

**Debate the Issues: The Financial Sector****Draft September 2018**

The following text summarises the views of a number of leading economists and financial experts who have contributed in a personal capacity to the NAEC Initiative.

This draft document is being presented to the NAEC Group on 13 September to solicit feedback, comments and contributions from OECD Policy Committees and Members and to continue the dialogue with NAEC partners and thinkers outside the OECD.

Gabriela Ramos – [gabriela.ramos@oecd.org](mailto:gabriela.ramos@oecd.org)

William Hynes – [william.hynes@oecd.org](mailto:william.hynes@oecd.org)

Patrick Love – [patrick.love@oecd.org](mailto:patrick.love@oecd.org)

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# **Debate the Issues: The financial sector**

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### Disclaimer and further consultation

The following text summarises the views of a number of thinkers who have contributed to NAEC seminars.

The present document is a draft for consultation. It will be revised to reflect the discussions, conclusions and recommendations of the NAEC Group meeting on 13 September, and the OECD-NAEC and Partners for a New Economy conference “10 Years after the Crisis” on 14 September 2018. Committee Chairs dealing with financial and economic issues, and the OECD Secretariat supporting their work, are invited to contribute, and share their views. To do so, please send your comments to William Hynes, Head of the NAEC Unit ([william.hynes@oecd.org](mailto:william.hynes@oecd.org)).

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.

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## Introduction

### Gabriela Ramos

Ten of the world's top 50 financial corporations have assets of over \$2 trillion. That's more than the GDP of all but the six richest OECD countries. On the foreign exchange markets, daily turnover passed the 4 trillion dollar mark in April 2010, up 20% from April 2007 before the crisis. Such sums are huge to the point of abstraction, but the reality behind them was brutally revealed when the crisis struck and provoked a recession, leaving people without jobs, homes or pensions.

The crisis showed that banks and financial markets are not simply intermediaries between economic agents like companies and investors, and that they have an impact on the real economy in their own right. This prompts questions about how finance and investment can be used more to drive job creation and income growth and act as a conduit for the global diffusion of innovation, expertise and the funding all these depend on.

The crisis also revealed how the tools economists used to analyse and understand developments were not accurate enough. The dominant school of economic thought prior to the crisis essentially modelled the national economy as a totally understandable and changeless machine usually operating at its optimal speed, producing outputs in an almost totally predictable way, under the close control of its (policy) operators. People were represented by an average agent acting rationally on information to optimise profit. The real economy and real people do not behave like that.

The OECD's call for "better policies for better lives" includes policies concerning finance. Many citizens feel, however, that the financial system is too complicated for them. Some technical details require considerable knowledge of course, but in this book, world experts on the theory, practice and policy of finance explain in plain language the mechanisms and outcomes we all need to understand to contribute to the debate around the financial system, and particularly, to the relevant question on whether we are prepared to avoid another crisis.

The book is divided into three sections. The first looks at the theory and models of the financial system. The second discusses the role of the financial system in itself and its relations with the rest of the economy. The final section looks at policies for the financial sector in light of the 2008 crisis and what has changed since then and still needs to change. We are grateful for the different contributions, and for the NAEC Unit for having put together such an interesting and diverse report.

## Theory and models of the financial system

### *What causes financial crises?*

#### Steve Keen

One popular explanation of financial crises is excessive government debt and spending. Historical data going back two centuries reveal serious flaws in this argument, though. Government debt was falling before two major crises and started to rise after them, and even fell to zero before the 1837 crisis, and did not rise after it. Financial crises are caused by a boom-bust process driven by private credit: excessive private debt and credit before crisis, negative credit during it (the annual change in private debt being negative rather than positive). Private debt was rising before three great crises and started to fall after the crises began. There was negative credit in the 1837 crisis, as well as in 1929 and 2007.

Fluctuations in credit are of minor significance when private debt levels are low, but are catastrophic when they are high. The mechanism starts from the fact that expenditure is income. What you spend becomes income for someone else. There are two sources of expenditure: turnover of existing money; and new money created by exports exceeding imports, governments spending more than they tax, and banks lending more than they get back in repayments. Booms are caused by bank lending, as extra credit-money is spent into the economy. Bust follows when growth in private debt stops. Credit is not the largest component of expenditure but it is by far the most volatile. A fall in credit can cause crisis even if other factors are still growing, with the effect depending on both level and rate of change of private debt. We can see this by looking at a low-debt and a high-debt example.

In the low debt ratio example, imagine an economy with turnover of existing money of \$1000bn/year initially, growing at 10%/year. Private debt is initially 50% of turnover of existing money, \$500bn, growing at 20%/year. Credit is \$100bn/year. Total demand is \$1100bn/year. The next year, turnover of existing money is \$1100bn; growth of debt is 10%/year; credit = \$60bn/Year (10% of \$600bn); total demand is \$1160bn/Year: \$60bn higher than previous year.

For the high debt ratio example, we start with the same figures, except that private debt initially is not 50% but 200% of turnover of existing money, so \$2000bn, growing at 20%/year, meaning credit is \$400bn rather than \$100bn/year. Total demand is now \$1400bn/year and turnover of existing money the next year is \$1100bn/year. Growth of debt slows to 10%/year. Credit is \$240bn/Year (10% of \$2400bn). Total demand is higher than the low debt example, \$1340bn versus \$1160/Year, but this is \$60bn lower than the previous year in the high debt scenario.

Both the level of private debt/GDP ratio and rate of growth matter. The danger zone is when private debt is greater than 150% of GDP, and credit accounts for a large fraction of total demand (10% of GDP). The data on this for recent crises are overwhelming. Japan (the first country to suffer a serious credit crisis, back in 1990) the USA, UK, and Spain had crises when private debt reached historically unprecedented levels -150% in the USA, as high as 220% in Spain and Japan. All of these crises were preceded by credit rising to substantial levels, 20% of GDP in most cases, and almost 40% in the case of Spain (where credit is the annual change in private debt).

All involved negative credit, with Spain being the worst, with credit at negative 19% of GDP in 2013. This was unprecedented since the end of WWII for all of them except the

UK, and even there, the previous negative credit events had been short-lived, whereas credit was negative for most of 2009-2015. Not only did these crises begin when the credit started to fall, the ups and downs of credit were a major determinant of economic activity at all times in every country except the UK since the 1990s.

Similar relationships exist in asset markets, and in particular, between mortgage credit and house prices. This contradicts the canons of conventional finance theory, which argues that leverage does not determine asset prices. The main determinant of the change in house prices is the change in mortgage credit. For US data, econometric testing confirms that changes in mortgage credit cause changes in house prices, rather than vice versa. The correlations between change in total household credit and change in house prices since 1970 for the other countries are respectively 0.4 for Japan, 0.6 for the UK, and 0.47 for Spain.

Data like these demand examination, but a decade after the financial crisis, mainstream economists continue to ignore them. These economists have learnt an intricate and superficially all-encompassing theory, which they believe provides not merely an explanation of the complicated reality of the economy, but also a guide as to how it can be improved. A core component of mainstream theory is the belief that one can quite literally ignore the banking system when modelling the macroeconomy. This was easy to do before 2007 since there had not been a banking crisis of this scale since the Great Depression. Voluntary blindness about the role of banks and credit in macroeconomics will give the world no warning again when another crisis approaches, not because no warning is possible, but because this wilful ignorance turns a blind eye to the very obvious causes of financial crises.

These causes are unfolding now, not at a global level but in the many countries that avoided the crisis in 2008 by continuing to accumulate more private debt. The four largest such economies are China, Canada, South Korea and Australia. Others include Singapore, Sweden, Norway and Belgium. In all of these countries, government policies led the private sector to avoid the negative credit experiences that made the 2008 crisis so severe in the USA and UK. But they accumulated even more private debt than the USA and UK in 2008. These countries will therefore experience their own, localised versions of the 2008 crisis when their credit bubbles burst. When their crises occur, virtually all the world's major economies will be caught in private debt traps. The only exceptions will be countries like Germany that have exploited huge trade surpluses to enable their private sector debt levels to fall over the last two decades.

### *From economic crisis to crisis in economics*

#### Andy Haldane

It would be easy to become very depressed at the state of economics in the current environment. Many experts, including economics experts, are simply being ignored. But the economic challenges facing us could not be greater: slowing growth, slowing productivity, increased protectionism, the retreat of globalisation, high and rising levels of inequality. These are deep and diverse problems facing our societies and we will need deep and diverse frameworks to help understand them and to set policy in response to them. In the pre-crisis environment when things were relatively stable and stationary, our existing frameworks in macroeconomics did a pretty good job of making sense of things.

But the world these days is characterised by features such as discontinuities, tipping points, multiple equilibria, and radical uncertainty. So if we are to make economics

interesting and the response to the challenges adequate, we need new frameworks that can capture the complexities of modern societies.

We are seeing increased interest in using complexity theory to make sense of the dynamics of economic and financial systems. For example, epidemiological models have been used to understand and calibrate regulatory capital standards for the largest, most interconnected banks, the so-called “super-spreaders”. Less attention has been placed on using complexity theory to understand the overall architecture of public policy – how the various pieces of the policy jigsaw fit together as a whole in relation to modern economic and financial systems. These systems can be characterised as a complex, adaptive “system of systems”, a nested set of sub-systems, each one itself a complex web. The architecture of a complex system of systems means that policies with varying degrees of magnification are necessary to understand and to moderate fluctuations. It also means that taking account of interactions between these layers is important when gauging risk.

Although there is no generally-accepted definition of complexity, that proposed by Herbert Simon in *The Architecture of Complexity* – “one made up of a large number of parts that interact in a non-simple way” – captures well its everyday essence. The whole behaves very differently than the sum of its parts. The properties of complex systems typically give rise to irregular, and often highly non-normal, statistical distributions for these systems over time. This manifests itself as much fatter tails than a normal distribution would suggest. In other words, system-wide interactions and feedbacks generate a much higher probability of catastrophic events than Gaussian distributions would imply.

