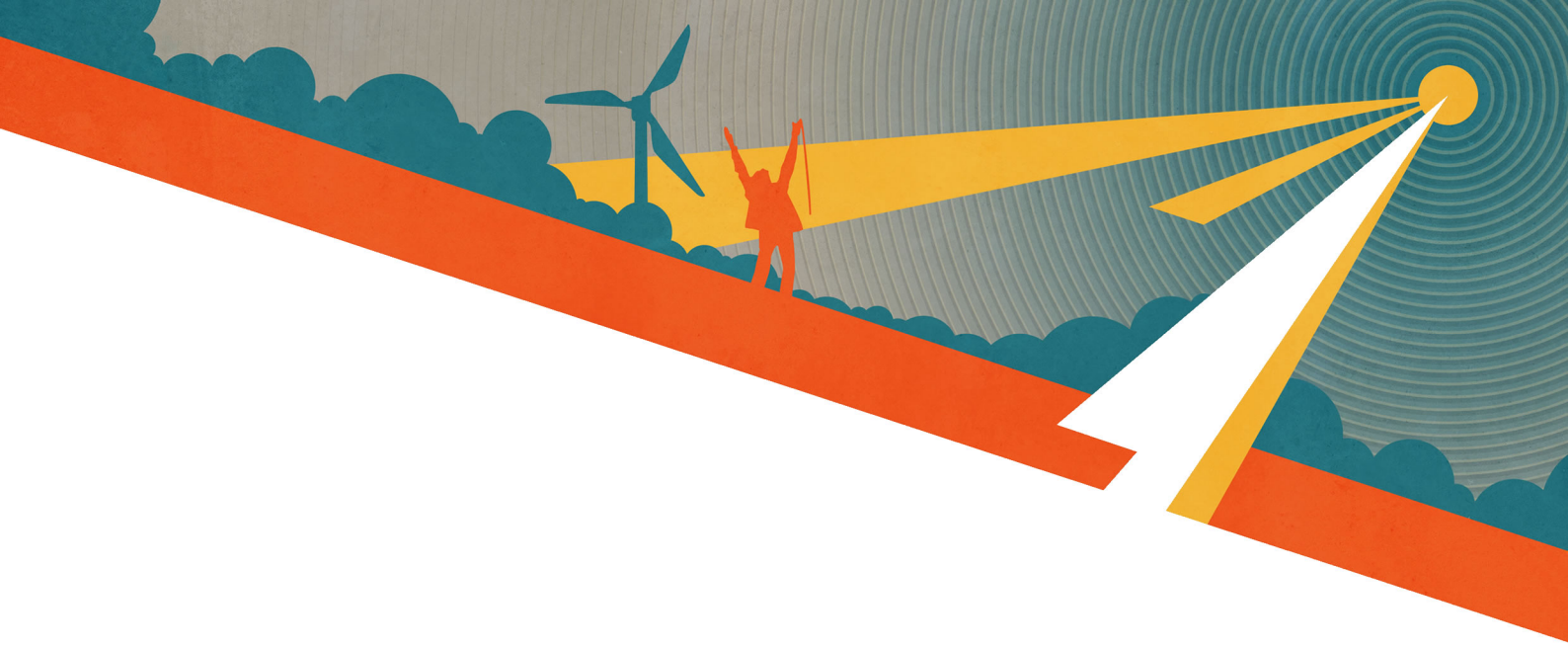

Conference Day 3: 24 July 2014
City Hall, London, UK

Keynesian & Schumpeterian Missions
Book of abstracts

University of Sussex
SPRU – Science Policy Research Unit

LONDON, 22-24 JULY 2014
MISSION-ORIENTED
FINANCE FOR INNOVATION
Rethinking Public & Private Risks and Rewards

About

This is a collection of abstracts of papers presented during the third day of the *Mission-Oriented Finance for Innovation Conference: Rethinking Public & Private Risks and Rewards* (London, 22-24 July 2014).

The role of the state in modern capitalism has gone beyond fixing 'market failures'. Those regions and countries that have succeeded in achieving 'smart' innovation-led growth have benefited from long-term visionary 'mission-oriented' policies — from 'putting a man on the moon' to tackling societal challenges such as climate change and the well-being of an ageing population. In addressing these missions, public sector agencies have led the way, investing along the entire innovation chain and courageously defining new high-risk directions. Traditional cost-benefit analysis and market failure justifications would have halted these investments from the start. No internet, no biotech, no nanotech. And today no clean-tech.

To fulfil this mission-oriented function, state agencies — from DARPA in the US to Brazil's BNDES and the China Development Bank — have been willing to welcome failure and tackle extreme uncertainty. How do they do it? What are the challenges ahead? Should government step back, or step up? And how can we socialize both risks and rewards so that economic growth is not only 'smart' but also 'inclusive'?

Such investments would not lead to commercialization without a private sector that is able and willing to engage along the innovation chain. Is financialisation putting such engagement under threat? If so, how can innovation policy also promote de-financialisation?

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Keynesian & Schumpeterian Missions

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Financing the capital development of the economy: a Keynes–Schumpeter–Minsky synthesis

Mariana Mazzucato and L. Randall Wray

This paper is based on a research project funded by a grant from the Institute for New Economic Thinking. Our project concerns the role that finance plays in promoting the capital development of the economy. We have found it useful to synthesis the main contributions of three of the 20th century's greatest thinkers: John Maynard Keynes, Josef Schumpeter, and Hyman P. Minsky.

We define both 'finance' and 'capital development' very broadly. We begin with the observation that the financial *system* evolved over the post-war period from one in which closely regulated and chartered commercial *banks* were dominant to one in which financial *markets* dominated the system. Over this period, the financial system grew relatively to the nonfinancial sector, rising from about 10 percent of value added and a 10 percent share of corporate profits to 20 percent of value added and 40 percent of corporate profits. Further, as many commentators have noted, the nonfinancial sector became highly *financialised* by many measures, including debt ratios as well as proportion of income generated by financial activities (even industrial powerhouses like GM and GE created financial arms, although most large firms began to treat cash balances as a financial asset to generate revenue).

At the same time, the capital development of the economy suffered perceptibly. If we apply a broad definition, to include technological advance, rising labour productivity, public and private infrastructure, innovations, and advance of human knowledge, the rate of growth has slowed. Admittedly, this is a difficult claim to prove. In some areas, advances have come at lightning, almost revolutionary, speed. However, the US and UK are falling behind in many basic areas, including universal education, health improvements, public and private infrastructure and poverty alleviation. In 2013, the American Society of Civil Engineer's infrastructure report card awarded an overall D+, estimating that $3.6 trillion of infrastructure investments are needed by 2020. Almost none of the infrastructure needed to keep America competitive in the global economy received a grade better than a D.

Further, even as the financial sector experienced serial booms (and busts), the infrastructure situation has actually worsened since 1998 across most of these categories, as the estimate of the spending required rose from $1.3 trillion. Although the grades have risen slightly in recent years, this is mostly due to private investment in infrastructure. As the 2013 report notes, "We know that investing in infrastructure is essential to support healthy, vibrant communities. Infrastructure is also critical for long-term economic growth, increasing GDP, employment, household income, and exports. The reverse is also true—without prioritising our nation's infrastructure needs, deteriorating conditions can become a drag on the economy."[1]

The capital development of the economy advances in two ways—and we as a society are failing in both ways across most categories. First we can improve the quantity and quality of investments that promote the capital development using state-of-the-art knowledge, techniques and processes. Since new investment in physical capital as well as in human development will generally utilise the newest knowledge, techniques and processes, new and replacement investment will usually promote the capital development of the economy. This is essentially what the ASCE grade report is highlighting, although it focuses on the public and private infrastructure investments that are necessary to improve quantity and quality.

[1] http://www.infrastructurereportcard.org/a/#p/overview/executive-summary

Second, quality can be improved through Schumpeterian innovation and 'creative destruction': new technologies come along that 'destroy' the productivity of old technologies (not always in a physical sense, but in a profits sense). Schumpeter did not just mean physical investments in plant and equipment, but also new ways of doing things. For Schumpeter, economic development is the result of innovation, which he characterised as the carrying out of new combinations of materials and forces or productive means. It includes the introduction of a new type or quality of commodity, introduction of a new method of production, opening of a new market, conquest of a new source of supply of raw materials or intermediate goods, or carrying out of a new organisation of industry (such as the creation or destruction of monopoly power). This innovation is the product of the entrepreneur who swims against the tide, putting inventions into practice.

Schumpeter emphasised that innovation must be distinct from invention given that entrepreneurs often merely borrow inventions that have not been applied, precisely because they represent a break with routine. The innovation is intended to break habits, to break down resistance of groups threatened by use of the invention, and to obtain the necessary cooperation of capitalists, managers, workers and consumers. This is the role of the entrepreneur; it is a role that cannot be a profession and there cannot be a class of entrepreneurs.

To be clear, even Schumpeter argued that most economic development does not require innovation. However, in the increasingly globalised economy, innovation is critical to retaining and expending market share. In the 1950s, a large and relatively closed economy could rely on investment that improved the quantity and quality of the nation's means of production—the first path to improving capital development discussed above. However, the relative openness of economies today has made innovation critical for retaining market share. Growth without innovation is becoming unsustainable.

Innovation is a key to long-run growth. Because innovation must be financed, finance is central to the innovation process. Indeed, this is why Schumpeter called the banker the 'ephor' of the exchange economy (Schumpeter, 1934 [1912], p. 74). In recent decades, however, finance has retreated from serving the real economy: the financial sector serves itself, and companies in the real economy have become 'financialised'.

Furthermore, in order for growth to be not only smart (innovation-led) but also inclusive (see EC 2020 strategy), it must produce full employment and less inequality. Thinking about finance in this way—that is, restructuring it to serve the 'real' economy, rather than itself, and to produce *both* innovation-led growth *and* full employment—is the key goal of this paper. This requires the thoughts of John Maynard Keynes, Hyman Minsky, and Joseph Schumpeter to be brought together, and the role of the public sector to be understood as much more than fixing static market failures.

From Keynes we borrow the central insight of the theory of effective demand: Firms hire the resources they think they will need to produce what they think they can sell. This means that employment is not determined in labour markets, but rather by the level of sales expected. Indeed, the concept of 'animal spirits' in Keynes is not only useful for behavioural finance (Shiller, 2005), but also for Schumpeterian economists that have focused on entry and investment behaviour as being driven by the 'perception' of where the future technological and market opportunities are (Dosi and Lovallo, 1997; Pavitt, 1984; Mazzucato, 2013a/b).

Keynes also argued that saving is not the source of finance, as he rejected the loanable funds theory that a flexible interest rate allocates a scarce supply of saving to investment. Keynes reversed the causation:

spending creates income and it is the spending on investment that creates the income that is saved. This means that we must look elsewhere to find the source of finance for investment.

From Schumpeter we borrow two insights: firstly, it is critical to understand the innovation process in order to begin to analyse the dynamics of the capitalist economy; and secondly, innovation needs finance. In Schumpeter's view this is because innovation must be financed *before* it can generate revenues. In his early work (Schumpeter, 1912) he focused on the need for finance to allow new entry (into the circular flow through start-ups). In his later work (Schumpeter, 1934), however, he focused on the importance of internal finance for financing large R&D laboratories of established corporations. Either way, the point of finance is that it is tightly related to the ability to allow new things to happen.

From Minsky we borrow the recognition that the dynamics of the capitalist system are not necessarily stabilising, and that when finance is brought into the analysis, the dynamics become much worse. Minsky broadened Schumpeter's view—it is not just innovation that has to be financed, as a portion of investment is typically externally financed.[2] He also extended Keynes's "investment theory of the cycle" to include a "financial theory of investment." In other words, he provided the alternative to the loanable funds theory that Keynes had rejected.

We can go further and argue that actually all production must be financed (the process 'begins with money to end up with more money'—as both Marx and Keynes said). In addition, Minsky argued that finance itself is subject to innovation. Finally, he warned that 'stability is destabilising', which mainly has to do with the innovations in finance that are encouraged by the appearance of stability.

The past quarter-century has seen the greatest ever explosion of financial innovation. Financial fragility grew until the economy collapsed into the Global Financial Crisis. At the same time, we have seen that much (or even most) of the financial innovation was directed outside the sphere of production—to complex financial instruments related to securitised mortgages, to commodities futures, and to a range of other financial derivatives. Unlike Schumpeter, Minsky did *not* see the banker merely as the ephor of capitalism, but as its key source of instability. This comes from his understanding of finance as having a dynamic of its own (M-C-M')[3]—beyond a medium of exchange, an insight that Marx had as well, of course. Furthermore, due to financialisation of the real economy, the picture is not simply one of runaway finance and an investment-starved real economy, but one in which the real economy itself has retreated from funding investment opportunities and has instead either hoarded cash or used corporate profits for speculative investments such as share buybacks (Lazonick, 2013). As we will argue, financialisation is rooted in predation; Matt Taibbi, in his 2009 *Rolling Stone* magazine article, famously described Wall Street as behaving like a giant blood-sucking vampire squid.

