of little help, and so financial stability must inevitably depend on financial policies, imperfect as they might be.

How central banks should deal with the large balance sheets they have accumulated as a result of the crisis also has to be addressed. There is no strong reason for large central banks to keep those large balance sheets. To the extent that there are reasons to affect spreads, this is better handled through debt management and fiscal policy.

Implications for fiscal policy

In an environment of limits to monetary policy, and neutral interest rates below growth rates, fiscal policy will inevitably play a much more active role in stabilisation. However, fiscal policy faces a highly unusual environment. Debt levels relative to GDP are high by historical standards, but interest rates on government debt are low, and in many countries, they are expected to remain lower than growth rates for some time to come. As a consequence, levels of government debt service relative to GDP are low by historical standards.

These evolutions raise two issues. The first is how fiscal policy can be used as a stabilisation tool. Given how short-handed governments were in reacting to the fall in demand in 2008-9, there has been surprisingly little academic work and no policy progress on this front. Another issue is the complexity of “multipliers”, i.e. the effects of fiscal policy on demand and output, of their dependence on the specific type of fiscal adjustment and the economic environment. We still have a poor understanding, for example, of the effects of spending cuts versus tax increases, and on the supply side effects of alternative fiscal policies.

Automatic stabilisers can be made more potent and effective with policy effort. And, in an environment in which the interest rate is likely to remain below the growth rate for some time to come, the usual discussion of debt sustainability must be re-examined. At a minimum, debt consolidation can take place more slowly and there are additional arguments for debt-financed increased public investment.

Financial policies

Based on recent experience, a large fraction of instability in advanced economies over the next decades is likely to be associated with financial instability. This raises the issue of both crisis prevention and crisis resolution.

Some believe that policymakers need stronger tools for responding to financial strains, others that the moral hazard associated with the excessive availability of bailout funds was an important contributor to the excessive risk taking that led to the crisis. To a substantial extent, crises have their roots not in conscious risk taking by financial institutions, but in events that they do not anticipate, and so cannot be changed by altering incentives. Moreover, the provision of liquidity to combat runs may not represent a moral hazard cost because it need not be socially costly. The US government made a profit on the TARP programme of support for financial institutions. Because major crises only occur every half century or so, actions in one crisis may not be important as precedents for the next.

For crisis prevention, the efficacy of capital regulation and stress tests, and the desirability of time varying regulatory policies to promote stability are central issues. However, claims that the system would weather a storm far worse than 2008 without any large institution needing to raise capital probably say more about stress test methodologies than they do about banking system robustness. This has direct policy relevance. A major policy error made in the 2008 crisis was the failure of regulatory authorities in the United States to force the raising of capital or at least the reduction of dividend payments and stock repurchases in the spring and summer of 2008, even as markets were seriously concerned about the health of the financial system.

While regulatory policies that are more responsive to changes in firms' economic capital are desirable, time-varying capital requirements or leverage limits may not be. It is very difficult to identify bubbles or excessive credit booms *ex ante* and even more difficult to confidently identify them enough ahead of their bursting to make countercyclical policy worthwhile. These considerations suggest financial stability benefits of higher and constant capital ratios, rather than lower and cyclically sensitive ones.

One of the most interesting findings of research since the crisis is that, leaving aside the risk that some activity shifts to the shadow banking sector (which thus needs to be regulated as well) higher capital ratios have limited effects on either the cost of funds for banks or on bank lending. Higher capital ratios than the current regulatory ratios may therefore be appropriate.

To summarise: for the best mix between financial regulation and macro prudential policy, having higher and constant capital ratios rather than lower and varying ones is likely to be more conducive to the maintenance of financial stability.

Ten years ago, few would have predicted the events that were to unfold, from runs on the largest world financial institutions, to interest rates at liquidity trap levels for close to a decade, to inflation still below target today, to output gaps being still large and negative in many advanced economies. There is a temptation to go back to the pre-crisis ways, a return to inflation targeting and to a Taylor-like rule, with no use of fiscal policy for stabilisation purposes, and pushback on financial regulation and macroprudential measures.

This temptation should be resisted, but the approach adopted could be evolution or revolution.

Evolution In a world where financial instability, lower bounds on interest rates, and protracted effects of cyclical downturns are ever-present threats, strong stabilisation policies are key. At a minimum, monetary policy must re-establish its margin of manoeuvre. Fiscal policy must be reintroduced as a major stabilisation tool. Financial policies must continue to be adjusted and reinforced.