For evolutionary reasons of survival of the fittest, Simon posited that “decomposable” networks were more resilient and hence more likely to proliferate. By decomposable networks, he meant organisational structures which could be partitioned such that the resilience of the system as a whole did not rely on any one sub-element. This may be a reasonable long-run description of some real-world complex systems, but less suitable as a description of the evolution of socio-economic systems. The efficiency of many of today’s networks relies on their hyper-connectivity. There are, in the language of economics, significantly increasing returns to scale and scope in a network industry. Think of the benefits of global supply chains and global interbank networks for trade and financial risk-sharing. This provides a powerful secular incentive for non-decomposable socio-economic systems.

Moreover, if these hyper-connected networks do face systemic threat, they are often able to adapt in ways which avoid extinction. For example, the risk of social, economic or financial disorder will typically lead to an adaptation of policies to prevent systemic collapse. These adaptive policy responses may preserve otherwise-fragile socio-economic topologies. They may even further encourage the growth of connectivity and complexity of these networks. Policies to support “super-spreader” banks in a crisis for instance may encourage them to become larger and more complex. The combination of network economies and policy responses to failure means socio-economic systems may be less Darwinian, and hence decomposable, than natural and biological systems.

What public policy implications follow from this complex system of systems perspective? First, it underscores the importance of accurate data and timely mapping of each layer in the system. This is especially important when these layers are themselves complex. Granular data is needed to capture the interactions within and between these complex sub-systems.

Second, modelling of each of these layers, and their interaction with other layers, is likely to be important, both for understanding system risks and dynamics and for calibrating potential policy responses to them.

Third, in controlling these risks, something akin to the Tinbergen Rule is likely to apply: there is likely to be a need for at least as many policy instruments as there are complex sub-components of a system of systems if risk is to be monitored and managed effectively. Put differently, an under-identified complex system of systems is likely to result in a loss of control, both system-wide and for each of the layers.

In the meantime, there is a crisis in economics. For some, it is a threat. For others it is an opportunity to make a great leap forward, as Keynes did in the 1930s. But seizing this opportunity requires first a re-examination of the contours of economics and an exploration of some new pathways. Second, it is important to look at economic systems through a cross-disciplinary lens. Drawing on insights from a range of disciplines, natural as well as social sciences, can provide a different perspective on individual behaviour and system-wide dynamics.

The NAEC initiative does so, and the OECD's willingness to consider a complexity approach puts the Organisation at the forefront of bringing economic analysis policy-making into the 21st century.

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### *The Adaptive Markets Hypothesis*

#### Andrew Lo

Economic behaviour and financial markets are a product of human evolution, and as such are shaped by biological laws. The basic principles of mutation, competition, and natural selection apply to the banking industry as much as to natural ecosystems. The key to these laws is adaptive behaviour in shifting environments. To understand the complexity of human behaviour, we need to understand the different environments that have shaped it over time and across circumstances. We need to understand how the financial system functions and sometimes fails under these different conditions. We have assumed rational economic behaviour for so long that we've forgotten about other aspects of human behaviour.

Neuroscience and evolutionary biology confirm that rational expectations and the Efficient Markets Hypothesis (EMH) capture only some of the full range of human behaviour. That is not to say we should discard EMH altogether. It takes a theory to beat a theory, and the behavioural finance literature has yet to offer a clear alternative that does better. Psychology, neuroscience, evolutionary biology, and artificial intelligence can all help us to understand market behaviour, but none of them offers a complete solution. We need a new narrative for how markets work, and now have enough pieces of the puzzle to start putting it all together.

We begin by acknowledging that market inefficiencies exist. These inefficiencies and the behavioural biases that create them are important clues into how the brain makes financial

decisions. We've seen how biofeedback measurements can be used to study behaviour, and can use imaging techniques to watch how the human brain functions in real time as we make decisions. However, neuroeconomics is only one layer. For example, neuroscience can tell us why people with dopamine dysregulation syndrome become addicted to gambling, but it doesn't explain anything about the larger picture of financial decision making. To the sceptic, the peculiar behaviours described in these neuroscientific case studies are really just "bugs" in the basic program of economic rationality, the exceptions that prove the rule.

In fact, we have to turn the standard economic view of human rationality on its head. We aren't rational actors with a few quirks in our behaviour. Our brains are collections of quirks. Working together, under certain conditions, these quirks often produce behaviour that an economist would call "rational." But under other conditions, they produce behaviours that an economist would consider wildly irrational. These quirks are the products of brain structures whose main purpose isn't economic rationality, but survival.

Our neuroanatomy has been shaped by the long process of evolution, changing only slowly over millions of generations. Our behaviours are shaped by our brains. Some of our behaviours are evolutionarily old and very powerful. The raw forces of natural selection, reproductive success or failure—in other words, life or death—have engraved those behaviours into our very DNA. Natural selection gave us abstract thought, language, and the memory-prediction framework. These adaptations give us the power to change our behaviour within a single lifespan, in response to immediate environmental challenges and the anticipation of new challenges. Natural selection also gave us heuristics, cognitive shortcuts, behavioural biases, and other conscious and unconscious rules of thumb—the adaptations that we make at the speed of thought. Natural selection isn't interested in exact solutions and optimal behaviour, features of *Homo economicus*. Natural selection only cares about differential reproduction and elimination, in other words, life or death. Our behavioural adaptations reflect this cold logic. However, evolution at the speed of thought is far more efficient and powerful than evolution at the speed of biological reproduction, which unfolds one generation at a time. Evolution at the speed of thought allows us to adapt our brain functions across time and under myriad circumstances to generate behaviours that have greatly improved our chances for survival.

This is the core of the Adaptive Markets Hypothesis, whose basic idea can be summarized in five key principles:

1. We are neither always rational nor irrational, but we are biological entities whose features and behaviours are shaped by the forces of evolution.
2. We display behavioural biases and make apparently suboptimal decisions, but we can learn from past experience and revise our heuristics in response to negative feedback.
3. We have the capacity for abstract thinking, specifically forward-looking what-if analysis; predictions about the future based on experience; and preparation for changes in our environment. This is evolution at the speed of thought, which is different from but related to biological evolution.
4. Financial market dynamics are driven by our interactions as we behave, learn, and adapt to each other, and to the social, cultural, political, economic, and natural environments in which we live.

## 5. Survival is the ultimate force driving competition, innovation, and adaptation.

Under the Adaptive Markets Hypothesis, individuals never know for sure whether their current heuristic is “good enough.” They make choices based on their experience and their best guess as to what might be optimal. They learn by receiving positive or negative reinforcement from the outcomes. As a result of this feedback, individuals will develop new heuristics and mental rules of thumb to help them solve their various economic challenges. As long as those challenges remain stable over time, their heuristics will eventually adapt to yield approximately optimal solutions to those challenges.

The Adaptive Markets Hypothesis can easily explain economic behaviour that is only approximately rational, or that misses rationality narrowly. But it can also explain economic behaviour that looks completely irrational, as when the environment changes and the heuristics of the old environment might not be suited to the new one. Or when individuals receive no reinforcement from their environment, and don’t learn. Likewise, inappropriate reinforcement will teach individuals suboptimal behaviour. And if the environment is constantly shifting, individuals may never reach an optimal heuristic. This, too, will look “irrational.”

The Adaptive Markets Hypothesis recognises that suboptimal behaviour is going to happen when we take heuristics out of the environmental context for which they emerged. Even when an economic behaviour appears extremely irrational, it may still have an adaptive explanation. Such behaviour isn’t “irrational,” but “maladaptive.” Our behaviour adapts to new environments both in the short term as well as across evolutionary time, and not always in financially beneficial ways. Financial behaviour that may seem irrational now is behaviour that has not had sufficient time to adapt to the context. Economic expansions and contractions are the consequences of individuals and institutions adapting to changing financial environments, and bubbles and crashes are the result when the change occurs too quickly.

### *How can physics help economics?*

#### Jean-Philippe Bouchaud

The crisis put classical economics under pressure. In theory, deregulated markets should be efficient, with rational agents quickly correcting any mispricing or forecasting error. Prices should reflect the underlying reality and ensure optimal allocation of resources. These “equilibrated” markets should be stable: crises can only be triggered by acute exogenous disturbances not the market itself. This is in stark contrast with most financial crashes.

The crisis might offer an occasion for a paradigm change, to which physics could contribute, through so-called econophysics. Econophysics has tended to concentrate on financial markets, and these represent an ideal laboratory for testing economics concepts using the terabytes of data generated every day by financial markets to compare theories with observations.

In financial markets, physicists are intrigued by a number of phenomena described by power-laws. For example, the distribution of price changes, of company sizes, of individual wealth all have a power-law tail, to a large extent universal. The activity and volatility of markets have a power-law correlation in time, reflecting their intermittent nature, obvious to the naked eye. Many complex physical systems display very similar intermittent dynamics, for example velocity fluctuations in turbulent flows. While the exogenous driving force is regular and steady, the resulting endogenous dynamics is

complex and jittery. In these cases, the non-trivial (physicists say “critical”) nature of the dynamics comes from collective effects: individual components have a relatively simple behaviour, but interactions lead to new, emergent phenomena. The whole is fundamentally different from any of its sub-parts. The dynamics of financial markets, and more generally of economic systems, may reflect the same underlying mechanisms.

Several economically-inspired models exhibit these critical features. One (a transposition of the Random Field Ising Model, RFIM) describes situations where there is a conflict between personal opinions, public information, and social pressure. Traders are influenced by some slowly varying global factors, for example interest rates or dividend forecasts. Assume no shocks in the dynamics of these exogenous factors, but that each trader is influenced by the opinion of the majority. If all agents made up their mind in isolation (zero herding tendency) then the aggregate opinion would faithfully track the external influences and, by assumption, evolve smoothly.

But if the herding tendency exceeds some finite threshold, the evolution of the aggregate opinion jumps discontinuously from optimistic to pessimistic, while global factors only deteriorate slowly and smoothly. Furthermore, some hysteresis appears. Like supersaturated vapour refusing to turn into liquid, optimism is self-consistently maintained. To trigger the crash, global factors have to degrade far beyond the point where pessimism should prevail. Likewise, these factors must improve much beyond the crash tipping point for global optimism to be reinstalled.