According to a recent financial newsletter, the S&P 500 companies (excluding banks and other financial institutions) were sitting on $1.3 trillion as of the third quarter of 2013, up by 13.5 percent from the previous year.[4] Financial investments—as opposed to productive investments (in R&D, for example)—became key sources of profit for a great proportion of American corporations (Krippner, 2005). In some industries, such as pharmaceuticals and oil and gas, firms invest more in share buybacks and paying dividends than on R&D and innovation (Lazonick and Tulum, 2011; Lazonick and Mazzucato, 2013).

[2] See Minsky 1986, 1990, 1992A, 1992B, 1993, 1996; Minsky and Ferri 1991; Minsky et.al. 1994; Wray 1991, 1993, 1994, 1995, 2009, 2010, 2012; Wray and Papadimitriou 1997; and Papadimitriou and Wray 1998 for links between the approaches of Schumpeter and Minsky.
[3] The expression M-C-M' summarizes the capitalist process according to Marx: money (M) is used by the capitalist to buy a commodity (C), which is worked upon by labour and then resold by the capitalist to obtain a larger sum of money (M').
[4] Source: Nathan Slaughter, https://www.streetauthority.com/research/3/item/9734.

We have positioned our project around the five following central issues:

a. The distinction between quality vs. quantity of finance
b. The mismatch between demand and supply of finance
c. The issue of public vs. private finance
d. The question of where finance comes from
e. How to promote finance for innovation *and* employment.

We start to address these issues by focusing on promoting the capital development of the economy. We first provide a detailed discussion of the Keynes–Schumpeter–Minsky framework used for the analysis. We then turn to the connection between finance and innovation, arguing that the current system is failing us. We close with suggestions for reform. ■

Socialisation of investment: Keynes, Minsky and beyond

Riccardo Bellofiore

An understanding of and an intervention on the present capitalist reality requires that we combine Marx's insights on labour with those of Minsky on finance, in a longer-term perspective that looks at the different stages through which capitalism evolves. In other words, we must build a kind of Schumpeterian non-mechanical view about long-waves, integrating in it Minsky's financial Keynesianism together with Marx's focus on capitalist relations of production. Minsky himself provided crucial elements to understand our world. These elements do not appear very much in his 1986 book, but are scattered across the many articles and papers he wrote from the early 1980s onwards. They can be regrouped under the heading 'money manager capitalism'; that is, the new form of capitalism that took over after the crisis of the so-called Keynesian 'golden age'.

Capitalist long waves and Minsky's stages view of capitalism

Let us see how the theoretical picture about Minsky may be altered if we try to read his contributions 'backwards', from his later writings to his early books. The focus here must be on the long-term changes in capitalism, or what Randy Wray calls Minsky's stages approach.

To introduce this problematic, I recall Minsky's argument in his chapter on "Money and Crisis in Schumpeter and Keynes" (first presented in Minsky, 1983). Keynes and Schumpeter recognised that money is not an outside asset; it is introduced in the economy as finance. In the abstract but fundamental case of a closed economy without a government and without household debts, this finance not only allows capitalist production to begin, but also finance longer-term investment demand and ownership of capital assets. As Kalecki taught us, cash-flows to non-financial businesses are determined by their investments, which depend on the two-price system dynamics. A careful interpretation of Minsky's two-price system should relate the supply price of capital to the price of current production, and the demand price of capital assets to the demand of those assets that can be held through time—therefore, capital goods are only one example of capital assets. The money supply may affect the demand price of capital assets, but will not directly affect the price level of current output. Since money is related back to banks through credit creation in calendar time, the question must be answered if debts commitments are actually met, and what happens if they are not.

For the early Minsky, the money supply was not horizontal at a given point in time, although the shifts in the financing supply and demand led him to reach conclusions near the horizontalist perspective. For the later Minsky, the insistence that loans makes deposits out of thin air, together with the stress on innovations within the finance sector, took his views even nearer to other circuitist and post-Keynesian understanding of money. The liability structure of businesses matters. The greater the liabilities due to private indebtedness, the greater the possibility of a collapse in asset values 'if something happens', as he used to say. Schumpeterian innovation within finance nurtures the shift from stability to instability, from hedge finance to fragility, whereas a fall in cash inflows and/or a worsening in financing conditions may trigger a financial collapse. Sustaining profits through big government (especially if through military expenditure or non-targeted unproductive demand; and/or through a welfare based on transfer money payments; and/or through an interventionist central bank) bears its cost: however, the fall in asset prices is contained. All this notwithstanding, the financial structure has evolved towards a different form of fragility, growing upon the continuous rise in capital asset prices.

Countering the old and new forms of financial turbulence requires a different kind of policy interventions that is irreducible to the usual form of Keynesianism. Before dealing with the economic policy side, we must take into account the specificities of the new-stage capitalism entered in the last few decades.

Minsky focused on US capitalism. Commercial capitalism (since, more or less, the 17th century) is the first stage, which progressively turned into industrial capitalism (more and more relevant in the second half of the 18th century and first half of the 19th century). Merchant banks and commercial banks financed goods in transit, inventories and goods in process. Business owners based their acquisition of capital assets on self-financing in commercial capitalism, while industrial capitalism in the US saw the emergence of wildcat financing. This is the capitalism depicted by Classical Political Economy, witnessing the opposition between the Banking School and the Currency School. During the 19th century, however, a new form of capitalism was emerging: finance capitalism. Long-term investments in heavy infrastructures (railroads, mill, and fixed capital) may require the involvement of the State and/or adventurous financing. Marx somehow captured the transition from the industrial to the finance capitalism. The tendency of the rate of profit to fall because of a rising capital composition is part of the story that led to the Long Depression of the late 19th century, a great capitalist crisis that accelerated the formation of finance capitalism, and then stimulated countertendencies such as technical and organisational innovations, leading to a higher rate of surplus value. In this financial capitalism stage, the financiers were mainly investment bankers and big corporations: the large shareholders dominated over firm managers.

In Europe, and especially in Germany, this era set the background for Hilferding's *Finanz-Kapital*. Finance capitalism collapsed in the Great Crash of 1929, followed by the Great Depression, both for financial (Fisher's debt-deflation) and real causes (Luxemburg-Kalecki's realisation crisis). The next stage was managerial capitalism, which emerged in the decades following the Second World War. Household and business debts were low, and external financing ultimately involved big government. Managerial capitalism was characterised by high profits, high investments and massive ex ante fiscal deficits. Ex ante deficits may be self-correcting, as long as the government runs a 'good deficit' policy; that is, where expenditures not only lead to a GDP increase but also to a better quality of its composition. In this period, power shifted from large shareholders to corporate managers.

Money manager capitalism

Again, the Marx–Schumpeter point is that this form of capitalism was inherently driven to dissolve itself, both because of its internal contradictions and because it cultivated in itself the seeds of the next stage: money manager capitalism (Minsky, 1996). If we move from the end of WWII to the 1960s, we witness a capitalism of big corporations, large banks and financial institutions, and new intermediaries like mutual and pension funds. The economic process is dominated by money managers whose target is the 'valorisation of capital' (the meaning of which shifted to the appreciation of the investments of the holders of their liabilities, including households). Inside managerial capitalism, employers offered pension plans to workers, and financial institutions started to aggressively manage retirement funds and other assets by organisations and households. As Charles Whalen (1997) said, after 1982 institutional investors became the new masters of the economy. Funds bought equity from highly leveraged buy-out non-financial businesses. Minsky insisted that it is the behaviour of these funds that made business management highly sensitive to stock-market evaluations and transformed American capitalism in a predatory social formation. Such alterations affected corporate governance, favouring the institution of a network productive system far from the vertically integrated big factory but also from the usual small-medium firm. The new configuration pushed forward a policy of downsizing and variable costs compression, which jeopardised employment conditions, so that the latter became discontinuous and precarious.

In this framework, the FIH can be redefined in a cyclical perspective that is far more instructive about the characteristics of the 'new' post-1979–1980 capitalism.[5] Reagan's and Thatcher's Monetarist U-turn rested on a decisive compression of the money supply determining an upsurge in money and real interest rates, which squeezed private investment and spread uncertainty. Together with the attack on trade unions, wages, and social provision, this could have created the conditions for another 1930s-style Great Crash due to a lack of effective demand, were it not for unexpected and powerful, expansionary counter-tendencies. Indeed, as Minsky (and Sweezy) well knew, it (that is, a Great Depression) is unlikely to happen again (and stagnation does not last forever). The first counter-tendency took the form of Reagan's twin deficits: the fiscal deficit (what Krugman has termed Weaponised Keynesianism) supported internal demand, while the negative trade account provided external outlets for European and Asian Neo-mercantilism. The second counter-tendency was Greenspan's 'privatised Keynesianism'. Since the mid-1970s, the class struggle from above produced the continuous traumatisation of workers mentioned above. The dominance of Minsky's money manager capitalism meant that the middle class and workers' household savings were channelled into private institutional funds and asset markets, fuelling capital market inflation. Managers were co-opted through stock options and their assigned mission of maximising dividends and share values. Together with a destructive competition between global players in manufacturing and services breeding over-production, the ensuing corporate governance generated a process of centralisation without concentration. Mergers and acquisitions continued to centralise capital, but this did not universally bring about a higher concentration of units of production. The result was a disappearance of a homogeneous working class and its replacement by fragmentation and precariousness of a working class "lost in space" (Bellofiore and Vertova, 2006).

Rather than the overly generic term financialisation, Minsky's money manager capitalism more accurately describes what I have elsewhere called a 'real subsumption of labour to finance'. This financial configuration impacted directly on the process of production, generating longer working hours and extracting greater effort from workers, and forcing an increase in the labour supply provided by families (the Marxian side of the story about money manager capitalism, if you like). The rate at which money flowed from funds to financial markets enabled non-financial firms to issue shares more cheaply, the returns of which increasingly depended upon speculative gains. This process gave way to an 'overcapitalization' of productive enterprises (Toporowski, 2010). Given the convenience of expanding financial relative to real investment, ownership titles were issued in excess of the needs for industrial and commercial financing. The money mopped up by those issues was invested in short-term financial activities, propelling a cumulative upward disequilibrium in asset prices without any self-adjustment mechanism. Markets became more liquid, and the supposed quality of collateral assets was thought to be regularly improving. This led to a perceived ex-post increase in the cushions of safety (Kregel, 2008). It is no surprise that the increasing indebtedness emerged mostly from financial businesses and households rather than from the physical investment of non-financial firms. This may partially be in contrast relative to Minsky's pre-1986 canonical model, but it is coherent with his later description of money manager capitalism.

Manic savers, mesmerised by the rise in the asset values of their holdings, turned into indebted consumers, with the associated collapse of the propensity to save on income: the higher paper value of their savings gave way to a reduction in saving. Stock market manias, first, and housing bubbles, after, fuelled the expansion of consumption on credit, with consumption becoming an 'autonomous' form of demand, sustaining profits. In the subprime frenzy, the two-price model probably incorporated in the demand price of capital assets the price of housing. Wage deflation, capital asset inflation and the increasingly leveraged

[5] This outlook on the crisis is further developed in Bellofiore (2013).

position of households and financial companies were complementary elements of a perverse mechanism where real growth was doped by toxic finance. Nonetheless, it is important to recognise that 'fictitious' capital had 'non-fictitious' fallouts, contrary to the usual Marxist narratives, and confirming Minskian insights.

This new configuration of capitalism was made possible by a new role of the central bank as lender of first resort (De Cecco, 2007) to support capital asset price inflation. The central bank managed the creation of liquidity with the objective of sustaining the continuous increase in asset values; it also assured the viability of the shadow banking system and financial intermediaries. Through Greenspan, quantitative monetarism was replaced by a policy in which money was made available in unlimited amounts at any interest rate established by the central bank. The money supply became flat, and was finally recognised as endogenous, even within the mainstream. It was an eminently political management of effective demand, manipulating indebted consumption as the pillar of autonomous demand. This configuration has been labelled 'privatised Keynesianism' by Greenspan. Because of workers' traumatisation, it was possible to have a reduction in unemployment without an increase in wages, so that the so-called Phillips curve flattens-out (Lavoie, 2009). However, the resulting full employment was not characterised by decent wages and stable jobs. It was, instead, a full under-employment, with unemployment penetrating into the employed labour force through the spreading of part-time and casual/informal occupations.

It was a dynamic configuration of capitalism that was capable of manufacturing consent and yielding hegemony. However, households' indebtedness in no way corresponded to a state of economic and social welfare. The US's 'overspending' consumers matched that country's 'overworking' wage-earners. Growing debt had its ultimate raison-d'être in the insufficiency of income to support consumption of non-manufacturing goods and services. This caused an escalation in expenditures generating rents for the financial sector.

The socialisation of investment and of the economy

This backwards way of looking at Minsky, through the prism of his stages approach to capitalism and his characterisation of the Neoliberal era as money manager capitalism, gives further weight to his economic policy perspective, which was as heretical during the Keynesianism and Post-Keynesianism of the 1970s as it is now. I am referring to his proposal of a socialisation of investment and a socialisation of employment, which is critical of the 1960s policy synthesis and of Keynes himself. Keynes' view was that capitalism is inherently flawed, and that it requires regulation, fiscal intervention, and the central bank as lender of last resort. It is true that big government capitalism is superior to free market capitalism, and this can be said also of 'Keynesian' economic policies of the Kennedy and Johnson administrations in the US. The problem, however, is that these policies led to a high-profits-high-investment economy that gained full employment through waste and military expenditures at the cost of social and ecological disasters.