Revolution If however neutral rates remain extremely low, perhaps even negative, or financial regulation falls short, more dramatic changes may be needed, from reliance on fiscal deficits, to active policy efforts to promote private spending, to higher inflation to achieve lower real rates, and much tighter constraints on the financial sector.

The roots of inequality

Income distributions are clearly becoming more unequal, and inequality is blamed for the growth in populism, but what is inequality, and what role does it play in inhibiting or encouraging economic growth, or in undermining democracy?

Angus Deaton stressed that we should be careful not to confuse inequality with unfairness. It is the perception of unfairness that is driving populism, while some kinds of inequality seem acceptable. Deaton's analysis of inequality starts from a similar perspective to the one NAEC defends regarding economic crises as being endogenous to the economic system, not exogenous shocks. Likewise, for Deaton the economy is a set of processes and policies, and the interaction between these processes and policies produces various outcomes, including inequality. Some of these processes are good, some are bad, and only by sorting the good from the bad can we understand inequality and what to do about it. History shows that some societies with little or no inequality had little or no economic growth either, and it is possible to find examples of various combinations of high/low growth/inequality. In *The Great Escape: Health, Wealth, and the Origins of Inequality*, Deaton points out that periods of great progress are usually periods of rising inequality. Rising inequality can be a sign of real progress, but that's not what's happening now.

One of the main causes is rent-seeking. Mancur Olson said that this is what would happen in mature capitalism, and you could make an argument that this has been happening all along, but the Second World War stopped it for a while.

If monopolies are unregulated, they can be very effective at squeezing profits out of consumers and workers. That's a process of rent-seeking which would transfer resources upwards, from relatively-poor people to people who are much better-off, thus increasing inequality but also slowing economic growth and making the market less efficient. Under those circumstances you would get a correlation between inequality and slower growth, but it's the monopolies that are causing both, not one causing the other.

Rent-seeking doesn't have to redistribute upwards—when there were powerful unions, there was a fair amount of redistributing downward, to autoworkers in Detroit for example when there was little competition. Now big companies are not sharing the rents with the workers anymore and one of the reasons people are worried about inequality is that rent-seeking is now almost entirely in favour of the elite.

So the living standards of the working class are not rising anymore. That's linked to the “deaths of despair” (drugs, alcohol and suicide) that Anne Case and Deaton have been analysing - people dying in middle age. In *Mortality and morbidity in the 21st century*, they find that while midlife mortality rates continue to fall among all education classes in most of the rich world, middle-aged non-Hispanic whites in the U.S. with a high school diploma or less have experienced increasing midlife mortality since the late 1990s. This is due to both rises in the number of deaths of despair and to a slowdown in progress against mortality from heart disease and cancer, the two largest killers in middle age. The combined effect means that mortality rates of whites with no more than a high school degree, which were around 30 percent lower than mortality rates of blacks in 1999, grew to be 30 percent higher than blacks by 2015.

The increases in deaths of despair are accompanied by a measurable deterioration in economic and social wellbeing, which has become more pronounced for each successive birth cohort. Marriage rates, labour force participation rates, and other indicators linked to well-being such as various forms of social participation, fall between successive birth cohorts, while reports of physical pain, and poor health and mental health rise.

Some aspects of globalisation and technological change, like outsourcing and robotics, also suppress worker wages while benefiting the rich. But these alone can't explain why median incomes have stagnated

for half a century, while incomes at the top have grown. A series of unfair economic and social processes propagate inequality:

Healthcare financing. Each year, the US spends a trillion dollars (\$8000 per family) more than other wealthy nations on healthcare costs, with worse outcomes. Healthcare jobs grew the second fastest in 2017, but wages were largely flat, leading hospital workers to unionise for higher pay. Healthcare financing cuts wages for the average American too—most employer-sponsored healthcare benefits are actually taken out workers' pay rather than being paid for by the company.

Mergers. Many industries, like tech, media, and healthcare, are now run by a few, large companies. But mergers rarely boost the wages of workers. Because of hospital mergers, hospital prices have risen, while hospital wages have not. Big companies have an easier time manipulating public policy to accrue profits, instead of making money through innovation and investment.

Low federal minimum wage. The federal minimum wage, at \$7.25 an hour, hasn't budged since 2009. According to a 2017 YouGov Survey, 66% of US adults would like to see the minimum wage raised to \$10.10. But the policy change usually faces resistance in Congress, where wealthy firms exert disproportionate influence.