The representative agent theory amounts to replacing an ensemble of heterogeneous and interacting agents by a unique representative one, but in the RFIM, this is impossible: the behaviour of the crowd is fundamentally different from that of any single individual.

Minority Games define another, much richer, family of models in which agents learn to compete for scarce resources. A crucial aspect here is that the decisions of these agents impact the market: the price does not evolve exogenously but moves as a result of these decisions. A remarkable result here is the existence of a phase transition as the number of speculators increases, between a predictable market where agents can make some profit from their strategies, and an over-crowded market, where these profits vanish or become too risky.

There are other examples in physics and computer science where competition and heterogeneities lead to interesting phenomena, for example cases where even if an equilibrium state exists in theory, it may be totally irrelevant in practice, because the equilibration time is far too long.

As models become more realistic, analytics often has to give way to numerical simulations. This is well-accepted in physics, but many economists are still reluctant to recognise that numerical investigation of a model, although very far from theorem proving, is a valid way to do science. It is surprising how easily numerical experiments allow one to qualify an agent-based model (ABM) as potentially realistic or completely off the mark. What makes this expeditious diagnosis possible is the fact that for large systems details do not matter much – only a few microscopic features end up surviving at the macro scale.

The attraction of ABM is that they can put together simple elements that produce rich behaviours. The instability mechanisms in the complex systems they are used to study show common features. Phase diagrams are a core element of this approach, allowing the study of places where behaviour can change suddenly and radically. In ABM, macro

observables such as output are not smooth functions of the parameters. The interest rate for example can induce a transition between a good and a bad phase.

The notion of emergence is important in ABM. Equilibrium output level is usually exogenous in traditional, models, but in an ABM it is the result of the ability of agents (or firms) to cooperate, so it is an emergent property that can appear or disappear suddenly. This is one way to think about crises.

ABM also allow for the notion of hysteresis. Different states of the economy can coexist in the same region of parameter space. The economy can be stuck in a good or a bad state, while the system could have chosen another outcome if the history had been different or some anecdotal event occurred.

ABM can allow policy experiments, even if they still require a lot of work as policy tools. They show that policies that would be stabilising if you assume infinitely rational, forward-looking agents can actually be destabilising when you remove that assumption. This makes it intrinsically difficult to design hybrid models incorporating some elements of ABM. If you abandon infinitely forward-looking agents, things happen that would not happen with them. In addition, there is the “curse of complexity”. Optimised complex systems are often on the verge of instability – optimality and instability go hand in hand.

Other empirical results, useful analytical methods and numerical tricks have been established by econophysics, which I have no space to review here, but the most valuable contribution may be methodological nature. Physics constructs models of reality based on a subtle mixture of intuition, analogies and mathematical spin, where the ill-defined concept of plausibility can be more relevant than the accuracy of the prediction. Kepler’s ellipses and Newton’s gravitation were more plausible than Ptolemy’s epicycles, even when the latter theory, after centuries of fixes and stitches, was initially more accurate to describe observations. Physicists definitely want to know what an equation means in intuitive terms, and believe that assumptions ought to be both plausible and compatible with observations. This is probably the most urgently needed paradigm shift in economics.

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#### *Agent-based models*

##### Richard Bookstaber

Four characteristics of human experience that manifest themselves in crises cannot be addressed well by the methods of traditional economics. The first of these “Four Horsemen of the Econopolypse” is 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. It’s a bit like the map Borges describes in *On Rigor in Science*, where “the Map of the Empire had the size of the Empire itself and coincided with it point by point”. Not being able to reduce the economy to a

computation means you can't predict it using analytical methods, but economics requires that you can.

The second characteristic property is emergence. Emergent phenomena occur when the overall effect of individuals' actions is qualitatively different from what each of the individuals are 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 with people getting crushed, despite nobody wanting this or acting intentionally to produce it. Likewise no one decides to precipitate a financial crisis, and indeed at the level of the individual firms, decisions generally are made to take prudent action to avoid the costly effects of a crisis. But what is locally stable can become globally unstable.

The name for the third characteristic, non-ergodicity, comes from the German physicist Ludwig Boltzmann who defined as "ergodic" a concept in statistical mechanics whereby a single trajectory, continued long enough at constant energy, would be representative of an isolated system as a whole, from the Greek ergon energy, and odos path. 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 – 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 completes our quartet. It 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. Electric power, the atomic bomb, or the internet are examples from the past, and of course by definition we don't know what the future will be. 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. This in fact is the human condition. We don't know where we are going, and we don't know who we will be when we get there. The reality of humanity means that a mechanistic approach to economics will fail.

So is there any hope of understanding what's happening in our irreducible, emergent, non-ergodic, radically uncertain economy? Yes, if we use methods that are more robust, that are not embedded in the standard rational expectations, optimisation mode of economics. To deal with crises, we need methods that deal with computational irreducibility; recognise emergence; allow for the fact that not even the present is reflected in the past, never mind the future; and that can deal with radical uncertainty. Agent-based modelling could be a step in the right direction.

Agent-based models (ABM) use a dynamic system of interacting, autonomous agents to allow macroscopic behaviour to emerge from microscopic rules. The models specify rules that dictate how agents will act based on various inputs. Each agent individually assesses its situation and makes decisions on the basis of its rules. Starlings swirling in the sky (a "murmuration") is a good illustration. The birds appear to operate as a system, yet the flight is based on the decisions of the individual birds. Building a macro, top-down model will miss the reality of the situation, because at the macro level the movements of the

flock are complex, non-linear, yet are not based on any system-wide programme. But you can model the murmuration based on simple rules as to how a bird reacts to the distance, speed and direction of the other birds, and heads for the perceived centre of the flock in its immediate neighbourhood.

Likewise, the agent-based approach recognises that individuals interact and in interacting change the environment, leading to the next course of interaction. It operates without the fiction of a representative consumer or investor who is as unerringly right as a mathematical model can dream. It allows for construction of a narrative—unique to the particular circumstances in the real world—in which the system may jump the tracks and careen down the mountainside. This narrative gives us a shot at pulling the system back safely.

In short, agent-based economics arrives ready to face the real world, the world that is amplified and distorted during times of crisis. This is a new paradigm rooted in pragmatism and in the complexities of being human.

For the financial system, we model liquidity, leverage and concentration. We plug in values we believe to accurately represent the current state of economic market. We run simulations to see how often things go off the rails. If things don't go off the rails often we make it green, if not we make it red. If you increase both liquidity and leverage, things tend to get worse. When we model risk in time according to static models, scenarios of crisis and boom are equally likely. When we apply ABM, crisis and boom are not symmetrical. Crisis is not a single bad draw from a homogeneous distribution of risks. It causes a cascade.

In the analytic deductive approach, you plan everything from start to finish and then fill it all in. This is not the way to approach a crisis where the unexpected will always happen. A better way is the “headlights on the road” approach. You go ahead and see where the next curve is. Once you get there, you see where the following curve is, and so on. You solve it as far as you can see, and you are always adapting. In a crisis, you should be able to make changes, test critical assumptions and variables.

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### *Financial Network Analysis*

#### Sheri M. Markose

The 2007 financial crisis exposed the shortcomings of monetary economics and the regulatory framework known as Basel II. While financial innovations were progressing at a rapid rate, there was a lack of urgency to develop modelling tools capable of mapping and studying the massive interrelationships in the financial system implied by the workings of new financial products. Regulators, and other actors, had to rely on approaches dating from the period of double-digit stagflation in the 1970s and early 1980s when inflationary overheating was the sign of growing monetary and economic instability. The epochal reduction in inflation starting from about 1994 gave a semblance of calm and led to complacency.

A lack of a holistic perspective on the linkages between constituent elements can be blamed for why Basel II regulatory authorities encouraged bank behaviour that may appear sound at an individual level but contributes to system-wide failure. Systemic risk in financial systems, like environmental externalities which lead to overuse and degradation of resources, arises from design problems that are required to attenuate individual behaviour based on local incentives to prevent system collapse.

ICT based multi-agent financial network models can be useful in monitoring and analysing existing systems and can be used as computational test beds for the design of robust policy reforms. They can compensate for the weaknesses of mainstream macroeconomic or monetary models for policy that show an absence of the endemic arms race of strategic gaming by those regulated, and the weaknesses of econometric models that cannot handle structural interconnections and interactions between economic units.

Network models are increasingly being used to obtain a better understanding of stability of systems in biology, eco-systems, road transport, infrastructure and cities, engineering, power networks, information systems, etc. Network analysis and fine-grained firm level data based multi-agent simulators can also help address stability concerns for any financial market. Typically, in a financial network, the nodes are financial institutions and there are links called in-degrees which represent obligations from others, while out-degrees represent a financial entity's obligations to others.

Network models depict causal chains between nodes rather than relying solely on statistical correlations which still remain the basis of most contagion models. The study of causal chains of network interconnections with nodes taken to be 'agents' with capacity for rule-based behaviour or fully autonomous behaviour that represents financial intermediaries (FIs) and regulatory authorities, constitutes the framework of financial network modelling.

The contractual obligations between FIs, and FIs and end users that determine bilateral flows of payoffs, constitute pre-existing network structures. A crisis with default of counterparties can trigger further contingent claims and large losses at default due to collapse in asset markets. Interactions of agents produce system-wide feedback loops. In the traditional equation-oriented analyses, structural changes from strategic behaviour and tracing of causal links and influences of feedback loops on individual decisions are almost impossible to do. In agent-based models, these need not be restricted to pre-specified equations that have to be estimated using past data in econometric or time series approaches. Agent-based ICT technology embedded in fine-grained digital maps of the structural interconnections of financial markets should therefore be developed as the starting point of stress tests and scenario analysis, especially in the context of the policy design.

Financial networks are not random and are most likely to have network properties like other socio-economic, communication and information networks. These manifest a statistical signature of complex systems, namely, a top tier multi-hub of few agents who are highly connected among themselves and to other nodes that show few if any connections to others in the periphery. The consequence of the clustered structure of a network is short path lengths between a node and any other node in the system. This is efficient in terms of liquidity and informational flows in good times, but worsens fragility in bad times when so-called hub banks ('super-spreaders') fail or suffer illiquidity. Failure of a big unit increases the probability of failure of other big units, an aspect of the too-interconnected-to-fail phenomenon. Structurally, however, the interconnected hubs

can contain the liquidity shocks and prevent them from going to the extremities, but only if there are adequate buffers.