These limits of standard Keynesianism derive not only from a limited understanding of Keynes, but also from contradictions in Keynes himself. Where Minsky is clearest on his vision in economic policy is in the last two chapters of his book, *John Maynard Keynes*. Keynes in the 1930s was proposing a moderately conservative perspective; his vision was that investment must ensure full employment, and taxation must ensure a reasonable income distribution. He combined two very different views: the need for a socialisation of investment on one hand, and the market mechanism free allocation of resources after reaching full employment on the other. There is here an apparent inconsistency. The Keynesian way out from the crisis was faithful to this contradictory Keynes. Wartime policy gave respectability to large government deficits that pushed up firms' quasi-rents; investment was accompanied by an accommodating

monetary policy; a large tax bite subsidised individual consumption and money transfer payments. All this turned into a claim on productive capacity. Minsky argued that full employment like this was socialism for the rich and led to a fruitless inflationary treadmill and a deterioration in the biological and social environments.

Minsky was not only able to anticipate the (internal) dissolution of the 1960s Keynesian economic policy—and the ensuing stagflation—he was also able to put forward an alternative economic policy that is insightful today. Here, 'alternative' means opposed both to austerity policies and to generic pump priming of effective demand (through government spending and tax reductions, with low interest rates). Investment has not been socialised in the Golden Age, when we experienced a boom driven by military spending, while individual discretionary consumption grew into waste. Minsky believed that we had to return to the 1933 questions, the New Deal questions: for whom should the game be fixed and what kind of output should be produced? The answer to the difficulties was to be found in a more radical approach than Keynes: a socialisation of towering heights and leading sectors, with communal consumption. A larger, not a smaller, role for the State; a low, not a high, private investment policy; serious controls on how capital moves and investment is financed; a bias against giant financial institutions.

Now that a serious business cycle is back with the Lesser Depression, and now that a Fisherian debt deflation is ongoing, we should know better that an interventionist form of capitalism is better than one that pretends to be free market capitalism. The key question remains as to which kind of interventionism should be employed. Minsky's 1975 answer looks incredibly perceptive, and even more so after the crash of money manager capitalism as we knew it. Minsky's socialisation of investment is a socialisation in the use of productive capacity: it is a 'command' over the utilisation of resources and its results are immediately 'social use value'. It is complementary to a socialisation of banking and finance, and to a socialisation of employment such that it gives way to an increase of potential output. The importance of this last point may be better understood if we see how the Keynesian welfare state welfare reforms that allegedly point beyond it are framed as an alternative to Minsky's preferred economic policy: a full employment policy led by the government as direct employer (he wrote more generally of extra-market extra-private enterprise and employment schemes). Minsky went as far as to define welfare a conservative instrument to increase government deficits so that profits are sustained in a slump (Minsky 1981). His ultimate lesson is that we need structural reform, not only expansionary demand policies. A commitment to the design of a new type among the possible 57 capitalism varieties: a guided interventionist capitalism, or a decentralised socialism. The label, he added, is of little importance. ■

Democratising Innovation: From top-down missions to bottom-up causes

Andy Stirling

Innovation is not just about technological inventions. It encompasses all the many ways to further human wellbeing and social progress. Therefore, innovation does not just comprise improved production and use of goods or services in firms and other organisations; it also includes new practices and relations in the workplace, communities, households and culture at large.

Advanced science and technological research can help drive and enable innovation, but many other new forms of knowledge and action are also important. Innovation can be created by social mobilisation as much as commercial entrepreneurialism. Grassroots movements, civil society, creative arts and wider cultural activities, along with small business, service industries and the public sector are just as important for innovation as universities, research labs and high-tech companies.

It is a distinctive feature of scientific and technological forms of innovation (as opposed to other kinds) that those particular directions for development that actually get pursued can quickly look, in retrospect, as if they were inevitable. The cultural status of science and technology can reinforce this impression. It is with such resignation, for instance, that many tend to view the urban automobile, chemically intensive agriculture, centralised electricity production, nuclear weapons—or indeed military technology in general. However, this deterministic impression is more to do with various powerful economic, political and wider social processes of closure than to historical inevitability.

For example, it is well understood how small-scale contingencies can channel technologies in path-dependent ways, such as the QWERTY keyboard. As in computer software and design, the tendency for innovation to be governed by particular paradigms and routines further reinforces this point. Even the most competitive markets, such as those in popular consumer products, can find themselves becoming further 'locked in' by increasing returns to what everyone would agree are sub-optimal technologies. Still, further positive feedback is exercised by the role of expectations in research and finance systems and (as in the Apollo programme, for example) commitments are also reinforced by particular prevailing imaginations about humanity and its place in the world.

However, some of the most powerful effects are deliberate. As with tobacco, these may involve colossal investments in marketing and advertising in order to steer global markets. Or, as in many cases of environmental pollution, they may involve the 'client capture' of regulators. Mission-oriented public agencies can be especially vulnerable to these dynamics, becoming vulnerable (as in the case of nuclear fuel reprocessing) to processes of entrapment. It is in all these ways, then, that the pathways taken by innovation are routinely closed down and many promising alternatives are irreversibly 'crowded out'.

As a result, not all innovation trajectories that are technically possible, economically feasible or socially viable will actually prove to be historically realisable. Therefore, the same is true in innovation as in other areas of public life. Government policy and private strategies are both about making social choices across a variety of continually branching alternative pathways for change. In this sense, innovation is more like an evolutionary process than some kind of one-track race. Innovation possesses the crucial property of direction, which makes it a vector, not a scalar. It is as much about exploring a space of different possibilities as optimising any single one. Therefore, the key questions are not so much about 'how fast?' and 'who's winning?' as 'which way?', 'who says?' and 'why?'

Amidst all this diversity and choice in innovation, the key question is how are we to recognise what counts most as 'progress'? In very general terms, this is not so hard. Under any reasonable notion of progress, the most compelling imperatives are, for instance, quite clearly formalised in global governance frameworks

around human wellbeing, social development and environmental sustainability. When we think of mechanisms of lock-in like those described above, it is crucial to the politics of innovation, that human progress is nowhere in global debates directly characterised in terms of the driving forces and incentives that act most directly within innovation systems themselves.

In areas outside science and technology, it is not unusual to recognise this; indeed, it would be regarded as partisan to deny it. The proximate pressures in both public- and private-sector innovation are rarely directly toward 'the public good'. Instead, other factors come to the fore, such as shareholder value, market power, organisational rivalries, individual advancement, control of infrastructures, bureaucratic concentration, rents in value chains, appropriation of intellectual property and short-run profit. This not necessarily a cause for undue surprise or alarm, it is simply how things are. After all, it is this kind of mismatch between proximate pressures and wider public values that forms the ubiquitous case for democracy. In a multiplicity of ways, the remedies lie in transparency about resources and priorities, political debate rather than just technical analysis, open public scepticism and legitimate dissent—all of which are subject to overarching democratic accountability. So, whether mission-oriented or emergent, the same might be thought to apply to innovation.

So far, so obvious. But this is where there something rather odd emerges. This crucial property of the *direction* of innovation remains strikingly neglected in much high-level innovation debate, to an extent far worse than in other areas of policy. Equally in the UK, the EU and wider international documentation, government and industry espouse indiscriminate 'pro-innovation' strategies. Europe, for instance, is increasingly an 'innovation union', without clearly justifying which trajectories are particular favoured or why. It is as if all innovation were one self-evident thing. And scepticism about whatever happens to be the most powerfully favoured innovation pathway is routinely branded as generally 'anti-innovation'. Therefore, whatever happens to emerge from incumbent priorities and interests in innovation systems implicitly tends to be presented as if it is inevitable or best.

In what other area of policy would it be tolerable that an incumbent position would be defended simply as 'pro-policy'? Yet it is this kind of indiscriminate language that routinely dominates innovation debates. In areas like GM foods or nuclear power, for instance, it is not uncommon to hear official claims that there are effectively 'no alternatives'. However, both are fields with manifest choices between radically divergent but equally viable alternative pathways for innovation. In the case of transgenics, many highly feasible alternative pathways are offered by innovations like conventional breeding, genetic markers, open source and participatory breeding. Carbon capture and storage as well as a rich diversity of renewable energy infrastructures offer highly viable to alternatives to nuclear power, as the basis for zero-carbon electricity systems.

Likewise, many hidden choices exist between different areas for innovation. Why, for instance, is so much more invested globally in proprietary innovations for treating mild and avoidable disorders of the rich than in open-source innovations to prevent the grave and involuntary diseases of the poor? And why is it, both in the UK and worldwide, that the largest single area for public investment in innovation supports the organised projection of violence?

The point here is not to arguefor one innovation pathway over another. The issue is that this picture of choice is routinely suppressed by indiscriminate pro-innovation language. This is reinforced by the way in which expert knowledge is privileged in innovation debates. 'Sound science' and 'evidence-based' decision making are frequently invoked in innovation policy, in ways that further airbrush out the many complexities, ambiguities and conditionalities. Despite the manifestly political nature of the contending perspectives, possibilities and uncertainties, the impression is often given that there is a single, definitively 'best' way forward. A great deal of technical and economic analysis of innovation also resounds with terms

like ‘forging ahead’, ‘catching up’ and ‘leapfrogging’—metaphors that only make sense in the case of a single presumed direction for advance.

In areas like energy policy, public health, food production or security, this kind of language further confines room for reasoned, balanced debate over alternatives. Attempts to deploy the authority science or innovation in general, in favour of particular partisan interests, risk aggravating conflict. Ironically, they also threaten to discredit science. The suppression of openly political debate has the effect of undermining democracy itself. Nowhere are these dangers more pronounced than in the fevered sense of urgency that often gives rise to large-scale mission-oriented initiatives.

It is here that history may offer its most important lessons for innovation. Recent high-level recognition for the importance of green innovation tells an interesting story. Once-radical technologies like wind turbines, ecological farming, super-efficient buildings and green chemistry are all now emerging as major areas for mainstream innovation. However, they all owe their pioneering origins and early development to grassroots social movements. All were systematically marginalised, if not actively supressed, by contemporary incumbent interests in science, government and industry. This exclusion was not only enacted by large private corporations in each respective sector. They were also for a long time crowded out by publicly-funded mission-oriented agencies of the kind devoted at the time to applications in military systems, space exploration, supersonic transport, or nuclear fission or fusion.

The reason for the existence and persistence of these once-marginalised innovation pathways lies not in any single structured top-down ‘mission’, but in diverse bottom-up struggles. A similar story applies to the establishment of clear debates about what progress in innovation even means. Take, for instance, the global governance frameworks mentioned at the beginning of this paper. Worldwide aspirations towards greater global equity, climate change mitigation, sustainability or disarmament were not elevated to their present formalised status by orderly top-down missions or apolitical management. Nor were they always willingly conceded by incumbent power and established interests. Instead—as was arguably the case with all great progressive social transformations of the past—these potentially transformative social innovations were also secured primarily through radically challenging and overtly political forms of bottom-up contention and democratic struggle.

Of course, innovation involves a highly diverse and complex set of processes and care should be taken when making any kind of generalisation. There are vulnerabilities to many kinds of romanticism; the devil is typically in the detail and the crucial dynamics often lie between top-down control and bottom-up care. But the crucial role seems undeniable, not only of public policy and large scale technical programmes, but even more so of overarching space for democratic accountability and struggle. As these qualities seem most neglected in fields of science, technology and innovation, it is most important to support them. And, with public organisations evidently no less immune than private firms to the powerful forces of lock-in, it seems especially important to highlight the roles not only of hierarchical mission-oriented agencies, but also of the vibrant social movements that shape the gradients of progress and nurture its most promising values and practises. For innovation to truly contribute to human progress, what is most important is not orderly fear-driven top-down technical missions, but unruly, hope-inspired bottom-up democratic causes.[6] ■

[6] A fully referenced version of this paper is posted at http://www.sussex.ac.uk/Users/prfh0/Stirling_Democratising_Innovation.pdf.

Resurrecting Keynes: Full employment, value creation, and public purpose

Pavlina Tcherneva

In the interwar period, Keynes argued that the public sector can play the role of 'entrepreneur-in-chief' (Keynes, 1981a: 324) when dealing with two core objectives: the maintenance of full employment over the long run and the design of direct job-creation programmes to serve the public purpose. Conventionally, however, neither economists nor policy-makers think of the state as 'an innovator' or 'a job creator'. This paper links the ability of the state to create value to achieving these two objectives. It argues that reorienting fiscal policy from the conventional pump priming/aggregate demand management orientation to a 'bottom-up' approach can do the job. The bottom-up approach is based on a reinterpretation of Keynes's original recipe for full employment (Tcherneva, 2012) that would offer targeted, direct, and unconditional employment opportunity to all who need it—a policy that resembles Keynes's 'on-the-spot-employment' programme. This paper explains the methodological and theoretical reasons why conventional methods of closing 'the output gap' are inadequate. A policy that aims to close the 'labour demand gap' during *all* phases of the business cycle (not just in downturns) can offer the elusive long-run full-employment solution, while helping to 'replan the environment for our daily life' (Keynes, 1980: 270). The paper re-envisions what such an on-the-spot employment programme might look like for developed countries. ■

The state within national systems of innovation: active or passive role?