Diminishing worker power. Twenty percent of workers sign non-compete clauses. This used to be restricted to employees with access to exclusive information or expertise, but now even blue-collar workers are being asked to sign, thereby reducing their incomes and bargaining power by preventing them from taking on other work, something which in fact is illegal but not enforced. What's more, over half of non-union, privately employed Americans—some 60 million people—have signed mandatory arbitration agreements, which means they can never sue their employers.

The rise of temporary contracts. Companies are increasingly replacing full-time, salaried workers with contractors. Janitors, servers, and maintenance staff who once worked for wealthy companies now work for independent service corporations that compete aggressively against each other over pricing. Working conditions are precarious, without benefits, and with little opportunity for promotion.

The stock market. While the stock market rewards innovation, it also incentivizes companies to shuffle resources from labour to capital. As median wages have stagnated, corporate profits relative to GDP have grown 20% to 25%. That number would be even higher if executive pay was tracked as profits instead of salaries.

Corporate influence on politics. Both the Consumer Financial Protection Bureau and the 2010 Dodd-Frank legislation are under attack. President Trump plans to attack 75% of regulations, and may roll back a rule that requires money managers to prioritise their clients' interests. The US Supreme Court has ruled that corporations can act as political entities, spending unlimited amounts to support candidates and the legislation they will eventually push.

Mission-oriented research and innovation

The ability of innovation to spur economic growth has long been recognised. Less recognised is the fact that innovation has not only a rate but also a direction. For Mariana Mazzucato, by harnessing the directionality of innovation, we also harness the power of research and innovation to achieve wider social and policy aims as well as economic goals. Therefore, we can have innovation-led growth that is also more sustainable and equitable.

This will not be achieved by governments applying the standard policy approach that consists in setting the rules of the game, de-risking, enabling, incentivising, facilitating the private sector, and fixing market and system failures (and then getting out of way). In the world of innovation, the biggest market failure arises when you have something like basic research with strong positive externalities around it, so the private sector under invests in it because it's very hard to appropriate the returns from that. So the state has to come in and fix that problem and fund things like basic science.

Fixing market failures did not get us major advances like the mass production system, aviation and space technologies, IT and internet, nuclear power, nanotechnology and AI, or green technology. Mass production for example would not actually have diffused and been deployed throughout the whole economy without a demand side policy around for instance suburbanisation. It was actually that people moved to the suburbs that then made them require the washing machines, the cars, etc. Without that direction of the demand side, that revolution would not have had the effect that it did. And in today's world, simply trying to fix so-called market failures will not help us achieve major objectives such as the Sustainable Development Goals.

The role of policy should include finding ways to steer economic growth, and missions are a powerful tool to do this. They can provide the means to focus our research, innovation and investments on solving critical problems, while also spurring growth, jobs and resulting in positive spillovers across many sectors. Critically, by spearheading public research and innovation investments in new strategic areas that have the possibility to bring together different actors (public, private and third sector) and spurring collaboration across different sectors (e.g. from transport to digital to nutrition) it is possible to awaken private sector investment that continues to lag. Indeed, what drives private investment is the perception of future growth opportunities. Missions help define those opportunities in ambitious ways.

The Apollo Program exemplifies the power of missions in driving government-led innovation and eventually transforming the global economy. Over 50 countries have now launched and operate a satellite, and that number will grow. Space is an essential dimension of today's world economic infrastructure, and a source of economic growth and new jobs. The public are used to seeing the satellite maps used in weather forecasts, but many other applications are all around us without most people being aware of the spaceborne technologies they rely on. Mobile phone calls rely on satellites, as do thousands of TV channels. Satellite tracking allows transport companies to locate vehicles across the world or inform passengers when the next bus is due. Automatic teller machines check PIN codes and other details via space. GPS navigation has created a whole new market for equipment and software, and the use of mobile location technologies in automotive and consumer applications, including smartphones, has been growing exponentially since the early 2000s. Many other products have benefitted from space R&D, including digital image processing, baby formula and heart pumps, not to mention the integrated circuits that are the heart of the modern digital economy, along with other publicly-funded innovations like voice recognition and the internet itself.

The Apollo example shows how a mission can change the whole innovation ecosystem. Even if it had failed to put a man on the Moon, it would still have had major consequences, most of them unintended. Mission-oriented policies can be defined as systemic public policies that draw on frontier knowledge to attain specific goals or “big science deployed to meet big problems”, but their systemic nature means they may well achieve many other goals in addition to the initial objective.