The presence of highly-connected and contagion-causing players typical of a complex system network perspective is to be contrasted with what economists regard to be an equilibrium network. In the latter, the probability that a contagion occurs conditional on one bank failing is significantly reduced, but the drivers of network formation in the real world are different from those assumed in economic equilibrium models. In terms of propagation of failure, however, it is not true that financial systems where no node is too interconnected are necessarily easier to manage in terms of structural coherence and stability. Stability analysis shows that the less-interconnected system is in some respects more dangerous. This suggests the need for caution in espousing an ideal network topology for financial networks.

It is important to consider network formation to be a complex adaptive process in that nodes interact strategically and respond to institutional incentives. A key aspect of complex adaptive systems is the capacity of interacting agents to show über intelligence with strong proclivities for contrarian (rule breaking) behaviour and the production of structure changing novelty and 'surprises'. This takes the co-evolutionary form of a regulator-regulatee arms race with monitoring and production of countervailing new measures by the authorities in response to regulatee deviations from rules due to perverse incentives or loopholes. Failure to monitor and co-evolve the regulatory framework by authorities could result in system collapse.

Instability of large networks can result from a combination of individually rational behaviour and policy incentives which reinforce local efficiency but cause an increase in concentration and interconnectedness in the form of closer coupling with reduced buffers of nodes to a point of supercriticality or instability. The pressure to conserve scarce resources can lead to buffers being treated as costly and superfluous, leading to tighter coupling within the system. Economic forces can drive both designed and self-organising systems towards being balanced on the point of supercriticality where extreme system failure can follow. In the financial system, the different ways by which FIs in the system implement avoidance or reduction of key buffers (capital, collateral and margin requirements, for example) plus the numbers of those doing this have implications for the size of the hub nodes, the inter-connectivity between them and smaller nodes, and also contingent feedback loops of the system. All these factors can move the system to a supercritical state.

Socio-economic system failures, including financial crises, arise from a disparity between the pursuit of local interest and those needed for overall stability of the system. Poor rules made with no cognizance of their systemic risk consequences can wreck financial superstructures faster than any terrorist malfeasance.

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## The role of the financial system

### *The crisis, finance and central banking*

Jean-Claude Trichet

With the benefit of hindsight, we can see that the crisis resulted from the interactions of at least five features of the world economic system. First, the extreme sophistication of financial instruments and the development of securitisation, the generalisation of derivative markets, the rapid growth of shadow banking, and the emergence of highly-leveraged institutions. We had a new financial environment that was very obscure in many respect and very difficult to decipher.

Second, we had increased interconnectedness between all financial and non-financial institutions, enabled and encouraged by the advance of information technologies, giving rise to new, untested properties of global finance. At the same time, we had what appears to be strange now, a sentiment of excessive tranquillity and confidence both in the public and private sectors due to sustained growth (even at a low level) with low inflation.

Third, we believed that were justified to speak of a Great Moderation, a permanent reduction in the volatility of business cycle fluctuations thanks to institutional and structural change.

Fourth, and linked to the Great Moderation, consensus in the international community on the efficiency of markets in almost all circumstances, justifying large deregulation. The belief that the financial system could never be far away from a single optimal equilibrium. This implied that the possibility of multiple equilibria could be neglected by market participants.

Fifth, generalised excess leverage was totally neglected by the international community before the crisis.

The first two reasons are forgivable. It was hard to capture the emerging properties of the new world until the crisis came as a kind of stress test. What is unforgivable was to be that calm when we were accumulating so much debt. And we are still vulnerable, perhaps more vulnerable at a global level today than we were in 2007 if we look at global debt to GDP ratios.

The major response to the crisis was unconventional quantitative policies, quantitative easing and the like. At the European Central Bank (ECB), and elsewhere, we had to accept that we were in an extraordinary situation. These measures were designed to combat directly, and very aggressively, a crisis creating a major disruption of all markets. That had nothing to do with the level of interest rates. It was because the markets themselves were signalling an absence of functioning. The specific actions in the US and Europe were different because of our different financial structures. In Europe, we focused on the banks. In the US around 75 percent of the economy was financed through markets and only twenty five or twenty through banks, so the Fed had to provide liquidity massively to financial institutions. One consequence of the crisis could be the idea of maintaining permanently the capacity of public authorities to substitute when needed for the private sector.

A striking feature of this response to the crisis is the acceptance that you have measures that are off-balance-sheet for central banks. Telling commercial banks you can have all the liquidity you need provided you have the eligible collateral means that there is an implicit off-balance-sheet commitment of the order of four trillion euros, the amount of

eligible collateral. Only a small fraction is utilised, but the commitment is there and was so extraordinary that it was neglected by observers and market participants.

The crisis saw convergence of views on the role of central banks. Before 2007, the dominant school of thought was that banking surveillance should be independent, particularly of the central bank. During and after the crisis, it was accepted that the central banks could have good reasons to be at the heart of banking surveillance or close to it. The UK changed its approach, Europe gave this responsibility to the ECB, and the US Federal Reserve System's important role was acknowledged. Convergence is not total, though, since it does not include Japan.

The second element of convergence concerns the prevention of systemic risks. Before the crisis, this was not seen as the very important concept it is now.

A third point is a change of view on monetary policy. It might seem bizarre ex-post that the dynamics of credit we are not considered important before the crisis. Nobody would claim today when deciding overall monetary policy that you can neglect the consequence on price stability of the accumulation of indebtedness.

Central banks have all converged towards much more active communication, and because of the crisis press conferences are generalised now. You have to explain tirelessly what you're doing and why you're doing it.

The last element of convergence concerns the definition of price stability. The central banks that issue four of the five currencies in the IMF's Special Drawing Right have the same definition of price stability. This has consequences in terms of stability of the international monetary system when you have different medium and long-term real growth rates.

A final issue concerns not the crisis as such, but the tools that economics gave us to understand and deal with it. In 2010, I said that as a policy-maker during the crisis, I found the available models of limited help and that in the face of the crisis, we felt abandoned by conventional tools. As the crisis unfolded after the collapse of Lehman, the figures we had were demonstrating a collapse that was out of all the ranges of traditional modelling. The models were not showing us even approximately where we were.

New nonlinear considerations have to be introduced into our models. I was impressed by the fact that some things I could see with my own eyes in the financial world and in the real economy were closer to phenomena you observe in physics than what you normally observe in economics. Dynamic stochastic general equilibrium models have difficulty in capturing phase transitions for example, such as the way spreads changed suddenly after the collapse of Lehman. It was not that the market was totally disrupted, it was that the perception of risk had changed overnight. It is clear, too, that the efficient markets hypothesis cannot be accepted ex ante in all cases. We could learn a lot from econophysics in these respects.

Is the financial system still vulnerable? The pace of additional leverage at a global level has continued more or less exactly as before the crisis, driven by the emerging economies. In an interconnected global economy, leverage is a vulnerability indicator as to systemic instability. Today, this indicator is not reassuring.

**Sources**  
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## *Productive bubbles*

### William Janeway

Not all bubbles are alike. The credit bubble of 2005-08 leading to the global financial crisis was radically unproductive. A mountain of leverage was built on a tiny amount of capital, so when asset prices declined slightly, the collapse in credit was extreme and starved the real economy of working capital. On the other hand, the 1990s dotcom bubble not only funded the building of the infrastructure of the internet, it also funded the first great wave of exploration of what to do with this infrastructure. When this bubble burst, the economic consequences were limited and contained within the scope of conventional policy. The critical factor was the relative lack of leverage by public market investors buying tradable securities.

Asset prices are backward looking and tell you something about what's going on. They are also forward looking because they're an inducement to action. The response to the price signal changes the signal, what George Soros calls reflexivity. That is fundamental in the financial market. But it leads to locally rational behaviour producing an incoherent systemic breakdown. The signature of a bubble is that the demand curve inverts and instead of demand declining as prices rise, demand increases.

Finance theory tells you that there is a fundamental value of every share, the expected net present value of the future cash flows. But as prices move, the arbitragers, the investors who are supposed to rationally know what that fundamental value is, don't dare sell shares that are rising too high or buy shares that are falling too low because if they do it too soon they're behind the market. Then their investors will take their money away. Up until the 1960s, stock prices were twice as volatile as the underlying cash flows of American business. Since 1990, they have become six to ten times more volatile. The people managing other people's money can afford to be wrong for a shorter and shorter time.

These volatile valuations in the market play a critical role in governing the flow of investment into the real economy. It's a game where speculators and entrepreneurs respond to each other's signals. The entrepreneur sees the speculator bid the price up and concludes that the speculator knows something about the future to take advantage of. Capital is becoming cheaper, so the entrepreneur invests. The speculators see that, think the entrepreneur knows more about the market than they do, and try to get in on the business. So the game goes back and forth, and is likely to be played more intensely during periods of intense technological or institutional change. Really risky start-ups may require a bubble to get funded at all, because only then are investors likely to believe that they can get a return even if it's by selling shares to others before they have to find out whether the company is worth anything.

The bubble, by creating an environment in which risk-taking is rational, solves a coordination failure. If I'm invited to be the first round investor in your start-up and I know that you only want five-million pounds now but you're going to need 25 million pounds to have a hope of getting a positive cash flow, how do I know there's going to be the next 20 million or even the next 5 million behind me? In a bubble you stop worrying about whether there is going to be more money behind you. The coordination failure through time is eliminated. That is the functional role that bubbles can play at the frontier of the innovation economy. Some bets will fail, others will pay off. Most start-ups that were founded during the dotcom bubble at the end of the 1990s failed completely, but those that succeeded, succeeded very well.