Giovanna Vertova

This paper starts with a review of the literature about the National Systems of Innovation (NSI), by linking the origin of the concept to the evolutionary theory of firm and innovation. Within this tradition, firms are economic agents that deal with an uncertain environment, especially as far as innovation and technological change are concerned, and not profit-maximising economic actors that choose from a well-defined and exogenously given sets of choice (Nelson and Winter, 1982). The evolutionary theory of the firm is about how firms learn through imperfect adaptation and mistake-ridden discovery, because it is not possible to believe that the best response has already been learned, but rather that it is still to be learned. Innovation is an uncertain, dynamic and learning process. Moreover, technological knowledge leading to innovations is partially context-specific and difficult to transfer due to its 'tacit' elements, which are embodied in routines, expertise and skills acquired through a process of learning and taking the shape of a set of specific practices. The 'tacit' aspect of technology is not so easily transferred because it is the result of learning processes (that is, learning by doing, by using, by interacting, etc.). So, when the geographical distance is negligible and language and culture are common, the tacit aspects are easier to transmit. Thus, the interaction between geography and innovation occurs, with the development of concepts such as national, regional and local systems of innovation.

My first point relates to flaws in the NSI concept. Despite some references to Friderick List's work, as the forerunner of the concept, the NSI literature developed mostly from the mid-1980 to the 1990s, with the aim of developing a theoretical framework to understand the most important elements that boost firms' ability to innovate. At that time, three books became the landmark for the development of the NSI concept: Freeman's *Technology Policy and Economic Performance. Lessons from Japan* (1987); Lundvall's *National Systems of Innovation. Towards a Theory of Innovation and Interactive Learning* (1992); and Nelson's *National Innovation Systems. A Comparative Analysis* (1993). These authors' definitions of NSI reveal some striking points (see Table 1). Firstly, these definitions are so broad that they can encompass almost anything. In the evolutionary tradition, innovations arise from knowledge as information, as well as from tacit knowledge, such as skills, expertise, competences and every variety of learning processes (that is, learning by doing, by using by interacting, by searching, etc.). This brings to mind the following question: Which institutions are not involved, either directly or indirectly, in the creation and support of tacit knowledge? Secondly, although all definitions share the central role played by institutions, the state and its policy are not explicitly mentioned. It seemed that the macro-economic environment, which is also shaped by government policy, is not taken into consideration as far as innovation is concerned. The state comes into the NSI only as the 'institution' that has the task of supplying the 'key' elements for creating an environment favourable to firms' innovative activities. Thirdly, it is not clear if the NSI concept is a descriptive or a normative tool.

As the concept has developed, many theoretical and empirical works have shared the same methodological approach. Namely, the key elements of a NSI must be identified and, when possible, measured; and comparative analysis among different NSI must be carried out in order to find the 'best' one, and use it as a benchmark for other countries (Patel and Pavitt, 1994; Kravchenco 2011). Therefore, the theoretical tool of NSI becomes a normative one and the supply-side orientation of the state elements of the NSI has never been questioned. Government policy towards innovation is relegated to a regulative task (markets, property rights, education, etc. must be regulated in order to foster innovation). Moreover, since firms are the main agents of innovative activities, the state has no direct control over what types of innovation are developed, with what objectives, and for whom. The *direct* intervention of the state to the innovative

activities is not called for. Only some kinds of *indirect* policies of incentives/disincentives are admissible. All innovative activities are left in the hands of private capitalist firms (where innovation is driven by profit expectations), regardless of their social consequences.

Table 1. Some NSI definitions.

Freeman (1987, p. 1)	Over the last two centuries those scientific and technical activities which are intended to promote the flow of technical and organizational innovations and their diffusion have vastly increased in scale and have become highly specialised in a variety of institutions. At the same time national education and training systems, which may both encourage and disseminate advances in technology, have expanded largely to ensure that the labour force has the changing mix of skills needed to diffuse and operate these new techniques efficiently. The network of institutions in the public and private sectors whose activities and interactions initiate, import, modify and diffuse new technologies may be described as 'the national system of innovation'.
Lundvall (1992, p. 12)	The narrow definition would include organisations and institutions involved in searching and exploring – such as R&D departments, technological institute and universities. The broad definition […] includes all parts and aspects of the economic structure and the institutional set-up affecting learning as well as searching and exploring.
Freeman (1992, p. 169)	[…] the concept 'National System of Innovation' may be used in two senses: in a *broad* sense it encompasses all institutions which affect the introduction and diffusion of new products, processes and systems in a national economy; and in a *narrow* sense it encompasses that set of institutions which are more directly concerned with scientific and technical activities.
Nelson and Rosenberg (1993, p. 4-5)	There is, first, the concept of a national system of innovation itself. […] Consider the term 'innovation'. In this study we interpret the term rather broadly, to encompass the process by which firms master and get into practice product designs and manufacturing processes that are new to them, if not to the universe of even to the nation. […] Then there is the term 'system'. […] Rather the concept is of a set of institutions whose interaction determine the innovative performance, in the sense above, of national firms. […] Rather, the 'system' concept is that of a set of institutional actors that, together, plays the major role in influencing innovative performance.

The second point I would like to raise is that when the role of the financial system was finally recognised by the evolutionary traditions, it was simply added as a 'new' element within the NSI. The main aim became to include the financial system within the NSI and to look for the 'right' financial system for the 'right' type of innovations. Starting with the first great distinction between market-based and bank-based financial systems (Levine, 2002), new ways for financing innovations are later investigated (that is, business angels, venture capital, crowd-funding, etc.) (Gompers, 2002; Martinsson, 2010; Tylecote, 2007). Again, the descriptive analysis translates immediately into a normative tool and, again, the supply-side orientation is clear. This way of looking at finance and innovations mixes the distinction among the financialisation of the economy (one of the great novelties of neoliberalism), the problem of financing innovative activities and financial innovations. Thanks to political interventions, and therefore to a regulatory state, financial innovations were invented to enable all firms to make profits through financial markets rather than through production and innovations. The financialisation of the economy harms innovation because resources (especially financial ones) are re-directed to financial markets. For example, Lazonick and O'Sullivan (2002, p. 33) remarked that Microsoft's 1998 stock repurchases were almost equal to its in-house spending on R&D. Therefore, a primary concern for the evolutionary literature should be the shift from an innovative-

led firm's strategy towards a financial-led one. Unfortunately, Minsky's money manager capitalism seems quite neglected by the evolutionary tradition.

My third and final point refers to a new way of looking at innovations. My suggestion here refers to the need for a stronger and more direct state interventions in innovative activities, especially those presenting strong social consequences. For example, the state should directly intervene in the pharmaceutical sector (where therapy of some illnesses cannot be left in private capitalist firms' hands due to market failure); in the agricultural sectors (where the quality of goods need to be so high that it might become unproductive for private firms to supply them); and in all sectors with a strong environmental impact. As Mazzuccato (2013) shows, the state has always been a fundamental but indirect actor for the development of certain innovations in certain sectors. However, I believe that this is not enough, especially during a period of crisis. The state should address innovative activities towards more basic and social needs, which are better off away from markets, thereby becoming an *innovator of first resort.* ■

The revolutionary power of peripheral agencies

Dan Breznitz and Darius Ornston

The state features prominently in literature on economic development. The 'developmental' state literature asserts that late developers require an autonomous, powerful, and centralized bureaucracy to industrialize (Chibber, 2002; Doner, Ritchie, & Slater, 2005; Johnson, 1982; Wade, 1990). Recent work on the 'neo-developmental' state asserts that such agencies are more effective when embedded in multiple domestic or international networks (Ansell, 2000; Block, 2008; Evans, 1995; O'Riain, 2004). Both literatures situate developmental agencies at the center of the public sector and the economy more generally. While such agencies may facilitate competition in mature industries with clear technological trajectories, we argue that policy-makers seeking to facilitate rapid innovation-based (RIB) competition must instead rely on a very different kind of organization.

We begin with the observation that the promotion of RIB growth requires a 'Schumpeterian developmental agency,' (SDA) committed to a process of continuous policy experimentation (Kuznetsov, 2009). In contrast to the literatures on the development and neo-developmental state, we argue that this type of radical innovation is more likely to occur at the *periphery* of the public sector, in low-profile agencies with relatively few hard resources and limited political prestige. These peripheral agencies are less vulnerable to political interference and more likely to adopt experimental policies that promote RIB growth. In identifying the circumstances under which agencies are more likely to engage in policy experimentation, we not only advance a novel explanation for how late developers can promote disruptive technological innovation, but also reveal why successful agencies become less entrepreneurial over time.

We develop the argument in five stages. Section one introduces the literature on the developmental and neo-developmental state. Section two defines the SDA and explains why radical policy innovation is more likely to occur at the periphery of the public sector. Section three and four illustrate the argument by analyzing how two historically, low-technology, late developers, Finland and Israel, assumed leadership in new, RIB industries. In these two, very different cases, SDAs, the Finnish Fund for Research and Development (Sitra) and the Office of the Chief Scientist (OCS) in the Israeli Ministry of Trade and Industry, played a crucial role in stimulating co-evolutionary change by precipitating policy experimentation and RIB growth.[7] Within-case analysis, based on 229 interviews conducted between 2000 and 2012, reveals that these innovative agencies were located at the periphery of the public sector and became progressively less entrepreneurial over time as increasing success exposed them to greater political interference. We conclude by generalizing the argument to a broader universe of cases. ■

[7] Our argument thus supports recent literature on endogenously generated institutional path change (Schneiberg, 2007). Unlike Schneiberg, however, who describes how "failed" battles leave behind alternative models that change the flow of the dominant path by acting as flotsam and jetsam, we view SDAs as a seeding source. SDAs propose and test models in the "shadows" that later enter the mainstream (in ways that ultimately hinder the experimental capacity of these agencies).

China as an entrepreneurial state: A Schumpeter–Keynes–Minsky perspective

Leonardo Burlamaqui

> *The task confronting economics today may be characterized as a need to integrate Schumpeter's vision of a resilient intertemporal capitalist process with Keynes' hard insights into the fragility introduced into the capitalist accumulation process by some inescapable properties of capitalist financial structures.*
> (Minsky: 1986 b, p.121).

In the ongoing debate on China and globalisation, a common question is whether China will be a winner or a loser in the evolving global landscape. The response is often that it will ultimately be a loser, with a host of reasons offered to back up such a claim, including: the one-party institutional setting, the lack of democracy (Acemoglu, and Robinson, 2012), the way the financial system is organised (Walter and Howie, 2012), and the country's failure to properly liberalise the exchange rate regime and interest rates (Pettis, 2013). I address this theme from a very different perspective by suggesting a radically different question: How did China manage to become a 'winner' so fast, and so many fronts? (For approaches that begin to recognise some of China's sustainable strengths, see Berggruen and Gardels, 2013, and Lee, 2012.)

In 1976, China barely managed to cover the costs of sending its highest-ranking dignitary to speak at the UN (Walter and Howie, 2012). By 2011, it had become the second-largest national economy, the largest exporter, the largest manufacturer, the possessor of the world's largest current account surplus,[8] and the holder of the greatest amount of foreign reserves. China has been described as the United States's 'banker; (World Bank, 2012; Tselichtchev, 2012; Bergsten and Alii, 2010).

China has also exhibited the fastest rate of growth of any nations over the past two decades, an extremely fast rate of technological upgrading (Gallagher and Porzecanski, 2010) and one of the most successful set of policies for poverty alleviation, which has allowed it to bring millions of people up above the poverty line every year. In sum, China has become an economic superpower. It has not just caught up with the West; it has leapfrogged it.[9] This is in addition to being a nuclear power and having veto power at the UN Security Council.[10]

Answering the question of how this all happened is well beyond the scope of this paper. However, the above provides the factual background that I believe is appropriate when discussing China's current situation and future prospects and the kind of institutional configuration that is likely to emerge from its successive waves of reform. The reason for that is that looking at China as a 'big success case' (although obviously not lacking problems) invites searching for lessons instead of recommending emulation (especially of Anglo-American practices and institutions).

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[8] Direct investment overseas by Chinese companies has increased from $5.5 billion in 2004 to $56.5 bn in 2009. Approximately 70 percent of the money invested in 2010 went to other parts of Asia, followed by 15 percent to Latin America ('The China Cycle', *Financial Times*, 13 September, 2010.)

[9] For a discussion, from an evolutionary perspective, of the pertinence of using this concept rather than that of 'catch-up', see Burlamaqui (2011).

[10] This wholesale structural transformation went beyond dry economic statistics. As McGregor recounts, when the *New York Times* architecture Nicolai Ouroussoff deplaned in Beijing for the 2008 Olympic Games, he compared arriving at the city's new airport to 'the epiphany that Adolf Loos, the Viennese architect, experienced in New York more than a century ago. He had crossed the threshold into the future' (2010: *Locations* 529–531).