Missions provide a solution, an opportunity, and an approach to address the numerous challenges that people face in their daily lives. That could be to have clean air to breathe in congested cities, to live a healthy and independent life at all ages, to have access to digital technologies that improve public services, or to have better and cheaper treatment of diseases like cancer or obesity that continue to affect billions of people.

To engage research and innovation in meeting such challenges, a clear direction must be given, while also enabling bottom-up solutions. The debate about directionality should involve a wide array of stakeholders, each contributing to the key questions: What are the key challenges facing society? How can concrete missions help solve those challenges? How can the missions be best designed to enable participation across different actors, bottom-up experimentation and system-wide innovation?

Selecting missions that matter to society and stimulate innovation across multiple sectors is a highly complex task. Missions should fulfil the following criteria.

Be bold and address societal value. Missions should engage the public. They should make clear that solutions will be developed that will have an impact on people's daily lives. To do this, missions must outline exciting opportunities for bold innovation — while being connected to debates in society about what the key challenges are, like sustainability, inequality, health, climate change, and increasing the quality of the welfare state. However, it is important to note that relevance does not necessarily equate with popularity.

Concrete targets. Missions need to be very clearly framed. While enabling long-term investments, they need a specific target that can either be formulated in binary ways (as clearly as whether man has reached the Moon and returned safely) or quantified (as clearly as whether a certain percentage reduction in carbon emissions against a baseline has been reached across manufacturing). In addition, they will need a clear timeframe within which actions should take place. This needs to be long enough to allow the process to grow, for actors to build relationships and interact, while at the same time being time-limited. Without specific targets and timing, it will not be possible to determine success (or failure), or measure progress towards success.

Involve research and innovation: technological readiness over a limited time-frame. Mission objectives should be set in an ambitious manner (taking risks), centred on research and innovation activities across the entire innovation chain, including the feedback effects between basic and applied research. Ambitious objectives challenge researchers and innovators to deliver what would otherwise not be attempted. The objective should however be feasible, at least in theory, within the given time period even if it is high risk. Setting the technical objectives unrealistically high will result in a lack of buy-in, while setting the objective too low will not incentivise extra efforts or provide inspiration. Furthermore, the required technological development should attract research and innovation activities that otherwise would likely not be undertaken by private actors, providing the justification and legitimacy for public intervention.

Cross-sectoral, cross-actor, cross disciplinary. Missions should be framed in such a way as to spark activity across, and among, multiple scientific disciplines (including social sciences and humanities), across different industrial sectors (e.g. transport, nutrition, health, services), and different types of actors (public, private, third sector, civil society organisations). Missions need to be chosen to address clear challenges that stimulate the private sector to invest where it would not have otherwise invested.

They should focus on problems rather than sectors. Problems related to sustainability will not just involve, for example, renewable energy, but could also involve transport, strategic design, or new digital solutions, amongst others. Problems related to health will not only involve innovation in pharmaceuticals, but also in such areas as nutrition, artificial intelligence, mobility and new forms of digitally enhanced public service provision. Missions connect all relevant actors through new forms of partnerships for co-design and co-creation by focussing on targets that require multiple sectors and actors to solve. Thus, mission-oriented innovation has the possibility of leading to system-wide transformation.

Multiple competing solutions. Missions should not be achievable by a single development path, or by a single technology. They must be open to being addressed by different types of solutions. A mission-based

approach is clear on the expected outcome. However, the trajectory to reach the outcome must be based on a bottom-up approach of multiple solutions — of which some will fail or have to be adjusted along the way.

Public policies are not ‘interventions’ in the economy, as if markets existed independently of the public institutions and social and environmental conditions in which they are embedded. The role of policy is not simply to ‘correct’ the failures of otherwise free markets. It is rather to help create and shape markets to achieve the co-production, and the fair distribution, of economic value. A more innovative, sustainable and inclusive economic system is possible. But it will require fundamental changes in our understanding of how capitalism works, and how public policy can help create and shape a different economic future.

It will also require a change in how policies are made and implemented. In many countries initiatives at the state or city level have helped to offset difficulties at the national level. As Elinor Ostrom argued, the “Tragedy of the Commons”, involving over exploitation of natural resources, has been successfully resisted at the local level by cooperative arrangements. Failure to reach an overarching international agreement on greenhouse gas emissions can be offset by self-organisation on a local or regional level. In too many of our models there has been a stark division between “government” and individuals, but, in fact individuals and firms organise themselves at many levels. This makes life more complicated for decision makers but helps to explain why national policies can be either thwarted or enhanced by the reaction of local communities to those policies.