This has been the case historically, too. Every decade from 1825 to the First World War saw some kind of maniacal bubble on the London Stock Exchange. These financed what would turn out to be highly productive core innovations such as the railways, but then London seemed to become vaccinated against speculating on risky new technologies. This may be why leadership in the innovation economy passed to the United States. Although most of new auto firms launched on the New York exchange soon went bust, some went on to become giants, just as PC firms would nearly a century later. Electrification is another illustration. During the 1920s, the mobilisation of capital overcoming that coordination failure led to massive investment in electrification in the United States. Electrification is an extreme example of the challenges to rational investors. It needs enormous capital just to produce anything, a flow of electrons. The marginal cost of the incremental electron is zero, similar to the incremental bit being moved across the internet.

If you have competitive conditions and prices move to marginal costs, the player with the most money wins because everybody else goes bankrupt along the way. They can't service the debt incurred to build the generating plant or the distribution network to deliver a service whose marginal cost approaches zero. However, in a bubble, the first movers will win and during the 1920s, the hottest stocks were the new electricity companies. Before the frenzy ended 13 to 33 million kilowatts were installed and delivering electricity across the country, the way the internet now delivers bits.

The killer app of electrification in the home was radio. This leads us to the often-ignored role of the government in building platforms. The United States Navy and the Department of Commerce assembled all of the patents to fight what appeared to be British dominance through the Marconi patents and produced an American company, RCA, capable of winning. RCA became the dominant technological player over the course of 60 years, first for radio and then for television.

Billions of government dollars also played a major role in the great wave of innovation that started in the early 1960s. If you took money from the government, you had to license your patents even to your fiercest competitors at a fair and reasonable price. If you sold something to the Defense Department that mattered, you had to put a competitor into production. This was how national security trumped conventional economics, and arguably accelerated the computer revolution by a generation and created a reservoir of accessible technology available to entrepreneurs and the venture capitalists who backed them.

Even when they burst, productive bubbles leave a useful legacy. The infrastructure for e-commerce and rail transport still serve us.

**Sources**

NAEC seminars

## *Aligning the financial system with sustainable development*

Simon Zadek

Financing the Sustainable Development Goals (SDGs) and the Paris Agreement commitments on climate requires trillions of dollars per year. Much of the finance needed will have to come from private sources, yet inadequate private capital is being deployed in ways that are aligned to these goals and commitments. Ample evidence exists that the financial system is out of step with its core purpose of ensuring that finance flows support the long-term needs of balanced, sustained growth. Policy and market failures were spectacularly in evidence as drivers of the financial crisis in 2008.

The Inquiry into the Design of a Sustainable Financial System was initiated by the UN Environment Programme in 2014, and completed its mandate in 2018, but many of its workstreams will continue in other forms. The Inquiry aimed to shape a narrative that demonstrated the need for system change in finance in pursuit of sustainable development, echoing the experience coming from many countries, market actors and collaborative platforms. It looked at how to address policy and market failures and turn the global financial system around to deliver the financing needed to transition to sustainable development. It focused on the ‘rules of the game’ governing financial and capital markets, and therefore the roles of central banks, financial regulators and standard-setters, stock exchanges and the like.

In 2014, a sustainable financial system meant focusing on resilience to financial crisis rather than capital allocation aligned to wider environmental, social and economic goals. Now, a sustainable financial system has a more profound meaning – a financial system that serves the transition to sustainable development. Sustainability is becoming part of the routine practice within financial institutions and regulatory bodies. A growing number of commitments to action are being made, matched by the beginnings of the reallocation of capital.

Some take-off has happened in areas such as investment in renewable energy, green bonds, fiduciary duty and risk-based disclosure. But substantial lags remain in large parts of the system, for example, in housing finance, often the largest asset class in banking portfolios, and infrastructure investments. There has been a fourteen-fold increase in labelled green bond issuance from US\$11 billion in 2013 to US\$155 billion in 2017. Key to this growth has been the market-creating role of public authorities, including key development banks. Such progress needs to be set against the scale of the global bond market of around US\$100 trillion. On the other hand, divestments in carbon-intensive assets reached an estimated US\$5 trillion in 2016, versus around US\$710 billion investments in coal, oil and gas.

National action is critical, and there are a growing number of examples of ambitious roadmaps in development and implementation but some national plans catalyse, broader international action. For example, China’s “Guidelines for Establishing a Green Financial System” are the world’s most comprehensive set of national commitments, covering priorities across banking, capital markets and insurance; and the EU High-Level Expert Group on Sustainable Finance has laid the foundations for a comprehensive action plan on sustainable finance.

The global number and range of policy measures to advance aspects of sustainable finance has increased. At the end of 2013, 139 subnational, national-level and international policy and regulatory measures were in place across 44 jurisdictions. Most of these were first-generation efforts to improve disclosure in securities markets and by

pension funds. Four years on, the number of measures has not only doubled – to 300 in 54 jurisdictions – but the pattern of activity has changed, with a substantial rise in system-level initiatives, which now account for a quarter of the total.

There has been a striking growth in international initiatives to share experience, stimulate action and promote cooperation on key rules and standards, such as the recent formation of a network of some of the world’s leading central banks to contribute to fighting climate change. Other structurally significant initiatives include the Financial Stability Board’s private sector-led Task Force on Climate-related Financial Disclosures (TCFD) as an industry-led initiative to draw up voluntary guidance on reporting by business and financial institutions.

National priorities as a starting point for a wider wave of changes is more effective than blueprinting change in a more formulaic manner. For example, building a digital infrastructure for greater financial inclusion in Kenya has also enabled the more effective deployment of clean energy and improved access to health services. While the Inquiry focused on countries with larger, evolving financial systems, especially emerging markets, because of their desire to influence traditional international rule-setting institutions in pursuit of national development priorities, countries with only modest financial systems can be influential by virtue of their willingness to innovate beyond the norm.

Some capital is flowing to the new economy, but far more is supporting the old economy, through an inability or unwillingness on the part of owners and intermediaries to redeploy it. The next phase in sustainable finance will be about making the shift from acknowledgement to alignment. It will be multidimensional and non-linear. It will involve mainstreaming but also replacing the mainstream by new, better ways of doing finance. It will encompass a sense of purpose for the financial system matched by a decentralised model of delivery. All this will mean new performance metrics that measure the extent to which sustainability is really part of the process of finance as well as its outcomes.

The Inquiry’s work with the World Bank Group in producing the ‘Roadmap for a Sustainable Financial System’ enabled it to identify developments needed to accelerate the flow of sustainable finance. Some actions can be taken by market actors, such as disclosure, but even these may need policy or regulatory interventions to advance at scale and speed. Other measures require policy interventions in the broadest sense, which would include a combination of policy, regulatory, standard-setting, judicial and fiscal actions, often working in concert with, and supportive of, market innovations and broader developments.

The Inquiry has helped to link the financial system with sustainable development. The evidence indicates the potential for a strong next wave of action.

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## *Finance, growth and inequality*

Boris Courneade and Oliver Denk, OECD Economics Department

Finance is the lifeblood of modern economies, but too much of the wrong type of finance can hamper economic prosperity and social cohesion. The UN's Sustainable Development Goals specify the target of better financial regulation under Goal 10, "Reduced Inequalities" and thereby directly recognise the importance of finance for inequality. Our research provides an empirical foundation for the SDGs' target to improve the regulation of financial markets and institutions to attain greater economic prosperity and income equality.

Since the 1960s, credit by financial institutions to households and businesses has grown three times as fast as economic activity. Stock markets too have expanded enormously. These secular changes to the financial landscape have taken place amidst a global economy in which growth has declined and inequalities have widened. They have therefore raised deep questions about the role of finance. What are the effects of changes in the size and structure of finance on economic growth? How do financial developments influence income inequality? Which policies can improve the contribution of finance to people's well-being?

The development of credit markets boosts economic growth when it starts from a low base, and many developing countries have a lot to gain from further financial expansion. Nevertheless, looking at the data over the last 50 years, our empirical analysis shows that credit expansion has reduced economic prosperity on average across OECD countries. An increase in credit by financial institutions by 10% of GDP has been associated with a 0.3 percentage point reduction in long-term growth. At the levels now reached in most OECD countries, further credit accumulation is therefore likely to lower long-term growth. On the other hand, further expansions in equity finance are found to promote economic growth.

Three main channels link the long-term expansion of credit with lower growth.

*Excessive financial deregulation.* OECD countries relaxed financial regulation in the 40 years preceding the global financial crisis, and this initially benefited economic activity. Relaxation of regulation however went too far and resulted in too much credit.

*The structure of credit.* Decomposing credit by lending and borrowing sectors shows that, on the lender side, bank loans have been linked with lower growth than bonds. On the borrower side, credit has dragged down growth more when it went to households rather than businesses.

*Too-big-to-fail guarantees.* Excessive financial deregulation and over-reliance on bank credit suggest that too-big-to-fail guarantees to banks have been one channel encouraging too much credit. This is further supported by evidence that the link between credit and growth is not as negative in OECD countries where creditors incurred losses due to bank failures as in those where they incurred no such losses.

Finance may also exacerbate inequalities. Expansions in bank credit and stock markets are both linked with a more unequal distribution of income, again due to three underlying mechanisms.

*The high concentration of workers in finance at the top of the earnings distribution.* There are few financial sector employees in low-income brackets and many higher up in the income distribution. This is justified as long as very high productivity underpins their

earnings. However, financial firms pay wages well above what employees with similar profiles earn in other sectors. The premium is especially large for top earners.

*Unequal bank lending.* Banks generally concentrate their lending on higher-income borrowers. Credit is twice as unequally distributed as household income in the euro area. This may reduce credit risk, but it also means that it is easier for well-off people to borrow money and fund profitable projects. In this way, lenders are likely to amplify inequalities in income, consumption and opportunities.

*Unequal distribution of stock market wealth.* Stock market wealth is concentrated among high-income households who thus get most of the income and capital gains generated through capital markets.

The evidence suggests that the SDGs' target of reforming finance is likely to contribute to greater economic prosperity and income equality. Reforms should concentrate on two areas.