However, my main purpose here is analytical, not descriptive, and the central claim is that China's speed and ability to leapfrog its peer nations in the last three decades stems largely from the fact that it is—to use Mariana Mazzucato thoughtful approach (Mazzucato, 2013)—a fully developed entrepreneurial state (ES). The goal of the present paper is to dig deeper into ES as a bridging concept that fits well with the Schumpeter–Keynes–Minsky analytical framework under construction within the current Ford-INET line of research, and one that is particularly appropriate for China.

From a theoretical point of view, China's achievements reaffirms key elements of works by Hilferding, Schumpeter, Keynes, Minsky and the 'developmental state' approach to economic analysis and public policy. Some of those features are well known: The centrality of credit for innovation and development (instead of 'savings'), the key role of the State in steering and governing the development process (instead of 'free markets'), the strategic role of investment-development banks to provide the necessary funding, and the functionality of financial restraint to avoid the build-up of 'financial casinos' (for the last point, see Hellman, Murdock and Stiglitz, 1996, and Bresser-Pereira, 2010).

China's development trajectory has all of these features, which point towards a two-fold conclusion. Firstly, it suggests that *the concept* of the entrepreneurial state should synthesise three core elements: a 'Hilferding-Minsky'-type banking system; an extension, to the government, of Schumpeter's link between entrepreneurial skills and structural change; and the presence of a robust degree of socialisation of investment as stated by Keynes in the General Theory and also by Schumpeter in his characterisation of 'socialism'. The second conclusion is that the Chinese State encapsulates all three dimensions and should therefore be taken as the prototype of a developed entrepreneurial state. These are admittedly bold propositions, which should invite further debate and discussion. ■

Beyond market failure: the rise of mission-oriented State Investment Banks

Mariana Mazzucato and Caetano Penna

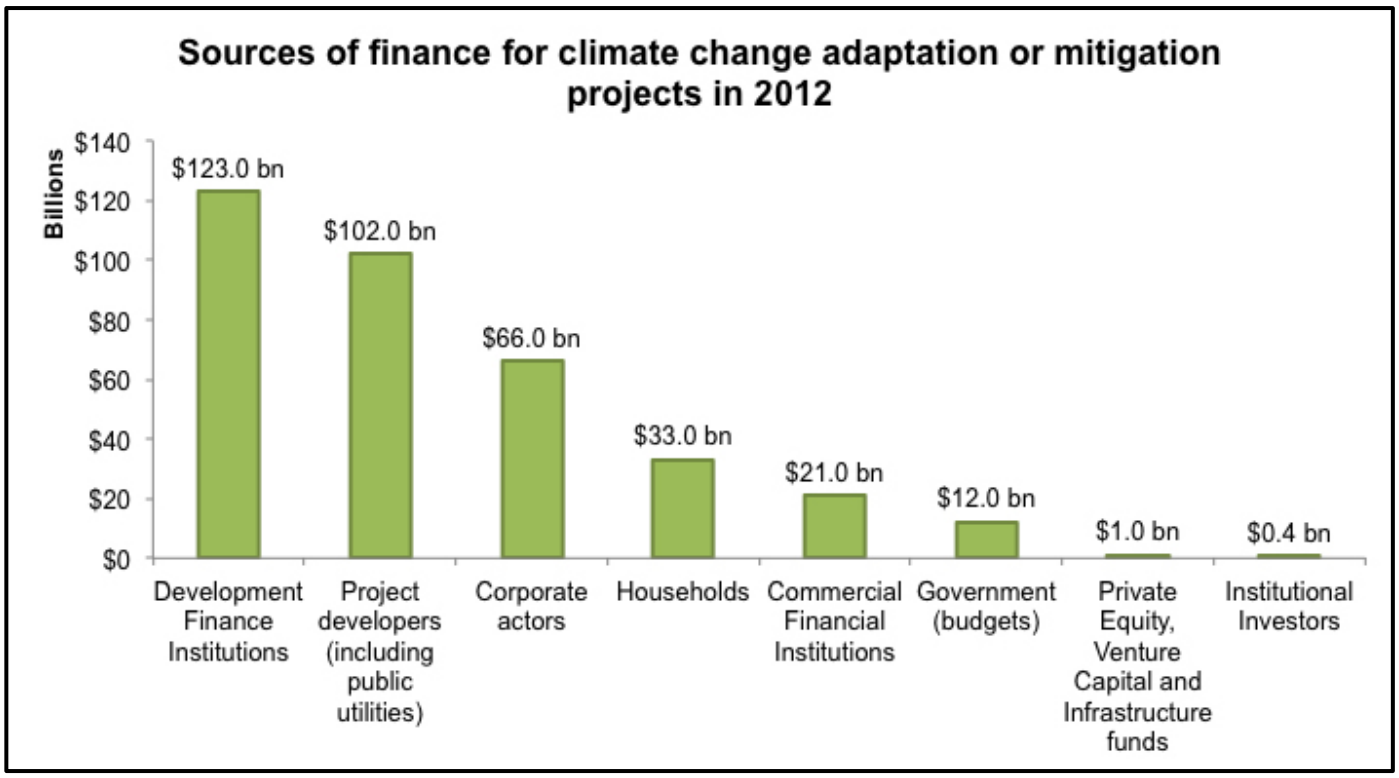
A well-functioning financial system must transform savings into productive investments that promote economic growth and rising living standards (Allen and Carletti, 2012). However, there is increasing evidence that, in recent decades, private finance has retreated from funding long-term productive investments in the 'real economy', as financial innovations coupled with de-regulation have made it easier to earn profits from speculative investments in financial assets rather than in productive assets (Wray, 2011; Kay, 2012). The 'short-termism' of the financial system (Haldane, 2011) has been accompanied by the 'financialisation' of business enterprises, the financial departments of which increasingly became main profit centres, to the detriment of core operational activities (Krippner, 2005; Dore, 2008). The 2007 financial crisis made these decade-long processes evident, by revealing the fragility of speculative financial markets and of financialised business enterprises (Epstein, 2005), both of which were falling short in terms of promoting the capital development of the economy. While the crisis prompted many governments to intervene in the financial system (for example, new regulations, reforms) or to increase spending (for example, indirect fiscal policies or direct public investments) in order to put the economy back on a growth path (Feldstein, 2009; Gutierrez *et al.*, 2011), the need for governments to step up has actually been a result of this long-term process of private finance retreating from providing capital to the real economy, which began with the 1970s de-regulation of the financial sector (Tomaskovic-Devey and Lin, 2011).

The retreat of private finance from funding the real economy has led to *public* finance taking on an increased role—in doing what the private sector will not. State investment banks (SIBs, or development banks), a particular source of public finance, have stepped up their activities in the aftermath of the financial crisis and subsequent economic recession. While development banks are not new (many were created in the 1940s and 1950s), they diversified their roles in the past three decades and increased investments, going beyond traditional activities in both scale and scope. In so doing, they have promoted the following four types of investments: (1) countercyclical lending to offset the credit crunch during economic recessions (Gutierrez *et al.*, 2011; Luna-Martinez and Vicente, 2012); (2) funding for long-term projects, industrialisation and capital development of the economy (Griffith-Jones and Tyson, 2013); (3) targeting investments in high-risk R&D, innovative start-ups, and lengthy innovations, areas in which private capital has proved to be too short-termist and risk-averse to venture into (George and Prabhu, 2003; Schapiro, 2012; Hochstetler and Montero, 2013; Sanderson and Forsythe, 2013); and (4) they also promoted investments that help address complex societal problems such as climate change (Schröder *et al.*, 2011; Louw, 2013), an activity that sometimes cuts across the other three areas,.

Looking at world-wide investments aimed at the global challenge of limiting carbon emissions (such as investments in renewable energies), the figures are striking (see Figure 1). In 2012, the share of development finance institutions (that is, SIBs) in the 'climate finance landscape' was 34 percent (the highest share of any single type of actor), compared to 29 percent for project developers (including public utilities), 19 percent for corporate actors, 9 percent for households, 6 percent for *all* types of private financial institutions and 3 percent for executive governments (investments from governmental budgets)[11] (Climate Policy Initiative, 2013).

[11] The figure for executive governments does not consider their US$37 billion participation in, for example, public utilities, which the Climate Policy Initiative has classified as private investments.

Figure 1: Finance for climate change adaptation and mitigation projects by source in 2012



Source: Based on data from Climate Policy Initiative (2013)

Several authors have identified the increased and differentiated (or 'enhanced') roles of SIBs. These include Sanderson and Forsythe (2013), who argued that the China Development Bank is 'rewriting the rules of finance' (for works focusing on other SIBs, see Griffith-Jones and Tyson, 2013; Schapiro, 2012; Hochstetler and Montero, 2013; Colby, 2013). What is still missing, however, is a framework to analyse and theoretically justify the enhanced role of SIBs in the 21st century. These banks are not just fixing markets; they are actively shaping and creating them. A framework is also missing to describe the role that active public agencies, such as DARPA in the United States or SITRA in Finland, have had in funding and supporting new technologies, firms and sectors, actively shaping and creating the information technology (IT) revolution (Mazzucato, 2013a). This lack of a framework makes it difficult to describe/analyse what is happening, difficult to give guidance to those countries wishing to make similar investments, and difficult to evaluate the performance of those investments in the few countries in which they are happening. In this paper we argue that the common place criticisms about 'crowding out' (Friedman, 1979) or 'picking winners' (Lisboa and Latif, 2013) derive directly from the limited (mainstream) theoretical perspective on what SIBs do.

The standard theory used by economists to inform the formulation and evaluation of public investments is problematic because it justifies public intervention in the economy only if it is geared towards the correction of different types of 'market failures'. Such failures may arise due to various conditions, including asymmetric information (leading to adverse selection) and the existence of public goods with positive externalities (see section 3). In market failure theory (MFT), it is the existence of these conditions that justify public spending on capital-intensive areas like infrastructure, uncertain high-risk basic research (a typical public good) and innovation, financing of risky small firms (whose real 'quality' as borrowers is unknown to the investor), or investments in technologies that help to internalise negative externalities. MFT calls for specific types of structures for public agencies (insulation from private interests in order to avoid 'governmental failures') and specific evaluation exercises (static cost-benefit analysis). The market failure justification for public intervention and associated toolkit has placed SIBs under increased scrutiny

and, in some cases, criticism (e.g., *Financial Times*, 2012; Lisboa and Latif, 2013; Mussler, 2013), because any role beyond fixing market failures is seen as unjustified.

This paper argues that the market failure 'framework' is too limited to understand the enhanced role that public financial institutions—and SIBs in particular—have had to play due to the increased short-termism and speculation of private finance. The fundamental problem is that the market failure perspective is based on a strong assumption: that markets are 'efficient' by default (Fama, 1970), so that public intervention should only aim to correct 'inefficiencies' in order to bring markets back to the default position. This perspective ignores the role that the State has played from the beginning of capitalism in *shaping* and *creating* markets (Polanyi, 2001 [1944]). Furthermore, the market failure framework does not capture how, in countries that have been successful in achieving 'smart' (innovation-led) growth, the *breadth* of such public investments has been driven by broad 'mission-oriented' justifications,[12] such as those that drove investments by NASA, DARPA and the NIH, all of which have gone beyond simply funding public goods like research. It also ignores the degree to which the increased financialisation of modern capitalism, in which profits are de-linked from investments in the real economy, is not just an 'imperfection' in financial markets but a feature of the system that has required (and still requires) public finance to do what private finance is increasingly unwilling to do; that is, fund (long-run) productive investments. This problem is seen especially, but not only, in the case of investments required for innovation, which is both high-risk and lengthy. As venture capital has become increasingly 'exit-driven' (mainly through IPOs), seeking returns in three years (while innovation takes 15–20 years), it has increasingly been public funds that have had to supply the early-stage patient seed finance for firms and technologies (Block and Keller, 2011; Mazzucato, 2013a; Mazzucato, 2013b).

The paper seeks to create a framework that can explain and help us better understand the rise of public finance. We draw specifically on the insights from alternative literatures, in innovation studies, that can be more useful for describing the process through which public policy actively shapes and creates markets. Key concepts that we mobilise are: *technological trajectories* and *techno-economic paradigm shifts* in evolutionary economics (Dosi, 1982; Perez, 2002); *mission-oriented investments* in science and technology policy research (Mowery, 2010; Foray *et al.*, 2012); *developmental network state* in development economics (Wade, 1990; O'Riain, 2004; Block and Keller, 2011), and the *entrepreneurial state* (Mazzucato, 2013a).