AND NARRATIVES INFLUENCE CHANGE

Narratives are the stories we construct to make sense of the wealth of information, opinion, facts and falsehoods that would otherwise overwhelm us. Narratives are more powerful in shaping public opinion and action than facts and figures. The dominant economic narrative of the past three or four decades has been that markets are efficient and should be “free”, as should enterprise, while the public sector is inefficient; government regulation and other interventions are harmful; and national budgets should be managed like those of a household. The neoliberal policies this narrative supported have failed to bring the widespread benefits they were supposed to.

This gives rise to another important feature of narrative: what happens when the narrative contradicts personal experience. In the neoliberal narrative, failure, like success, is due to personal attributes, decisions and actions. But many people who worked hard, saved to buy a house, and in general tried to “improve themselves” according to “common sense” prescriptions were hit hard by the crisis. They started to seek a new narrative and many found it in populism’s promises. An empowering narrative has to recognise this context and propose a story that convinces people that a brighter future is possible.

The role of narratives

But, as George Akerlof and Dennis Snower show, mainstream economic analysis leaves no role for narratives to play in shaping people’s objectives and constraints. It explains economic decisions under the assumptions of *Homo Economicus* – internally coherent, self-interested, context independent and temporally stable preferences; and means-end rationality applied to a determinate, objectively observable environment. The empirical deficiencies of this model of human nature have been highlighted by various disciplines, leading to a variety of conceptual extensions in behavioural economics. Yet behavioural economics has thus far also had little to say about the role of narratives, despite the fact that narratives play

a role in understanding the environment; focusing attention; predicting events; motivating action; assigning social roles and identities; defining power relations; and establishing and conveying social norms.

Understanding the environment

There are many ways for narratives to help us understand our environment, but mainstream economic analysis only recognises one - causes come maximally close to being necessary and sufficient conditions for events. The other ways include empowerment, achievement, affiliation, curiosity, and so on. Narrative explanations of our environment are not just dispassionate accounts of causes and effects, but are useful as explanations because they enable us to feel good and to avoid feeling bad.

For this reason alone, narratives play a fundamental sense-making role in economic decision making. This role of narratives has been ignored in traditional economic analysis because such analysis is based on the correspondence theory of truth. Economic models aim to mirror economic reality as closely as possible, but simplify aspects with no bearing on their stated purposes. Traditional analysis does not recognise that economic models, along with the variables and parameters they contain, are ways of structuring our understanding of economic activities, and that an important aspect of the appeal of economic models lies in the affective properties of their explanations.

Focusing attention

We cannot process all the possible information from our external and internal environment, so we need narratives to focus our attention on particular types of events and causal relations. Mainstream economic analysis, by assuming that agents optimise their objective functions over their entire regions of feasible opportunities, ignores the fact that without the filtering and neglect of extraneous stimuli, we would be unable to process relevant information efficiently. This is a major oversight, since all conscious decisions are made only with respect to the possibilities that are in our attentional field. Things in the centre of our attentional field have greater importance for our decisions than those things at the periphery.

Our attentional field is not the outcome of a utility maximisation process, since we have only limited cognitive resources to compare the outcomes of decision-making based on alternative attentional fields. Instead, our attention is driven by other processes, largely unexplored in economic analysis, including emotions and motivations.

Predicting events

By making particular causal relations salient, narratives bring these relationships into our attentional field when we predict events, including when we predict the future implications of our current actions. There are two approaches to causality underlying prediction. The first is the "classical" approach, according to which causes are determinate entities that exist independently of our minds and bodies, providing an objectively ascertainable causal link to the associated effects. The second approach is that causation is based on a psychological disposition, whereby we make empirical predictions without rational justification. While statistical models follow the first approach, they do not account for our intuitive understanding of the causal forces underlying the predictions on which most of our interactions with our environment are based.

Since we must continually make predictions in order to interact with our environment in ways that are meaningful to us, it is important to investigate how we become convinced of our predictions. The degree of conviction depends on more than statistical properties. Other factors that matter include how well the narrative accounts for the available evidence; the emotions it evokes; plausibility, consistency and completeness; the degree to which the narrative corresponds to other explanations, beliefs and social norms; and trust in the information available and the person conveying it.

Mainstream economic analysis gives no role to narratives in predicting events, aside from narratives that rationalise ex-post the results of economic models. Such narratives are at best convenient ways of recalling and communicating empirical results; they are neither a complement nor a substitute for the underlying statistical analysis. An important reason for the irrelevance of narratives in mainstream economics is that the latter deals almost exclusively with decision-making under risk (whereby the probability distributions of all random variables are assumed to be known) rather than under uncertainty (these distributions are unknown).