*Avoid credit overexpansion.* Macro-prudential instruments can provide tools to keep credit growth in check. Caps on debt-service-to-income ratios have been identified as effective in this regard. Strong capital requirements on banks and other lenders help limit the extent to which financial institutions can fund lending through liabilities that benefit from public support. Further reforms are necessary to reduce explicit and implicit subsidies to too-big-to-fail financial institutions and level the playing field for competition between large and small banks. This could be achieved through break-ups, structural separation, capital surcharges or credible resolution plans. In the short term, however, measures to avoid credit overexpansion may temporarily hurt economic activity.

*Improve the structure of finance.* Tax systems in most OECD countries currently encourage corporate funding through loans rather than equity. Tax reforms can improve the structure of finance by reducing this so-called debt bias, which leads to too much debt and not enough equity. They would help make finance more favourable to long-term economic growth. Measures to encourage broad-based participation in stock holdings, for instance in pension plans, can allow for a better sharing of the benefits from stock market expansion.

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### *Inequality and rent-seeking in the finance sector*

Angus Deaton

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. For example rags-to-riches stories seem to confirm that the American Dream can become a reality, even if the rising net worth and access to privilege of the person who succeeds contribute to inequality. To understand inequality, we have to consider the economy as a set of processes and policies whose interactions produce 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*, I show that periods of great progress are usually periods of rising inequality. So rising inequality can be a sign of real progress, but that is not what is happening now.

One of the main causes of rising inequality today 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 except for a brief period when 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 is the monopolies that are causing both, not one causing the other.

Rent-seeking does not 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.

As a consequence, the living standards of the working class are not rising anymore. This is not just an economics issue. We are seeing “deaths of despair” from drugs, alcohol and suicide that Anne Case and I have been analysing - people dying in middle age. In *Mortality and morbidity in the 21st century*, we 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 US 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 cannot explain why median incomes have stagnated for half a century, while incomes at the top have grown. The answer lies in a series of unfair economic and social processes that 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, has changed 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 doing low-skill service jobs are being asked to sign, thereby reducing their incomes and bargaining power by preventing them from taking on other work. This is in fact illegal but the law is 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.

## *Currency: Between debt and sovereignty*

Michel Aglietta

The concept of money implies a profound reversal of the way the economy is represented. Neoclassical economists postulate a generic individual, with a specific property, utility, that does not depend on the utility of others. Utilities are exogenous. The market is the exclusive mode of coordination and this makes it possible to define an intellectual project that is ideological: a discipline independent of the social, whereas in reality economic and other human activities are integrated by a link with the collective we can call society.

If society is your starting point, the relationship of the individual to the collective is fundamental. Money is the concept that expresses this generic relationship in the economic order. It is a specific language, a language of numbers. A language gives meaning to others. The meaning for others determined by money is what will be called value. Money and value are intrinsically linked. The functions of money will come as a characteristic of the process by which value is determined, because value is determined only by the generic relationship of economic actors to money, that is, payment. The generic process of coordinating a society in which individuals exchange objects in the form of value must be determined.

We do not need a metaphor to define coordination. Coordination is objective, and observable: it is the payments system. Money as an institution produces rules for the issue of means of payment, rules for clearing and settlement from which an overall coordination of exchanges takes place. The payment system is an institution and cannot be appropriated, but it must be guided by policy, so money is essentially political.

In the history of money, there has been a debate going on for centuries formalised in the opposition between the currency principle and banking principle. The opposition centres on two characteristics: endogenous and exogenous money.

The orthodox view is based on an exogenous hypothesis of external money or money as a specific commodity defined only by quantity. Market exchange coordination occurs through market discovery mechanisms (and not through the payment system). The real demand for money is derived from the theory of utility value: real wealth and opportunity cost. In market equilibrium money is neutral: it doesn't impinge upon equilibrium real prices. Money equilibrium determines only its own price.

According to the alternative, endogenous hypothesis of internal money, or money entirely related to the credit system, money is created as the counterpart of debt. The trade of debt is a trade of promises which can be plagued by uncertainty. Money is the fundamental institution (a way that we encompass a social contract within society). The payment system precedes the trade, clearing and settlement of debt. The finality of payment through the settlement mechanism of all daily payments ratifies the exchanges that have ratified value.

So, for the exogenous hypothesis, value is absolute and logically precedes the function of money, while in the endogenous hypothesis value is relative and is a pure social relationship. The value of money logically precedes the value of goods.

Endogenous money cannot be neutral, by nature. The link between exogeneity and neutrality of money is intrinsic. Hence the strong opposition between these two characteristics. In a concept of neutral money the bank is not a creator of money. It is only a transmission belt of the central bank, resulting in a monetary multiplier (a function of the interest rate), itself modulated by the behaviour of money seekers. In this

exogenous conception of money creation, under the assumption that the demand for money is a stable function, Friedman can claim that inflation is always and everywhere a monetary phenomenon, that is to say caused by the public authority in charge of monetary creation. The 2008 financial crisis and its aftermath proved otherwise. Central banks created huge amounts of money (in the order of \$ 10 trillion). If the currency were neutral, there would have been hyperinflation because the supply of money would have been in enormous excess of stable demand. If you offer a huge amount of money that nobody wants, you create inflation. In fact, the problem has been to avoid deflation. Reality refuted the monetarists' hypothesis.

As well as being an institution and a language, money has something that makes it ambivalent, that makes it appropriable. Liquidity is appropriable and therefore exchangeable. In this form, the value appears condensed, and disconnected from the public institution that is the payments system. Liquidity means you can make money with money. Through liquidity, money becomes the social form of wealth. Any particular wealth is only reflected in the amount of liquidity to which it could be equivalent. Contrary to the neoclassical conception, money is demanded because others demand it. This externality of demand violates the rule that prices are related purely to the desires of the individual independently of others.

When we look at the international financial system, we see that there is a global economy but no global currency. If capital did not circulate, there would be no problem since capital controls would maintain separate currencies. But with globalisation, an organisation is needed. In the nineteenth century, the gold standard was a way of tackling the question of an international currency, even if the convertibility of gold remained under the control of nations. The Bretton Woods system after the Second World War was an international institutionalised monetary system that established the preponderance of the dollar, as part of a set of common rules and procedures administered by an international institution, the IMF. Capital controls allowed this international arrangement to function because it preserved sufficient monetary autonomy for nations. The collapse of the Bretton Woods system removed international monetary rules. Monetary relations become directly dependent on exchange of liquidity on foreign exchange markets, and thus on unstable private arbitrage, which is reflected in exchange rate fluctuations.

Why elect one currency over another, a national currency that other nations will accept? The answer lies in the realm of hegemony and geopolitics.

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### *Bitcoins and legal tender*

Adrian Blundell-Wignall, former Director, OECD Directorate for Financial and Enterprise Affairs

Some of the technologies associated with crypto-currencies are very interesting and may one day become a serious disruptive technology for financial intermediaries. But these technologies should be thought about separately from the crypto-currencies like Bitcoin that have some very dubious uses. Neither Bitcoin nor any other crypto-currency can ever replace legal tender no matter how successful it is on any other criteria. Bitcoins are a parallel currency, adjacent to and not intersecting with legal tender.

It is impossible for Bitcoin to compete with legal tender as an alternative monetary system because the central bank has a very special monopoly that is impossible to attack - in the limit because people have to pay their taxes. The policy conclusions with respect to the crypto-currency concern money transmission that bypasses surveillance for certain purposes before coming happily back into the legal tender system afterwards with no authorities able to follow the money trail in between.

Some Bitcoin proponents are very frightened of the idea of bans on the interface of crypto-currencies with exchangers whose banks participate in the central bank's clearing system. Talk about the free world taking on the monopoly of legal tender and how they might have to create alternative clearing systems completely misunderstands the basics of the clearing system that the central bank participates in. The central bank creates the currency in which Bitcoin prices are quoted and that the traders of crypto-currencies want to be able to get back into when done trading.

Banks must settle between themselves and the central bank in what is deemed by the authorities to be 'cash'—and that cash is always the central bank's own liabilities (currency and bank reserves with the central bank). Smith writes a cheque on ABC bank to Jones who banks with XYZ. ABC bank can transfer \$1000 to XYZ which accepts ABC liabilities. Now suppose Smith writes a cheque to the government to pay taxes. The government's bank is the central bank and the essence of the monopoly is this: the central bank doesn't accept ABC bank liabilities to settle, it will only accept its own liabilities. So if ABC bank has excess reserves at the central bank, then it use them to cover the cheque. If it doesn't, it can borrow another bank's excess reserves at the overnight interest rate. If it can't do that it must borrow from the central bank itself at the overnight cash rate.

The same issue arises if ABC bank wants to buy from or sell government bonds to the central bank. With its monopoly the central bank can make interest rates whatever it likes. If the central bank wishes to change the stance of monetary policy, it changes the cash base of the system: if it creates more cash compared to the demand for it, interest rates can be induced to fall and vice versa. Bitcoins don't and can't matter.

Every Bitcoin user will want to be able to get back into dollars at some point. Since the central bank doesn't accept Bitcoins a crypto-currency adherent has to come back to the exchanger, cross the fee/spread, and get back into the banking system. But what are some of these in-and-out Bitcoin activities? There is a speculative and transactions demand for Bitcoins. On the speculative demand there are the founders who need to be able to extract value at some advantageous point, and others who participate in the 'greater fool' trading strategy believing they will get out ahead of the other 'fools' if prices tumble.

With regard to the transactions demand, it seems unlikely that the crypto-currencies are in general use to buy the weekly groceries because their use might be cheaper than credit and debit cards. This is because the transactions fee/spreads with exchangers must be high to compensate for all the volatility and regulatory risk, and holding the crypto-currency carries the risk of capital loss.

There is a clear demand on the part of some individuals, however, who are happy to cross the spreads with exchangers and those offering ‘darkening services’ as a price to pay for anonymity. Who might some of these people be who operate in complex cross-border structures, often in countries with little or no surveillance of or laws concerning Bitcoins? Businesses using virtual coins that pass through complex structures and ‘darkening’ procedures, trade on the internet and from mobile phones anonymously are impossible to trace. Such businesses do this presumably because they need to be anonymous. Then, when their untraceable business dealings are all done, the crypto-coins can then re-emerge in a new ‘legitimate’ transaction, for example, with a real estate company that decides to accept Bitcoins.