The paper is structured as follows. Section 2 provides an historical overview of the roles that state investment banks play in the economy, through which we identify the four roles cited above: countercyclical, developmental, venture capitalist, and promotion of mission-oriented investments that help to address societal problems. In section 3, we document contemporary evidence of these four roles (with a particular focus on evidence from Brazil's BNDES, the China Development Bank, the European Development Bank, and Germany's KfW), and present the market failure justification attached to each. Section 4 discusses the implications of market failure theory for how SIBs actions are structured and evaluated, and links this 'diagnosis and evaluation toolkit' to key criticism to the activities of SIBs. While such criticisms highlight some important issues, they are primarily the consequence of a limited perspective, and must therefore be reconsidered in order to take into account the empirical evidence and alternative theories and concepts. Section 5 introduces concepts from four literatures that have stemmed from innovation studies (evolutionary economics, science and technology policy research, development economics, and the entrepreneurial state) to show the limitations of MFT and to provide the basis for an alternative framework. This framework has a new set of criteria and measurements that we use to evaluate

[12] The classic example of a governmental mission is putting a man on the moon, which guided policy initiatives that resulted in the development of many revolutionary technologies, later commercialised by private enterprises.

the type of public intervention (via SIBs, for example) that, we argue, has become increasingly necessary in contemporary capitalism. Section 6 summarises and contrasts the mainstream perspective with the alternative conceptualisation, and reflects on the implications of the latter in terms of (a) the mainstream criticisms and (b) the relationship between risks assumed by SIBs and how the 'rewards' of their investments are shared across the economy. The concluding section 7 discusses the policy implications of the alternative framework and proposes avenues for a new research agenda that goes beyond MFT. ■

Financial governance, banking, and financial instability in Brazil

Felipe Rezende

The Global Financial Crisis triggered policy and regulatory responses designed to deal with the collapse of the financial systems of a number of developed countries and the spread of systemic risk in the global financial system and the impact on real economy performance. The regulatory systems of these countries had been considered as 'best practice' and formed the basis for recommendations to developing countries seeking to liberalise and expand their domestic financial markets. Thus, the crisis called into question the 'light touch' regulatory approach practiced in the US and the UK and produced an ad-hoc response to the financial crisis. This response has raised two fundamental issues. Firstly, the regulatory and supervisory framework put in place in advanced nations before the 2007–2008 Global Financial Crisis failed to capture and avoid the build-up of financial fragility in the economy. Secondly, to the extent that the financial structure that emerged in the US financial system in the past 30 years failed to provide support for the capital development of the economy, an alternative design of the financial structure that meets the needs of developing nations needs to be developed.

In this regard, the resilience and stability of Brazil's financial system has received attention as it navigated relatively smoothly through the crisis and the collapse of the shadow banking system. Both policy makers and regulators have pointed to the robustness of Brazil's financial system and its resilience to the global financial crisis by contrasting it with the conditions that existed in the US's financial system prior to the 'subprime' crisis. Brazil's economy has experienced a period of relative economic stability and rapid growth of domestic bank lending in the last 10 years. A striking feature of periods before financial crises is that they validate riskier practices. Periods of growth and tranquillity validate expectations and existing financial structures that change the dynamics of human behaviour, leading to endogenous instability.

This paper investigates the structure of the Brazilian financial system and its regulatory framework andhighlights their recent changes. Its aim is to identify the old and new sources of stability and instability and to provide policies for reforming Brazil's financial architecture to increase systemic stability, as well as the ability to provide funding for development by private financial institutions and the public financial system in providing long-term funding to develop and finance innovation in order to ensure financing of innovative capital projects.

Background

Brazil's financial system has experienced rapid evolutionary dynamic changes as a result of changes in regulations, taxes, market conditions, and policies over the past 15 years following policymakers' objectives of developing the country's capital market. The creation of new sources of financing and funding are at the centre of discussions to promote real capital development in Brazil. Legislative and regulatory measures were introduced to develop the mortgage lending market along the lines of the US housing finance system in order to provide financing of real estate through securitisation. Several proposals have been made in the past 15 years; those that have been adopted included the creation of the *Sistema de Financiamento Imobiliário* (SFI) and structured finance, and new instruments that banks can issue to raise funds. The use of securitisation structures, including the sale of asset pools to capital markets, would free up capital for loans' originators to lend more. There is a consensus in favour of developing the securitisation market in Brazil to foster its capital market and long-term funding. This argument is based on the assumption that traditional banks and the existing financial structure are unable, due to funding constraints, to meet the growing financing needs of the Brazilian economy.

Hence, during the past decade, the Brazilian financial system has experienced significant changes, including greater access to capital markets by issuers of debt securities, changes in the asset and loan portfolio mix of financial institutions, and the rapid expansion of securitisation (structured finance) such as *certificados de recebíveis imobiliários* (CRIs) and *fundos de investimento em direitos creditórios* (FIDC) structures. Regulatory reforms implemented in the late 1990s and during the 2000s have laid the foundation for the development of the securitisation market and made it possible to develop new alternatives for liquidity creation. The development of the Sistema de Financiamento Imobiliário (SFI), established in 1997, would presumably provide the funding necessary for the expansion of the housing market and the corresponding reduction of the housing gap in Brazil. Lending institutions would no longer hold assets on their balance sheets, but would instead sell them to securitisation companies and structured finance vehicles. Traditional lenders would focus on loan origination and remove loans from their books through securitisation structures. New issuers of structured securitisation transactions have evolved and now play a role similar to that of depository institutions, despite being outside the current banking regulatory structure and lacking access to official liquidity facilities.

The number of structured finance deals and securitisation structures has increased sharply. Despite the original intent of regulatory reforms in the context of SFI to develop the mortgage lending market, it was asset-backed securities (ABS) – backed by personal loans, auto loans, receivables' future flows – that took off. Moreover, the performance of the SFI was significantly below initial expectations. The majority of buyers of mortgage-backed securities (MBS) in Brazil are banks, as they are allowed to buy them up to a certain limit in order to meet the real estate lending requirements of *Sistema Financeiro de Habitação* (SFH). Recent initiatives include discussions about incentives to pension funds, mutual funds, and the insurance sector to invest in asset-backed securities and mortgage-backed securities.

Since the creation of receivable investment funds—or *Fundos de Investimento em Direitos Creditórios* (FIDCs)—in 2001, the range of underlying assets backing securitisation deals has broadened, including (but not limited to) consumer loans, auto loans, future flow receivables, and non-performing loan portfolios and originators typically including banks, finance companies, companies (small, medium and large) and governments. On the demand side, fund managers continuously increase their exposure to structured finance instruments to boost returns; in the past decade, the central bank's overnight interest rate has been significantly reduced from 26.5 percent in February 2003 to 7.25 percent in October 2012.

Economists, policy makers and lobby groups favour the development of this market, as this packaging of illiquid asset pools such as home mortgages into securities sold to institutional investors would help to eliminate the existing funding gap in the economy. In addition, it has been suggested that access to capital markets and long-term investors are a possible solution to the dilemma faced by Brazil's increasing financing requirements (such as infrastructure investment and mortgage lending needs) and the limited access to long-term funding in the country. It is argued that banks lack long-term funding instruments and that their financing of long-term assets would impose significant asset liability mismatches on their balance sheets. The strategy adopted with recent regulatory reforms emphasised loan origination growth by lending institutions and the sale of asset pools to securitisation structures (such as receivable investment funds and securitisation companies), thereby reducing banks' balance sheet asset liability mismatches and capital requirements and creating opportunities for regulatory arbitrage. Thus, the tendency towards creating and expanding non-bank liquidity-creating structures is of direct interest in designing financial policies to prevent (or minimise) the growth of endemic financial instability in Brazil.

Furthermore, Brazil's economy experienced a period of relative economic stability and rapid growth of domestic bank lending during the last 10 years. A striking feature of periods before the financial crises is

that they validate riskier practices and lead to reductions in margins of safety, asset quality deterioration, and increasing use of borrowed funds. These issues raise questions about the suitability of the existing regulatory framework and the role of domestic governance of Brazil's financial system in preventing and minimising the speed of transmission of financial fragility in the economic system and its impacts on economic activity.

The paper will map the changes in the global financial landscape after the crisis, but will focus on the domestic transformation of Brazil's financial system towards non-bank liquidity-creating structures and its implications for designing regulatory policy proposals to address them. In particular, building on Minsky's approach, the paper will emphasise the implications of developing alternative sources of liquidity, such as the growth of the asset-backed securities and mortgage-backed securities markets, and the interaction between new liquidity creators and traditional banking institutions for creating opportunities for regulatory arbitrage and the transmission of instability within the economy. The paper's goal is to provide both institutional reform proposals and policy advice that would feed the ongoing policy dialogues and help policy makers and regulators to enrich their *policy toolkits.* ■

Innovative enterprise and patient finance

William Lazonick

A successful economy is one that can achieve equitable and stable economic growth—what I call 'sustainable prosperity'. A major intellectual barrier to understanding how business and government can work together to achieve sustainable prosperity is the brand of economics known as agency theory with its policy prescription of 'maximising shareholder value' (MSV). Legitimised by agency theory's arguments for MSV, corporate boards have authorised massive cash pay-outs to public shareholders in the forms of dividends and buybacks that come at the expense of taxpayers who have invested their money and workers who have invested their effort in the innovation process with the expectation of future returns. The results of MSV-dominance, as my research has shown for the case of the United States, are income inequity and employment instability, both of which threaten the growth of the economy as a whole.

MSV is a theory of value extraction that lacks a theory of value creation. The purpose of the business enterprise is to produce competitive goods and services: that is, products that buyers want or need at prices that they are willing or able to pay. A business that generates higher-quality, lower-cost products over a sustained period of time is an 'innovative enterprise' that creates more value through its output than the value of the inputs that it consumes. However, it is possible for certain economic actors—let's call them 'financial interests'—to assert control over the resources and revenues of the innovative enterprise to extract value from it that far exceeds their contributions to the process that creates value. Members of these financial interests, including corporate CEOs, investment bankers and hedge-fund activists, can be found among in the top 0.1 percent of the income distribution.

Here is how a value-creating enterprise works. The innovative enterprise *develops* productive resources through collective and cumulative learning processes that, in and of themselves, burden the company with *high fixed costs* and expose it to the possibility of losses. If, however, through organisational learning, these high fixed costs enable the business to generate products that are of *higher quality* than those of its competitors, it can potentially gain a large market share that, through economies of scale, transforms these high fixed costs into *low unit costs*. By generating a product that is not only higher quality but also lower cost than those of competitors, potential losses can become actual profits; in other words, competitive disadvantage can be transformed into competitive advantage.

The essence of this innovation process is collective and cumulative learning, the success of which is inherently uncertain. If we knew how to innovate when commencing this collective and cumulative learning process, we would not be engaged in innovation. Given uncertainty, investments in organisational learning must be made without any guarantee of returns. The innovative enterprise faces three types of uncertainty: technological, market, and competitive. Technological uncertainty exists because the firm may be incapable of developing the higher-quality products envisaged in its innovative investment strategy. Market uncertainty exists because even if the firm is successful in its product development effort, future reductions in product prices and increases in factor prices that are beyond its control may lower the returns that can be generated by these investments. Finally, even if a firm can overcome technological and market uncertainty, it still faces competitive uncertainty: that is, the possibility that a competitor will have invested in a strategy that generates an even higher quality, lower-cost product, which may make the firm unable to access a large enough extent of the market for its products to transform the high fixed costs of its innovative investment strategy into low unit costs, and hence profits.

Nevertheless, if a firm is to have the opportunity to profit and grow through innovation, it must invest in the face of uncertainty. When a business enterprise is successful at overcoming technological, market, and competitive

uncertainty, it can share these gains as returns to those economic actors who risked their money and effort in contributing to the innovation process. So who are these economic actors who invest in the innovation process without guaranteed returns?

MSV assumes that it is only shareholders who invest in the business enterprise without guaranteed returns. All other economic actors, it is argued, receive a guaranteed market-determined price for their productive contributions. However, agency theory does not have a theory of the value-creating enterprise, and consequently makes fundamentally flawed assumptions about who bears risks in, and who should get rewards from, the innovation process. In practice, the application of MSV's policy prescriptions for distributing corporate cash to shareholders results in value extraction by those who have had little if anything to do with value creation, resulting in income inequity and employment instability.

Taxpayers often invest in the innovation process without guaranteed returns. Many of the critical productive inputs related to physical infrastructure and human capital that the business enterprise utilises are made available through government spending, often in the form of public goods financed by tax revenues and government debt. Even the largest business enterprises rely on government investments in physical and human resources to generate competitive products. In addition, business enterprises often receive government subsidies and procurement contracts that assist them in the development and utilisation of productive resources.

Tax systems can be structured to ensure that taxpayers reap the returns on past investments in innovation if and when they are successful. Some or all of these tax revenues can be used by government agencies to fund the next round of innovation. However, MSV ideology claims that only shareholders take risks and hence only shareholders have claims on profits. Financial interests, including business executives, seek lower tax rates to incentivise financial wealth-holders, including public shareholders, who supposedly take all the risk of investing in innovation. By securing lower tax rates, financial interests can extract value that taxpayers' investments helped to create.

Workers often invest in the innovation process without guaranteed returns. The most critical investments that a business makes are in integrated skill bases that can engage in collective and cumulative learning, and thereby generate the high-quality products that are essential for competitive advantage. Investments in organisational learning in the past can enable the company that develops and utilizes productive resources to generate profits in the present.