Motivating action

Simply knowing a person's goals, constraints and needs is not sufficient to determine that person's behaviour. A depressed person, for example, may have goals that can be satisfied, but no motivation to satisfy them, while an anorexic person may lack the motivation to eat. In addition to goals and needs, we require a drive that stimulates, controls and sustains a particular behaviour pattern. A motive influences the direction, intensity and persistence of a behaviour pattern. Each motive is associated with a distinct objective. The motive is, in effect, the drive that propels the organism towards achievement of an ultimate goal.

In bringing particular causal relations to their attention, narratives interpret people's intentions and thereby influence the motivations that become activated. Narratives influence people's appraisal of their environment, and affect a person's social environment, by coordinating the actions of various population groups in pursuit of a common goal, or in changing that goal. Mainstream economics permits consideration of altered directions in economic decision-making, for given constraints, only through the notion of exogenously given preference changes and changes of circumstance (supply shocks). But there are other reasons why the direction of economic decisions may change, and change suddenly, affecting large numbers of people, in accord with broadly rational principles of reason, with profound implications for the course of economic activities. Viewing such preference changes as exogenous implies that economic analysis ceases to account for many important economic events in history.

Social assignments and identities

The use of narratives to make sense of our social world begins early in life: children commonly use narratives to explore their relations to others and to investigate others' perspectives. Thereby narratives become crucial to the shaping of identities. Our sense of identity, as conveyed through narrative, is context-dependent, interpersonal, intersubjective (in need of corroboration by others) and emergent (in response to largely unforeseen circumstances). Mainstream economics ignores the influence of social groups on individual preferences and the role of narratives in generating and maintaining identities since it assumes that preferences are located exclusively in the individual. Identity economics fills this gap.

Power relationships and social norms

By assigning social roles such as parent-child or teacher-student, narratives establish and maintain power relationships by defining hierarchies of legitimate power, although the power relationships may be reinforced or replaced by coercion. Power, in terms of the potential to exert influence, can be generated in various ways, often involving perception: perceived control over others' rewards and punishments; social identification; perceived expertise; and legitimacy (being perceived as having the right to influence). Narratives are the organizing principles shaping such perceptions, especially when the perceptions depend on socially conferred status characteristics that might not be relevant to the domain where power is exercised.

Narratives develop branches, and much of the game of life is to graft branches favourable to us onto each other's narrative trees. Power relationships often arise from these grafting activities, but mainstream economics does not consider the power relations derived from the interplay among social groups. When

behavioural economics includes norms, it is often in reasonably stable utility functions. While Mancur Olson asserted that rational, self-interested individuals would not contribute to common goods, Elinor Ostrom showed how social norms may evolve, permitting people to overcome such collective action problems. Others have investigated how social norms enable people to cooperate in the absence of formal property right systems and centralised allocation mechanisms, in particular through promoting the establishment of reputations and sanctions, whose effectiveness tends to be strengthened through parochialism.

To take account of the roles of narratives, mainstream economics has to recognise that an individual's objectives are not unique, and do not need to be internally coherent across motives. Objectives are context-dependent, since contexts play a role in activating motivations. An individual's objectives are not exclusively self-interested, since the individual is concerned about relationships to others, shaped by identities. An individual's objectives need not be temporally stable, since motives may change quickly through time. An individual's environment is generally not determinate, since the individual generally has access to multiple interpretations of the environment, with no unambiguous objective criteria for defining the environment. An individual's environment is generally not objectively observable, since the individual is active in construction of this environment. Individuals are not means-end rational since they use only their attended-to means to achieve their attended-to ends.

In particular, since people's environments are not determinate and objectively observable, narratives can play a role in defining these environments. Furthermore, narratives influence the objectives of people's activities, for any given appraisal of the environment. These implications open up important roles for narratives to play in economic decision-making.

Narrative economics

Robert Shiller makes the case for “narrative economics” - studying the spread and dynamics of popular narratives and how these change through time, to understand economic fluctuations. A recession, for example, is a time when many people have decided to spend less, postpone starting a new business or hiring new help, or express support for fiscally conservative government. They might make any of these decisions in reaction to the recession itself (feedback), but we need to consider the possibility that the main reason a recession is severe is related to the prevalence and vividness of certain stories, not the purely economic feedback or multipliers that economists model. Economics should therefore be expanded to include the quantitative study of changing popular narratives to evaluate the importance of narratives in causing economic fluctuations and to establish the direction of causality between changing narratives and economic outcomes.