It is very unclear who should or can be responsible for monitoring crypto-currencies and in which jurisdictions—but someone should. If the technology is such that all users can’t be registered and identified, then more serious policy action should presumably follow.

What is true of the so-called coin is not so for the technology to which crypto-currencies have given rise. The technology of ‘trust-less transfer’ is very interesting and it is quite possible (or even likely) that it will become a disruptive technology for many financial intermediaries in the future. The idea of eliminating the need for a trusted third party in finance is revolutionary. The world of finance has never faced such a technological innovation that questions the need for intermediaries and the huge share of earnings in the economy that they appropriate for this role. Given that the trust-less transfer of financial quantities is already a proven technology, it is only a matter of time before it encroaches on business models of banks, credit card businesses, monetary transfers, and the trading of assets.

For the policy maker the lesson is clear: permit the development of the trust-less transfer technology with appropriate oversight, but shine light on the dark aspects of the virtual coins.

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## Financial policy

### *Lessons from the financial crisis*

#### John Llewellyn

There was no single cause of the 2007-2008 crisis. The crisis was systemic, with fear and greed interacting with the prevailing macroeconomic conditions, macroeconomic policies, and the regulatory framework to break down both confidence and trust. The abolition of the US Glass-Steagall Act did however play a major part. That Act separated commercial and investment banking to eliminate conflicts of interest that arise, as they did in the 1930s, when the granting of credit – lending – and the use of credit – investing – were undertaken by a single institution. With the abolition of Glass-Steagall, the stage was set for these conflicts to come back.

Equally important, however, were the ways in which behaviour unfolded. Savers, seeking yield, were relaxed about moving into assets that historically had been risky. US investment banks borrowed extensively on the wholesale money market, lending massively to households through mortgages and loans, further fuelling the property boom. Mortgage mis-selling aided the process, with sellers being paid per sale, while bearing no responsibility for the consequences. Investment banks invented complex, highly geared investment vehicles, many of which they funded on the wholesale money market and then sold on to other parties so that they did not appear on the banks' balance sheets. The explosion of leverage was boosted by the 'shadow banking' world of hedge funds, private equity firms, and other unregulated financial companies, the demand side of the trade in collateralised debt obligations (CDOs), mortgage-backed securities, credit default swaps (CDSs), and the like.

When asset values turned, confidence and trust collapsed and leverage, which had been everybody's friend, turned into a savage enemy. Various factors explain why so few people realised what was happening, or acted to stop it.

Incentive structures encouraged traders to make unwarrantedly risky bets, but all traders have individual risk limits and banks' managements set those limits.

*Poor corporate risk analysis.* Within the investment banks, some risk managers were concerned that the risk models did not adequately take underlying macroeconomic risks into account. Many senior risk managers were reluctant to admit that they did not really understand their banks' risk models. And most managements did not appreciate that sponsors would not be able to avoid responsibility for their supposedly off-balance-sheet products.

*Undue reliance on Value at Risk (VAR) analysis.* This statistical technique has two serious limitations: information at the extremities – where catastrophic risk lies – was sparse, particularly after 15 years of exceptionally low macro volatility; accommodating framework conditions that evolve requires a structural framework, which a statistical distribution alone does not provide. Sometimes the model simply may not describe reality at all.

*Poor corporate governance.* Boards of Directors proved too weak, or too ill-informed, to challenge 'successful' CEOs. Managements appear increasingly to have run companies for themselves, and shareholders proved unwilling or unable to rein management back.

*'Grade inflation' by the credit rating agencies.* This implied, for example, that a mortgage vehicle rated as 'triple A' carried the same risk as similarly-rated major-country

government bonds. CRAs became conflicted, accepting fees for certifying that the new vehicles were high grade. At root, the CRAs' business model contains an unresolvable conflict: the people who pay for their services are not those who use them.

*Regulatory authorities did a poor job.* They relied too heavily on companies "doing the right thing", with too few checks; and they failed to achieve the basic separation of risk from reward; and financial regulation from financial activity.

*Capital ratios proved to be inadequate,* given the leverage the SEC permitted. The total amount the financial sector wrote off after August 2007 was over 100 times its collective VAR assessment of 18 months previously.

*The pro-cyclical impact of "mark-to-market" valuation* techniques exacerbated the capital inadequacy of banks. When crashing "fire-sale" values are used by auditors to value a bank's assets, they induce fire sales to spread, thereby deepening the crisis.

*A deficient understanding of corporate self-interest* led regulators to believe that managements would always have their company's survival as their primary objective, and so would avoid actions that would unduly jeopardise survival. This faith however underestimates management's personal short-term objectives; the unawareness of many CEOs of the scale of the risks of macroeconomic origin to which they were exposed; and the degree to which competitive pressures obliged each to do broadly what all the others were doing.

*International organisations failed to press the point.* The Bank for International Settlements sounded alarm bells and the IMF and the European Central Bank expressed concern, but in the policy world as a whole, much as in the investment banks, no one wanted to hear.

A number of broad policy proposals might have reduced the likelihood, or at least the severity, of the crisis. (Whether they would help with the next crisis, however, which will be different, is another matter.)

Macroeconomic policy:

- Pay greater attention to imbalances.
- Direct policy at any major macroeconomic variable that departs significantly from any historical relationship.
- Agree a better method of identifying bubbles. Minsky, for example, identified bubbles as any occasion when large numbers start trading in markets they don't understand.

Regulatory policy:

- Require the Regulatory Authorities to report on the potential financial sector implications of macroeconomic imbalances.
- Establish *ex ante* the conditions whereby it is appropriate to take over a distressed bank, ideally when its net worth is still positive, so that it can continue as a going concern.
- Raise capital adequacy ratios, at least for any bank that operates with its deposits guaranteed.
- Require banks to operate a pro-cyclical reserves policy.

- Oblige the CRAs to recover from their conflicted failure. There may be a case for two types of credit rating agency, one to carry out legislated supervisory responsibilities, the second undertaken for business for profit but with no role in supervision.
- Discourage off-balance-sheet activities and put the onus on the proposer to explain why they are in the public interest.

We often hear that “nobody saw it coming”, but there were pointers. At Lehman Brothers we had a tool called Damocles for predicting financial crises in developing countries. A Damocles reading above 75 implied a one-in-three chance of a financial crisis over the coming 12 months, and a reading above 100 implied a 50-50 chance. Almost as a joke at first, we also ran the US through the model. We concluded that while G10 economies can “get away with” poorer scores, and for longer, than emerging market economies, the US score had been between 75 and 100 over the 10 years before the crisis. Moreover, the US ranked second, between Iceland (worst) and Romania (third). The main negative signals were coming from external debt, the current account, and credit.

### *Rethinking macro stabilisation: evolution or revolution*

#### Olivier Blanchard

Before the Great Financial Crisis, 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. Fluctuations were seen as regular random shocks. This does not fit the financial crisis, where the best metaphor is plate tectonics and earthquakes.

Financial crises are characterised by non-linearities and positive feedback whereby shocks are strongly amplified rather than damped as they propagate. And rather than returning to the status quo when the shock ends, financial crises are followed by long periods of depressed output. Another nonlinearity comes 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. We are in an environment of low nominal and real interest rates, and may be for the foreseeable future. An environment that forces a rethink not only of monetary, but also of fiscal and financial policies. So far, the focus has been primarily on monetary policy. 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. It has been argued that a combination of human nature, leading to search 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.

Given the 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. 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.

Automatic stabilisers can be made more potent and effective with policy effort. And with the interest rate 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.

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.

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. 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 far 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. 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.

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### *The monetary system: master or servant?*

Anne Pettifor

High levels of unemployment or under-employment, falling incomes, housing crises, and obscene levels of inequality have led, predictably, to the rise of counter-movements in all the leading economies. This was foreseen by Karl Polanyi in the 1940s, in his book: *The Great Transformation*: “No sooner will today’s utopians have institutionalized their ideal of a global economy, apparently detached from political, social, and cultural relations, than powerful counter-movements—from the right no less than the left—would be mobilized”.

It is my view that current economic disorder that is helping to fuel populism is largely caused by the lack of transparency, and the intangibility of the international financial system. Widespread ignorance of the workings of the great public good that is our monetary system has made society vulnerable. If democracies are to subordinate the finance sector to the role of servant to the real economy, it is vital that the public gains greater understanding of the monetary system. Public ignorance of the workings of the system is compounded by the fact that many economists simply chose to ignore it, until as Olivier Blanchard says, the crisis forced macroeconomists to (re)discover the role and the complexity of the financial sector, and the danger of financial crises.

These economists chose to ignore reality because of the failings of the traditional approach to finance. In 1961 the newly-created OECD, encouraged by ‘classical’ economists proposed to turbocharge the economy. They championed an unsustainable and delusional new target for something they named “growth”, a rate of change of a continuous function, which turned out to be 50% over the decade. They also pushed policies for financial liberalisation, although it would take several decades for these changes to be fully implemented. These policies led to a series of credit booms – regarded as ‘infinite booms’ by for example, traders in sub-prime mortgages and collateralised debt obligations (CDOs) on Wall St. and in the City of London.

The situation was one of “all competition and no control”, both as regards demand-side measures, such as limits on loans-to-value ratios, and supply-side actions, including lending and interest rate ceilings, reserve and capital requirements, and supervisory guidance. Policy and regulation require boundaries, but finance capital abhors boundaries. The result is an international monetary system run by the equivalent of Goethe’s *Sorcerer’s Apprentice*. In the absence of the Sorcerer – regulatory democracy – financial risk-takers and fraudsters have, since 1971, periodically crashed the global economy and

ruined the lives of millions of people. There is no such thing as effective global regulation. Like the Sorcerer's Apprentice, global financiers want to be free to use the magic of money creation to flood the global economy with 'easy' money, and just as frequently to starve economies of any affordable finance.

If we want to strengthen democracy, then we must subordinate bankers to their role as servants of the economy. Capital control over both inflows and outflows, is, and will always be a vital tool for doing so. In other words, if we really want to 'take back control' we will have to bring offshore capital back onshore. That is the only way to restore order to the domestic economy, but also to the global economy.