As members of integrated skill bases, workers regularly make productive contributions to the companies that employ them through the expenditure of effort beyond those levels required to lay claim to their current pay, but without guaranteed returns. Any employer who seeks to generate higher-quality, lower-cost products knows the profound productivity difference between employees who just 'punch the clock' to get their daily pay and those who engage in organisational learning to make productive contributions through which they can build their careers and thereby reap future returns in work and in retirement. However, these careers and the returns that they can generate are not guaranteed. If these workers are laid off, or their wages and benefits are cut, financial interests can extract value that these workers helped to create.

As risk bearers, therefore, taxpayers whose money supports business enterprises and workers whose efforts generate productivity improvements have claims on corporate profits if and when they occur. MSV ignores the risk-reward relation for these two types of economic actors in the operation and performance

of business corporations. Instead, it erroneously assumes that only shareholders are 'residual claimants' who have the right to determine how a company's profits are distributed.

The irony of MSV is that the public shareholders whom agency theory holds up as the only risk-bearers in the economy typically never invest in the value-creating capabilities of the companies in which they hold shares. Rather, they invest in shares that are outstanding on the stock market in the hope that the shares will rise in price. Following the directives of MSV, a prime way in which corporate executives fuel this hope is by disgorging the so-called 'free' cash-flow to shareholders. In the United States, as the prime example, between 2001 and 2013, companies in the S&P 500 Index (which account for more than 70 percent of the capitalisation of companies in the United States) spent about $3.6 trillion buying back their own stock, the prime purpose of which was to manipulate their companies' stock prices. That was in addition to approximately $2.4 trillion spent on dividends. Together, buybacks and dividends absorbed over 90 percent of corporate earnings, leaving little to be allocated to new investment in productive capabilities or higher standards of living for corporate employees.

If sustainable prosperity is what we want, we must rid ourselves of MSV as the dominant ideology of corporate governance. To go beyond shareholder value, we need a theory of innovative enterprise in which patient finance redounds to the benefit of taxpayers and workers who contribute their money and effort to the innovation process. ■

Risks and rewards in innovation: Symbiotic vs. parasitic innovation eco-systems

Mariana Mazzucato

In order for an 'innovation union' to emerge, systems of innovation are needed so that new knowledge and innovation can be diffused throughout an economy. *Systems* and eco-systems of innovation (sectoral, regional, and national) require the presence of dynamic links between the different actors and institutions (firms, financial institutions, research/education, public sector funds, intermediary institutions) as well as horizontal links *within* organisations and institutions (Freeman, 1995).

However, in the debate about the different actors and institutions required for innovation-led growth, insufficient attention has been given to the exact role that each actor in the system plays along the bumpy and complex uncertain *risk landscape* (Mazzucato, 2013). Considering these roles more explicitly allows us to reflect on the degree to which the division of labour in risk-taking is matched, or not, by a division of rewards, so that the funds required for the investments in the next round are replenished. This consideration also helps us to better understand whether the eco-system is creating the right incentives in the long-run. Is it the case that because some actors are putting in a lot without being sufficiently recognised, other actors have been able to put in less, yet capture a rising share of the rewards?

This paper argues that a key problem is that the underlying framework which justifies public investments does not explicitly consider risk-taking in the 'entrepreneurial' sense. Talk of the public sector simply de-risking or facilitating business sector innovation misses the key way in which public funds have actively shaped and created new markets rather than just fixed existing ones (Mazzucato, 2013). Market failure theory discusses risk in terms of the wedge between private and social returns, which may arise from the public goods or different types of positive and negative externalities (Laffont, 2008). This is the classical argument that justifies state spending on basic research (Nelson, 1959; Arrow, 1962). However, the *mission-oriented* investments that resulted in most of the 'general-purpose technologies' cannot be understood within the market failure perspective. Missions—from putting a man on the moon to tackling climate change—involve investments along the entire innovation chain, not only in classical public good areas. All of the technologies that make the iPhone smart (the Internet, GPS, touch-screen display, and SIRI) trace their funding to public investments made in institutions like DARPA or the CIA that are guided by different types of missions (Block and Keller, 2013; Mazzucato, 2013). The same is true for the public funding from the National Institutes of Health that lies behind most of the revolutionary new drugs (new molecular entities) of the last decade. It is such mission-oriented *direct* investments that have created new technological opportunities, which are the key drivers affecting business investment. It is for this reason that we tend to see a higher business spend on R&D in countries that have a higher public spend on R&D (Hughes and Martin, 2013; Mazzucato and Perez, 2014).

Mission-oriented public investments are not driven by the private/social 'wedge' but by direct objectives of government (Mowery, 2010; Foray et al., 2012). They involve not only horizontal investments in research and skills, and investments in 'public goods', but also direct high-risk investments in particular companies and technologies. For example, the US Small Business Innovation Research Programme (SBIR) has been key in providing the kind of patient, long-term, committed finance to companies like Compaq and Intel that more risk-averse and increasingly short-termist private venture capitalists did not. Another example is the SBIC grant provided to Apple in its early days. Today, the clean-technology sector is being formed with massive funding from mission-oriented state investment banks around the world (Mazzucato and Penna, 2014). Such investments take the form of direct grants or loans. The latter includes guaranteed loans like

the ones given recently to both Tesla Motors and Solyndra. One of these succeeded and the other failed, with the taxpayer picking up the bill for the latter.

Indeed, failure is inevitable in the innovation process, at all stages along the uncertain innovation curve. Most R&D projects fail, and downstream many innovative firms fail. As any venture capital (VC) investor will admit, most VC investments fail. The key difference is that through equity stakes in the winning investments (such as Genentech for Kleiner Perkins), VC can more than cover its losses and raise the funds needed for the next round of investment. It is this type of 'revolving fund' that is missing in government today, whereby the risk for such direct investments is socialised while the profits are privatised. Does the tax system, as currently devised (even when taxes are not avoided) provide the type of revolving fund needed to ensure publicly funded innovation investments can be sustained over time, given the high failure rates that must also be covered? Are methods of more direct rewards for tax payers required, whether through retention of some equity, a 'golden share' of the IPR, or the use of income contingent loans? Under what circumstances would this/not be justified? And where does this already happen around the world?

While these questions may be less relevant for those investments in general public goods, like basic research or infrastructure, where we assume the benefit comes back through different types of spillovers and multipliers, the paper will analyse specific cases in which different types of direct public investments were made on specific firms or specific technologies, and ask whether, how and to what extent public and private rewards were generated. The paper will build on Lazonick and Mazzucato (2013) and argue that because we do not have an economic framework that admits these active risk-taking entrepreneurial investments by government, we have allowed some actors in the innovation eco-system to present themselves as the key risk-takers and innovators, and in so doing reaped a much greater share of the returns from innovation than the risk that was actually taken. This has happened, for example, through lobbying for lower taxes (for example, the National Venture Capital Association successfully lobbied for a 50 percent cut in capital gains in the late 1970s) and through spending a large share of returns on boosting stock prices (hence stock options and executive pay) rather than funding R&D (Lazonick and Mazzucato, 2013).

The paper will develop a new narrative of where innovation comes from, which admits the risk-taking role that government has played and must play in the future. This ultimately requires a different type of risk–reward nexus that socialises both risks and rewards, fuelling a more sustainable innovation cycle, and a less unequal growth process. ■

Is public venture capital an oxymoron ... or merely moronic?

Gordon Murray

Government policy often has a very short shelf life. Prescriptions change repeatedly and obsolescence is readily fuelled by new ideologies, different priorities, disappointing results or the need for a new governments to appear 'different'. In practice, policy making in its volatility and its desire for constant change is clearly part of the international fashion industry: a sort of Westminster as Milan.

In this context, therefore, it is surprising just how *continuously* popular venture capital (VC)[13] has been regarded by policy makers across the world. Any policy discussion or review of the twin policy 'givens' of the desirability of greater innovation and enterprise activity will almost invariably contain a section that dwells on the critical importance of a viable and flourishing VC industry to wider trade and industry goals. As an agreed vehicle for the promotion of successful, new economic and innovative activity, venture capital stands almost unchallenged across both the developed and developing worlds. This positive consensus embraces such super-national bodies as the World Bank, the OECD and the European Union.

It is ironic, therefore, that while the public polity sees venture capital as a critical component in a modern and well-functioning enterprise/innovation ecosystem, VC managers (aka 'general partners' or GPs) and their investors (aka 'limited partners' or LPs) have increasingly moved their attention and financial assets away from the 'classic' early-stage risk capital to the more profitable areas of private equity and other later-stage activities. The supply of venture capital has been highly cyclical and the period since the international technology market crash of 2000 has seen a long-run flight from VC as an asset class across the board. The reason is not hard to discover. With all too few exceptions, the dismal returns to institutional investors from a VC exposure have not warranted a continued commitment.

This sharp contrast between government enthusiasm and investor indifference for VC has created a major quandary for policy makers. Heavily influenced by a Silicon Valley model of 'cutting-edge' enterprise and innovation, governments see the presence of a VC facility to complement an array of both public and private support and investment in new knowledge industries as being critical for continued economic progress. If the market will not address such opportunities, policy makers feel obligated to create alternative public sources of VC or risk capital. Arguments for intervention frequently hinge on a discussion of market failure in the provision of finance for new and young firms. The so-called *financial escalator* is seen to be imperfect in its operation. The term—*equity gap*—was coined by Macmillan in 1931 and is repeatedly used to describe the circumstances in which attractive and high-potential businesses remained starved of appropriate sources of finance for growth.

Essentially, policy makers base the logic of their interventions on the imperfect working of the market for entrepreneurial finance. Supportive evidence is produced in the form of arguments to reduce information asymmetries and adverse selection (particularly in fields of new technologies and new knowledge) and to support investor knowledge in small but very important emerging industry sectors characterised by 'thin markets' for finance and other key resources, both on the supply and demands sides. Such arguments as to the ineffectiveness of specialist markets without some public nurturing are necessary. In the absence of such a rationale, the conclusion might be that the lack of early-stage VC finance is not a market failure but an illustration of a market that is actually working. Namely, poor investments in speculative and unproven

[13] We use the term venture capital in its classic sense of being the provision of risk capital (that is, equity) for the genesis and rapid growth of high-potential but high-risk young enterprises, particularly in areas of new knowledge and new technology.

technologies do not justify investors' continued interest and commitment given the opportunity cost of their capital.

The market failure arguments have been widely accepted by government. Academics are more ambivalent and have frequently qualified their support for venture capital's impact or the 'cost-benefit' validity of government direct intervention in the VC market as either a player or investor. The unambiguous support from government can be seen in the range and diversity of government-initiated and -supported VC programmes, both at country and regional levels. For governments in advanced market economies, increased support over the last decade is partly a direct consequence of the reduction in private investors' interest in continuing to finance early-stage technology or other innovative investment activities. This substitution effect can clearly be seen, for example, in the European Union over the period since the year 2000. The support for EC-supported programmes that increase the supply of VC is an outcome of policy concerns as to the comparatively small number of high-tech entrepreneurial, growth-oriented firms coming out of member states. The concerns are explicitly articulated in the Europe 2020 agenda and continue unchanged from earlier Competitiveness and Innovation Framework Programme (2007–2013). Almost-identical policy statements—both in analysis and prescription—can be seen repeatedly in the national reviews of the state of enterprise and innovation across the EU Member States.

In *realpolitik*, the question of whether governments should intervene in the market for equity or risk capital has already been answered. Namely, governments of all stripes see VC as important and have consequently supported a wide range and scale of equity investment programmes with public funds. (It should be remembered that economic policy is ultimately a political process and is not necessary fully amenable to empirical or quantitative evaluation.) Thus, a more salient question becomes: *By what means could governments most effectively intervene in the market process?* A subordinate question then becomes: *How do we best evaluate governments' efforts to support early-stage VC activity?*

Life often confounds neat answers, and policy is no different. What works and why in the area of entrepreneurial finance defies excessive simplification. However, ideology again often intervenes and the debate becomes a skirmish in the discussion between advocates of big or small government. 'What are the preconditions for successful VC activity?' is not a trivial question. We know that a majority of VC funds fail to provide an attractive risk-adjusted return to their investors. We also know that market and technology cycles can also have profound impacts on the success or otherwise of a (fixed-term) VC fund. Timing of market entry and exit produced huge variance in investment performance during the technology boom of the late 1990s and often supplanted the effects of management experience, scale and, on occasion, industry sector.

We have seen a pronounced *learning curve* for the best management teams (GPs) as the industry has matured over time with a relatively small number of VC firms owning the lion's share of investment performance and, as a consequence, the funds under management.[14] Independent VC firms have had to learn their craft often over several fund cycles. Similarly, Corporate Venture Capital investment managers have also had to learn how to undertake complementary VC investment within a corporate context. Accordingly, it is not unreasonable to expect that public VC supporters will also need to accumulate experience before the final forms and practices for successful investment activity are established … or at least more readily exampled.

[14] The most successful VC general partnerships cap the size of their funds and there is a long waiting list of investors seeking to be admitted to their new funds.