Narrative psychology is related to the cognitive bias known as framing, whereby people react to something depending on how it is presented, for example, “ineffective in one in five cases” versus “effective in 80 percent of cases”. It is also related to representativeness, whereby people form expectations based on similarity of circumstance to some idealised story or model, and tend to neglect base-rate probabilities. For example, surveys of institutional investors and high-income Americans since 1989 find that these people generally have exaggerated assessments of the risk of a stock market crash, and that these assessments are influenced by the news stories, especially front page stories, with an event such as an earthquake influencing estimations of the likelihood of a crash.

The narrative basis of economic recessions might be hard to see since narratives are not easy to measure. For example Milton Friedman and Anna J. Schwartz have given the most influential account of the 1920-21 recession, the sharpest US recession since modern statistics are available. In their *Monetary History of the United States* they say that the 1920-21 contraction has a single identifiable cause: an error made by the Federal Reserve to raise the discount rate to trim out-of-bounds inflation in 1919. The Fed was only

created in 1914, and so it is not surprising that they could have made mistakes and implemented overly strong swings in policy.

But other remarkable things were going on too, and important events are usually the result of the confluence of many factors. Changing narratives are often at work in those factors. There was a background of horrible recent events: World War I; an influenza epidemic even more deadly than the war that started during the war and was not quite over; and a series of postwar race riots in the United States. The 1920-21 recession also coincided with the early stages of widespread public fear of communism. There was also an oil price shock. All of these events were associated with hugely unsettling narratives that could have led to a sense of economic uncertainty that might have discouraged discretionary spending of households and slowed down hiring decisions of firms around the world. These certainly sound like more significant potential causes than New York Fed President Benjamin Strong's decision to take a cruise when he was needed.

There were also more subtle narratives that might have brought on the recession. A story was afloat in 1920 that consumer prices would eventually drop back to 1913 levels. With such deflation expectations, many would delay purchases until prices fell, but large numbers of people waiting to buy brought on a depression. 1920 was also blamed on people who were labelled with the newly-popular word "profiteer." Wartime narratives spread of customers angry at high prices chastising their milkmen and telling their butcher they would stop eating meat altogether to spite them. But the narrative epidemic was unfazed by the end of the war. The popular author Henry Hazlitt wrote in 1920: "The butcher is amazed at the profiteering of the man who sells him shoes; the shoe salesman is astounded at the effrontery of the theatre ticket speculator; the theatre ticket speculator is staggered at the high-handedness of his landlord; the landlord raises his hands to high heaven at the demands of his coal man, and the coal man collapses at the prices of the butcher." Senator Arthur Capper was reported in January 1920 as urging consumers to "boycott the profit hogs by refusing to buy goods offered at extortionate prices."

But it wasn't just anger at profiteers that curtailed consumption. The story that consumer prices would fall dramatically, a story which had good contagion since it was associated with the profiteer narrative, was not so much told as intimated thousands of times during the 1920-21 recession when newspapers heralded some individual prices that had indeed fallen to 1913 or 1914 levels. A possible narrative-based unconventional explanation – or at least partial explanation - for the Depression of 1920-21 would then be substantially a consumer boycott against imagined profiteers, based on narratives that made them villains, abetted by a sense of possible personal opportunity to postpone buying, or sense of revenge against the profiteers by outsmarting them, in the presence of emotion-laden narratives (connected to the World War, the communist threat, the influenza epidemic, the race riots, the oil shock).

The Great Depression

The first narrative of the Great Depression was that of the stock market drop on October 28, 1929. This narrative was especially powerful, in its suddenness and severity, focusing public attention on a crash as never before in America. But, beyond the record size, it is hard to say what made this crash narrative such a success. There was something very well timed about this story, that caused an immediate and lasting public reaction. The narrative of the crash of 1929 was so strong that it persists today. Part of the strength seems to come from a certain moralising. Sermons preached on the Sunday after the crash, November 3, 1929, as reported in newspapers the following day, took great note of the crash, and attributed it to moral and spiritual excesses. The sermons helped frame a narrative of a sort of day-of-judgment on the "Roaring Twenties."

Another narrative at the beginning of the Great Depression was that of a repeat of the 1920-21 event. Since many must have expected prices to fall, as they did before in 1920-21, they would want to delay their purchases until the price decline was complete. Economists naturally expected the contraction to be as short lived as in 1920-21, which helps explain why President Hoover and others confidently explained that it would be over soon. But the public didn't necessarily believe the President. Economists should look

more at testimonies of women to understand the consumption function, and how they decided on shopping strategies, particularly since shopping was mainly a woman's role.