Monetary relationships must be carefully managed – by public, not private authority. Loans must primarily be deployed for productive employment and income-generating activity. Speculation leads to capital gains that can rise exponentially. But speculation can also lead to catastrophic losses. Loans for rent-seeking and speculation, gambling or betting, must be made inadmissible.

Money lent must not be burdened by high, unpayable real rates of interest. Rates of interest for short- and long-term, in real terms, safe and risky – must, again, be managed by public, not private authority if they are to be sustainable and repayable, and if debt is not to lead to systemic failure. Keynes explained how that could be done with his Liquidity Preference Theory according to which interest is the reward for giving up liquidity and rates are lower on short-term securities because investors are not sacrificing liquidity for as long as with other securities.

Both the domestic and international system are socially constructed, man-made systems. Just as they were built by society, so they can be transformed by society, as happened during the 'golden age' of economics from 1945 -71. The good news is that if well-managed, the social relationships that make up our monetary system are potentially infinite, unlike natural resources or human capital. A publicly-backed monetary system can provide for all of society's needs, including the very costly requirement to transform the economy away from fossil fuels. Under a sound monetary system, there need never be a shortage of finance.

The very real possibility of using public awareness, understanding, and political will to restore such a system is why I see a 'horizon of hope' for a world that appears to be heading towards another dark age.

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## *Regulatory reform and equity*

John Vickers

Regulatory reform of the financial system has gone in in the right direction. Structural reform got started in the UK by way of ring-fencing, which is a good thing to do, but it's not happening anywhere else, and that is disappointing. We need to go a lot further in terms of beefing up the equity capital in banks and other financial institutions. However, the official word globally and in the UK is that there is no need, where we've got to is just fine. It's a long way short of fine.

It's strange that people in the financial sector, in the banks themselves, and the regulatory community, with some exceptions, share a consensus that we've done very well, we've got to a good place. On the other hand, in the opinion of economists outside that group, again with some exceptions, we're not even halfway there. For such a big public policy question as how safe to make the banks, a question that is so important for how the market economy works, it is worrying to have these different expert groups such a long way apart. I feel that the economists have the best of this argument.

There is some very low cost, even free, insurance to be had by over time by gradually building up equity buffers, and then the odds of another severe crisis would be reduced. You can never say never, but if and when the next crisis hits, we'd be in a better place to withstand it. The question here is the proportion of shareholder-funded equity, how large a multiple of shareholder equity capital should the banks be allowed to grow to. Even after all the reform efforts, big banks, or the very biggest perhaps, can still go highly leveraged, but the academic view is that this is too much.

The issue is to decide what are the costs and benefits. Do we have a safer system, better incentives, better decision-making in place for when the next crisis hits? Are we better placed to absorb the losses, pay the costs? For society as a whole, it's not so clear what those costs are, provided you phase them in over a good length of time. One of the lessons of the crisis for economists is we need to think much more carefully about how the system is regulated and run, and it should be the main spirit of thinking about the financial system.

When I chaired the UK Independent Commission on Banking, we faced a dilemma on this issue. We felt that the baseline global regulation was not strong enough, but we were making recommendations just for the UK, and there's a limit to how far one country, even a sizeable one like the UK, can go above the global baseline. So our recommendation concerned British retail banks, and with retail there is less of a risk of all the banks migrating somewhere else. We wanted quite a significant chunk over and above the proposed global baseline, and at the same time, we would have said that the global baseline itself should have been much higher. But of course we didn't have a say in that decision.

When you line up the costs and benefits and do the analysis, I think the official view is left a bit stranded. The weight of evidence is that we have not gone far enough. Today, the economy generally is a better state than it was in the years immediately following the crisis, so there is an opportunity to go further and build it up. It could be done. There are political reasons why it's difficult, but there are no technical obstacles to doing it.

Now that we're ten years on from the financial crisis, people talk about the pendulum swinging back. It may be so when we should be pushing forward. I'm not saying, and I don't think anyone is saying, there's a bigger crisis just around the corner. I am saying

though that we're in a reasonably calm situation at the moment, even if debt issues are building up in the world economy, so let's take this opportunity, let's build on the progress that has been made to go a number of steps further.

In the years immediately after the crisis, you had a firm line taken in the UK and with the then administration in the US and in Switzerland. It's not entirely a coincidence that the Swiss had two enormous banks in relation to the size of the Swiss economy, just as we in the UK had some huge banks in relation to our economy. The too-big-to-fail issue is particularly prominent in economies like ours, but the banks say that where we've got to is just fine. They would point to the new resolution regimes that bail-in debt to say they can lower the estimate of how much equity capital is needed.

I think that's the wrong approach. I like the bail-in debt resolution regimes, where instead of the taxpayer bailing out the bank, the bank's creditors and shareholders recapitalise the bank by converting some of its debt into common shares. But I see bail-in as a complement, an add-on, not a reason to lower the equity capital requirements.

It would be awful if we had a repeat of the crisis, and in some ways, I think that we are even worse off, or could be even worse off, than last time. Monetary policy is at the limits, you can't do that again because we've already fired all the ammunition if you like. And the political consequences of the rise of populism in various places that we've seen have a lot to do with the financial crisis. If you had another problem in the financial system well within living memory, it could be calamitous, not just in economic terms but in society and politics more generally. The stakes are very high and it's important therefore that this issue gets more prominence, that we have the policy debate and let the best argument win. I think the evidence points to a need for more equity capital, but I'm not at the table with those who decide.

**Source**

NAEC Financial markets workshop

## *Monetary finance*

### Adair Turner

“Monetary finance” means running a fiscal deficit (or a higher deficit than would otherwise be the case) which is not financed by the issue of interest-bearing debt, but by an increase in the monetary base. Milton Friedman described this as “helicopter money”, with the government printing dollar bills and then using them to make a lump-sum payment to citizens. Today it could involve either a tax cut or a public expenditure increase which would not otherwise occur. It could be one-off or repeated. It would typically involve the creation of additional deposit rather than paper money, initially in the government's own current accounts, and then transferred into private deposit accounts either as a tax cut or through additional public expenditure.

There are a number of ways in which the money could be “created”, but the choice between them has no substantive economic consequences. In all cases the consolidated balance sheet of the government and central bank together is the same; the monetary base of irredeemable non-interest-bearing money is increased; and the government is thus able to cut taxes or increase expenditure without incurring any future liability to pay more interest, or to redeem the capital value of the money created.

From a technical point of view, and excluding until now the impact of political dynamics, it is clear that money finance deficits can always stimulate aggregate nominal demand,

and will always do so more certainly and more powerfully than either debt financed fiscal deficits or pure quantitative easing operations. The scale of the resulting stimulus to nominal demand can be managed, and adjusted over time through the use of available policy tools. If therefore there exist circumstances in which economies might face a deficiency of aggregate nominal demand, money financed fiscal deficits are, in technical terms, a feasible and at times optimal policy option.

However, if monetary finance is accepted as legal and technically feasible, biases in the political system may create incentives for its excessive use. In democracies, electoral cycles create incentives for governments to reduce taxes or increase public expenditures in the run-up to the election, or to avoid necessary fiscal consolidation. If money financed deficits were an available option, they might appear a costless way out of this constraint. While non-democratic political systems might in principle be free of such incentives, in many cases they depend for their stability on clientele patronage systems which are most easily lubricated by money creation.

In response to these biases, and to the macroeconomic harm which excessive monetary finance has produced in many economies, modern economic policy has gravitated to the consensus that the only way to contain the dangers of monetary finance is to prohibit it entirely. The central issue therefore is political, whether we can design political economy rules, responsibilities and relationships which can allow us to obtain the technically possible benefits of money finance while constraining the dangers of excessive misuse.

We could place the use of monetary finance within the constraints of central bank independence and of inflation targeting, and preserve the legally defined self-denying ordinance which prevents politicians from enjoying discretion to implement inflationary policies. It would not however be acceptable for the central bank to determine the precise allocation of the fiscal resources thereby created, this should be done by the government. The guiding principle should be that the specific measures implemented should be credibly one-off. Tax cuts and specific investment programmes might meet this criterion, but increases in ongoing entitlement programmes which are difficult to reduce later would not.

One counter argument is that the effectiveness of monetary finance might be offset by anticipation of an “inflation tax” that would depress demand so that monetary financed deficits might be no more stimulative than deficits financed by debt. However, a money financed deficit will always stimulate nominal demand, while a debt financed deficit might not do so in some circumstances, so that the stimulative impact of a money financed deficit is always greater than or equal to that of a debt financed one. This is the case both where the economy is already at full employment/full potential output and where an increase in nominal demand can therefore only produce an increase in inflation; and in the case with underemployment/below full potential output, where an increase in nominal demand could produce some increase in real output as well as an inflationary effect.

Another crucial question relates to the private sector asset counterpart to a consolidated public sector non-interest-bearing liability. The impact of money financed deficits will only differ fundamentally from debt-financed deficits if the additional monetary base created is permanently non-interest-bearing. But who would willingly hold non-interest-bearing money?

That answer is that while no household or company needs to hold non-interest-bearing money once market interest rates have returned to significantly positive levels, monetary

finance is only fully effective if the commercial banks are required to hold non-interest-bearing reserves at the central bank. If instead the central bank paid interest on these reserves, the difference between money financed deficits and debt financed deficits would be very significantly reduced. But if the commercial banks are required to hold non-interest-bearing reserves, while companies and households earn interest on their deposits at commercial banks, this is equivalent to imposing a tax on commercial bank credit intermediation.

Although money finance should only be used in extreme circumstances and as a one-off exercise, it is possible that secular stagnation with negative real long-term interest rates would mean using money to finance part of a fiscal deficit year after year because this would be better than other options such as running debt financed fiscal deficits, meaning that public debt levels as percent of GDP either rise continuously or stabilise at a high level only sustainable if interest rates remain very low for ever.

To conclude, there is a technical case for using monetary finance in some circumstances. But before using it, we should address the political issue of how to ensure it will only be used in appropriate circumstances and appropriately moderate quantities.

#### Sources

NAEC seminar

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