Perhaps the single biggest practical question is whether governments should own and operate the public VC activity—including the funds for investment and the direct employment of the management teams—in order to allocate such public monies. There is strong support for wholly-owned, public VC activity in the social democracies of northern Europe, including Germany and the Nordic countries. In contrast, the USA, the UK and Israel have been among the strongest advocates for public VC programmes that directly contract the professional skills of independent VC management teams to run public investment funds (often in addition to private investment partners in the same fund). This latter model of (public) 'equity enhancement' derives from a model most clearly seen in the early exemplars of the USA (SBIC programme) and the Israel (Yozma programme). Latterly, this model has evolved into a wide number of national, publicly supported VC programmes including the Australian IIF programme and the UK's Enterprise Capital Funds.

Those observers and participants that support government acting as closely as possible to an independent VC model of practice often fail to identify or articulate the disparity of interests between the two modes of operation. In a private and independent VC fund, both the investors (LPs) and the investment managers (GPs) will gain most advantage from the generation of large and rapid capital gains via the investment in and divestment from attractive portfolio companies. Complex rewards systems in VC may generate some agency costs but essentially everyone is engaged to create as large a capital gain as possible from the investment activity. For both forms of government VC activity, while there is still a keen desire for a strong investment performance, given rewards systems often borrowed from private VC practitioners, a wide range of other goals and constraints materially affect the direction, execution and performance of the government fund. Above all, government ideally wishes its intervention to be a temporary stimulus to the market for entrepreneurial finance.

Without any apparent sign of irony, several programmes have implied that they wish to 'demonstrate' to the market that early-stage investing can be attractive for investors. Here the government sees itself as a *catalyst* encouraging the promotion of private investment activity that will ultimately replace public involvement. The trouble with such a demonstration role is that it assumes that the interests of government as an investor are comparable to the interests of private investors and managers. Belief in such a congruence of interests can be dangerously fanciful. All too often, such a naïve assumption is a direct consequence of a government that has little understanding of the very industry and activity that it is seeking to demonstrate and encourage in others.

Government encourages and engages in early-stage VC for several reasons. Employment, innovation, R&D commercialisation, new knowledge creation, small-business support and regional development can each feature very prominently as desired outcomes from the support of VC activity by government. Essentially, government is seeking to build new infrastructure or entrepreneurial ecosystems in a world of rapidly changing knowledge assets. None of these worthy goals are, or should be, of direct operational interest to the managers or investors in a private VC fund. Thus, it is highly improbable to assume that an independent and a government VC fund should act in identical ways given the disparity of their short- and longer-term interests.

That public VC activity can learn from independent VC activity is undeniable. Much learning of value can be made from analysing the mistakes of the VC industry in its approximately 25 years of history, as well as its evident successes. But learning requires access to information and analyses based on practice and performance. It is in this contentious area of information access and sharing that there is singular room for improvement. VC as an industry is highly secretive and published performance data must be treated with caution. The ability to verify gross and net investment flows in both public and private funds is weak and

too many VC management teams have a real interest in seeing that information remains very imperfect in its content and distribution. While such privacy is understandable in a private investment activity, it is much less tolerable when funds from the public exchequer underpin the activity of government or hybrid VC programmes. Evaluations and audits of public VC programmes are often not made public or are of dubious technical quality. The latter is particularly evident in 'in-house' programme evaluations.

There is a real need for best practice to be shared across public VC programmes. (Here, the OECD should be commended for its initiatives on information analysis and sharing.) We see a major pattern of emerging economies interested in establishing a national VC industry as a part of programmes of transition and catch-up with the industrialised countries of the West. Such programmes can be seen in such diverse countries as China, Poland, Columbia and South Africa. The managers of these programmes can learn from existing experience across the USA, Europe and beyond. While publicly supported VC is not without its flaws, recent evaluations have showed that the better designed public VC programmes have a valuable and complementary role to independent market investors. Both free markets and informed governments can extract material advantage from effective public/private partnerships in the provision of early-stage venture capital. ■

Public and private risks/rewards and the move to capitalise R&D

Alan Shipman

The reclassification of R&D in national accounts, from expense to investment, is now well advanced, with satellite R&D accounts available in Europe as well as the US. R&D spending is now treated as investment in an 'intangible' asset and regarded in the same way as 'tangible' investment (with an adjustment for software expenditure to avoid double-counting). This parallels a change in company accounting (driven by International Financial Reporting Standards and adopted by US GAAP) under which more applied research and later-stage development is treated as capital investment rather than expense. Capitalisation is especially favourable for the level and stability of earnings of relatively new companies making heavy and 'lumpy' expenditures on R&D, which can lower their external financing costs by accurately signalling innovation commitment to investors.

Under the new national accounting approach, the treatment of public R&D investment appears relatively favourable. Public research is assumed to be focused on basic research in knowledge with general applications and made freely available. In contrast, private research is assumed to be focused on applied research and product development, resulting in intellectual property that loses its value relatively quickly (due to copying or obsolescence) and/or requires increasingly heavy follow-up expenditure to maintain its value.

At the extreme, public R&D investment is assumed to cumulate without any depreciation, whereas the stock of private R&D investment is calculated by adding up annual investment *minus* the annual depreciation in the existing R&D stock. In practice, public and private R&D are increasingly being combined, with rising incentives for public research institutions (and individuals) to exploit their intellectual property privately. This may have the uncomfortable result—from a national accounting perspective—of shifting R&D from a sphere in which it is aggregated without depreciation to one in which depreciation and amortisation are applied, thereby slowing the growth of the stock. In effect, more of this newly-measured intangible capital is subjected to 'capture' by individual firms, which must then incur additional expense in protecting it against obsolescence or external diffusion. This may be offset by the firm's ability to make additional revenue by keeping its intellectual property protected and valued; however, this would constitute rent rather than profit, so it is not clear that such protection counters obsolescence and preserves the social value of the R&D.

Additional caution over the results of capitalising R&D (at the macro level) may be in order, because this will now be done using variants of the 'perpetual inventory method' (PIM), which has long been applied to measurement of the 'tangible' capital stock. The PIM adds up annual investment, adjusting for annual scrapping and depreciation of the remaining capital stock. There have been several well-known criticisms of this method, including the following:

- Equipment lifetimes and depreciation rates are difficult to determine, and results tend to be sensitive to the assumptions made.
- Annual rates of scrapping are difficult to determine, and some capital equipment is retired through obsolescence before it wears out, while some continues in use beyond its assumed technical lifespan.

- Price indices for different types of capital, to calculate new investment and depreciation in real terms, are not always available, especially when relevant items are not initially traded or subsequently retraded.

- Summing the investment of successive periods assumes that this is always put to efficient use, whereas there is empirical evidence that effective capacity does not rise in proportion to investment, implying that some investment is unproductive.

- Depreciation may, at the macroeconomic level, represent a redistribution of income (from capital to labour) rather than a loss of income, so cumulative gross investment (disregarding depreciation) may be the appropriate measure of the capital stock.

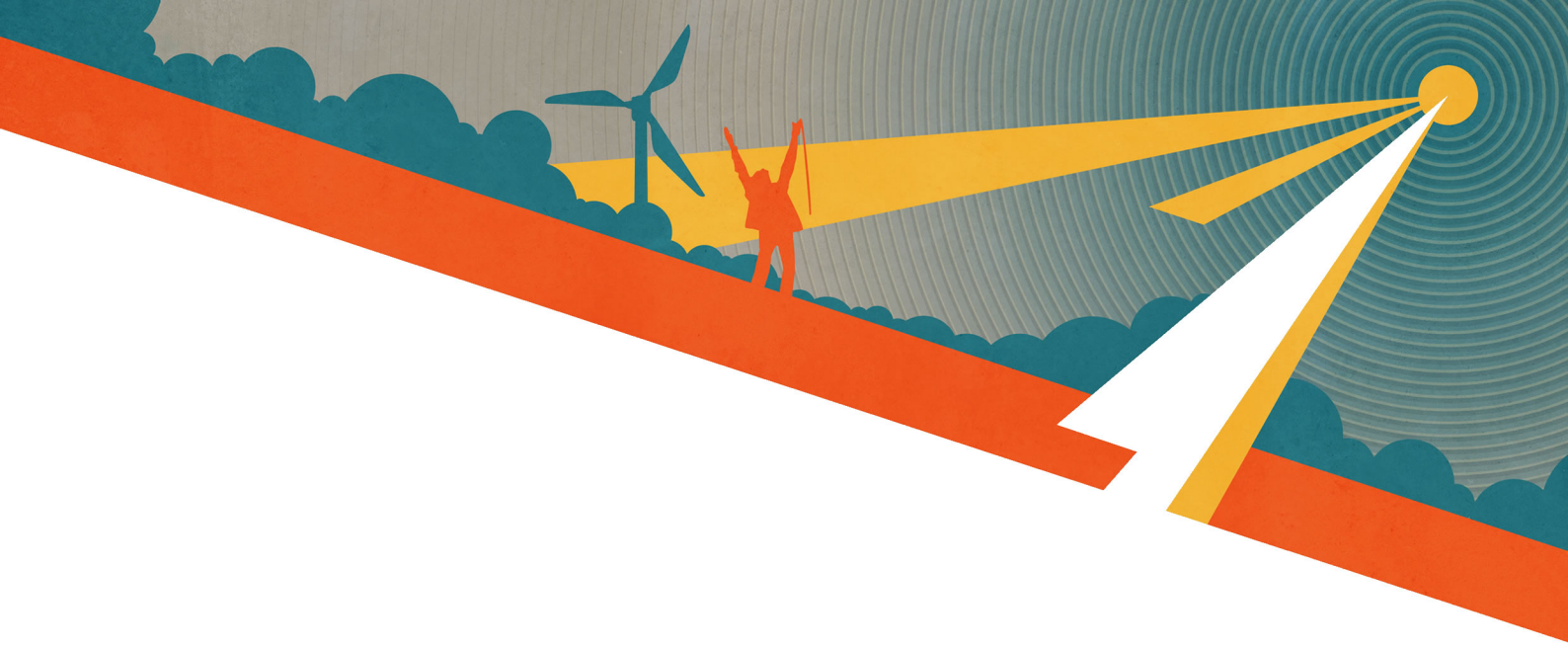
This last point echoes a much older critique, that capital must be converted to a money value before it is aggregated, and that this money valuation will depend on the distribution of income between wages and profit. If accepted, the 'redistribution' argument implies that the stock of private R&D (and other intangible capital) should be calculated by summing gross R&D investment, without adjustment for depreciation and obsolescence—overriding the public/private distinction noted above by effectively treating all R&D as public. Another interpretation of this result is that the contribution of investment (including R&D) to national income and output arises from the flow of the investment expenditure, regardless of its effect on the capital stock. Indeed, there may be only a very loose association between an economy's capital stock and its annual flow of national income, because changes in the distribution of that income affect the value of the stock. The resultant volatility of the aggregate capital:output ratio (and its variability across countries) appears to be confirmed as long series of capital stock data become available, enabling comparison with existing long series of real GDP.

Since Schumpeter first drew attention to it, the process of 'creative destruction' has become more sensitively divided between the private and public sectors. Creation of new value through innovation tends to inflict destruction (that is, unanticipatedly fast depreciation of existing capital stock) on non-innovating firms within the same sector and/or on other sectors. Shareholders (and bondholders) lose to the extent that they are exposed to investments that decline in value due to the innovation. These losses may be offset by gains elsewhere, if share/bond portfolios are sufficiently diversified to include enterprises whose stock is upwardly revalued by the same innovation. However, given that institutional shareholding tends to be concentrated on mature public corporations, while innovation tends to occur in newer firms that have not yet gone public, there may be a tendency for 'mainstream' equity investors to be more exposed to innovative value destruction than value creation. The state-financed rescue of large banks and non-financial corporations after 2008 confirms that shareholders cannot (for social and political reasons) be left to absorb large balance-sheet losses, when they are pension and insurance funds representing ordinary households rather than trusts run by a few wealthy individuals. Schumpeter's (1942) prediction of an ongoing socialisation of investment risk has been largely fulfilled, through the institutionalisation and 'democratisation' of the investment.

The move towards capitalising R&D is part of a general trend—which started with corporate accounting and is now being followed by national accounting—to regard the balance sheet as a fundamental financial statement, underlying the flows recorded on the income statement. This trend is understandable, given the increasing importance (even in economies with large manufacturing sectors) of financial institutions and financialised corporations whose income statements make little sense without reference to their balance sheets. Arguably, fuller reporting of (and attention to) national balance sheets would have made the build-

up to the 2007/08 global financial crisis much more visible, beyond the small group of macro-economists who were already concerned about the stock-flow balance.

However, increased emphasis on the balance sheet is problematic for macroeconomics, given the inexact nature of current methods for capitalising investment, calculating depreciation, and incorporating the effects of asset appreciation in financial (and housing) markets. There are undoubted gains from taking account of national liabilities, of the private and public sectors, more fully than was done before 2008. However, reasonable assessment of those liabilities requires an equally clear picture of national assets. This is hard to achieve while there is a lack of clarity about what is added to the 'capital stock' by investment, and what (if anything) is taken away by depreciation and obsolescence at the whole-economy level. The inclusion of R&D as investment in the system of national accounts may eventually clarify this picture. However, the history of attempts to measure the 'tangible' capital stock should instil caution over what the capitalisation of 'intangibles' will reveal about national wealth, and what longer-term impact it will have on levels and growth rates of national income. ■



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