Even as it happened, the contraction was thought of popularly as the product of some kind of feedback. In his 1933 inaugural address, President Roosevelt famously states “the only thing to fear is fear itself,” describing people as responding with fear to others' fear. Roosevelt also offered moral reasons to spend. Days after his inauguration, he took the unusual step of addressing the nation on the radio at a time of a massive national bank run that had necessitated shutting all the banks. In this “fireside chat” he explained the banking crisis and asked people not to continue their demands on banks. His personal request ended the bank run and money flowed into, not out of, the banks when they reopened. The narrative of this first fireside chat is still with us today, but the narrative has not been powerful enough, or not used well enough, to prevent recessions.

The macro storyline in the Great Depression gradually morphed into a national revulsion against the excesses and pathological confidence of the Roaring Twenties. Contagion rates for stories of business failures, rather than inspirational stories, were naturally high at a time when a large fraction of the population were unemployed. Stories abounded of business people committing suicide. Other narratives focused on the rising leftist or communist movement. The increasing radicalisation of President Roosevelt plays a part in these stories: in 1936, speaking of the magnates of organised money, he said “I welcome their hatred”.

The 2007-9 financial crisis

Financial crises are driven by stories. For example, stories about bank runs in the 19th century were virtually synonymous with financial crises. After the Great Depression bank runs were thought to be cured, but the run on Northern Rock in 2007, the first UK bank run since 1866, brought back the old narratives of panicked depositors forming angry crowds outside closed banks. The story led to a nervousness internationally, and in 2008 to the Washington Mutual bank run in the US, and the Reserve Prime Fund run a few days after that. These events then led to the very unconventional US government guarantee of all US money market funds for a year. Governments were aware that they could not let the old story of a bank run go live over concern for its effects on public anxiety.

A narrative approach to understanding the crisis could start before 2007, with the launch in 2001 of the UK reality television show “Property Ladder”. The show featured individuals buying homes, fixing them up, and then reselling them at a large profit. Successful narratives are copied with appropriate changes and launched anew in other countries. The US TV show “Flip that House” attempted to replicate Property Ladder in 2005, but it was cancelled in 2008. Property Ladder itself lasted until 2009, renaming itself Property Snakes and Ladders.

Leading up to the Great Recession 2007-9, and setting the stage for it, were widespread fears of long-term job insecurity because of advancing technology. Facebook and Gmail appeared in 2004, YouTube in 2005, Twitter in 2006, and the iPhone in 2007. These were the prominent business stories of the time, and they may have left the impression that the companies in the new economy might not be creating jobs for those not technologically gifted or connected with other such people. The very name “Great Recession” could be interpreted as evidence of a narrative epidemic. Naming the financial crisis after the Great Depression was not the choice of any one individual. There had been earlier unsuccessful attempts to attach the name “Great Recession” to preceding recessions. Nouriel Roubini first referred to the “Great Recession of 2007” in late 2006, a year before the recession had started. But it took several more years, until 2009, for the term to catch on and go viral.

What is it about the 2007-9 event that made the name “Great Recession” suddenly contagious? Judging from the peak US unemployment rate, it was less severe than the 1981-82 recession. Perhaps it was because the 2007-9 event fitted the most generic and ill-informed memories of the Great Depression.

People remember massive bank failures as part of the Great Depression story, and that was a better fit with the events of 2007. In the 1981-82 recession the stock market had not been booming, and the stock market did not fall below its 1980 value by 1982. In contrast, 2007-9 saw a near halving of the market from very high levels. People in 1981-82 were preoccupied with out-of-control consumer-price inflation, and saw the events in terms of a suddenly strong central bank effort to contain the inflation.

The Great Depression is exaggerated in people's minds because of its legendary status. In 2007-09 presidents and prime ministers invoked parallels to the Great Depression to justify their requests to apply stimulus. Did this contribute to a self-fulfilling prophecy, a mirror event to the Great Depression, albeit not as severe (Great Recession, not Great Depression)? However, no politician can actually control the progression of the narratives they create. The manner in which these narratives unfold will play an important role in any economic forecast. To best predict economic activity, we need, among other things, to watch the narratives and ask: how will the emerging twists in the narratives affect propensity to spend, to start unconventional new businesses, to hire new employees? In short, how will the animal spirits be affected?