

Agenda

Advancing economics in business

UK productivity and the diffusion machine

In the UK—and several other major economies—productivity growth has fallen below its long-term trend. One likely culprit is an increasing gap between the most productive firms and the rest. Patrick Nolan, Principal Advisor, New Zealand Productivity Commission, discusses whether the problem is a slowing of the pace at which innovation spreads throughout the economy or, as the OECD puts it, a ‘breakdown of the diffusion machine’. He also asks how the diffusion of innovation might be encouraged

In a 2015 paper by the UK Treasury, George Osborne (Chancellor of the Exchequer) and Sajid Javid (Secretary of State for Business, Innovation and Skills) described productivity as no less than ‘the challenge of our time’.¹ But why is lifting productivity in the UK so important?

Start with a national accounting framework. In this framework labour productivity is based on the output produced from each hour of work. Increasing labour productivity—along with increased hours in work—can lead to more output per person. More output per person—along with higher world prices for what is produced—leads to higher per capita incomes. And higher per capita incomes allow a country to enjoy better living standards, including by providing more resources for public services.

Yet labour productivity in the UK (measured as output per hour over the whole economy) has been weak for several years. In 2014 the UK’s productivity level was little higher than it was in 2007. This stagnation is unusual. The data on output per hour begins in 1971 and, in the 36 years to 2007, the level of productivity fell just three times (in 1974, 1984 and 1989).² It fell the same number of times from 2008 to 2014 (in 2008, 2009 and 2012)—meaning that, while productivity grew at an average rate of 2.3% between 1971 and 2007, between 2008 and 2014 the average annual rate was little over zero (0.02%). If the growth rate had remained at the earlier figure then productivity in 2014 would have been 17% higher.

The UK is not alone in experiencing declining productivity growth. Indeed, based on OECD data on GDP per hour worked, since 2008 the average labour productivity growth across the G7 has fallen by close to two-thirds, from 2.3% from 1970 to 2007 to 0.8% from 2008 to 2014.³ However, while not alone in experiencing a decline, the growth in productivity in the UK over these later years was lower than in any other G7 country.

A new normal, or a temporary blip?

There has been debate about whether the productivity slowdown is a temporary blip or a sign of things to come. As the UK Institute for Public Policy Research (IPPR) has noted, there are three possibilities.⁴ The most optimistic view is that the fall in productivity growth is cyclical (reflecting the recession) and that there remains scope for significant catch-up. If correct, the UK could expect relatively strong productivity growth and the level of productivity could potentially return to its pre-crash trend.

The most pessimistic view is that there has not only been a permanent loss in the level of productivity, but productivity growth has also taken a permanent hit. The result would be that both the growth and level of productivity could be expected to remain below their pre-crisis trends. A middle view is that, although the growth in productivity could return to its pre-crash rate, there has been a permanent one-off loss. If this is the case then even with an improvement in productivity growth the level of productivity will remain below its pre-crisis trend.

Sorting out these different views is no simple task. One challenge relates to measurement. Productivity measurement is not just an academic exercise, as, the IPPR proposes, around 40% of the fall in the UK’s productivity can be attributed to the professional services, finance and insurance, and information and telecommunications sectors, which are all sectors in which it is relatively difficult to measure output. Further, as former Bank of England deputy governor, Charles Bean, noted, measurement challenges also make estimates of spare capacity imprecise.⁵ This is important, as the strength of different views depends on the degree to which there is spare capacity in the UK economy. The lower the level of spare capacity, the more likely it is that the productivity loss is permanent.

These views can also be seen in the light of broader global debates. In one camp, Professor Robert Gordon, of Northwestern University, has argued that the productivity slowdown is permanent. His position is that the innovations that took place in the first half of the 20th century, such as electrification and the internal combustion engine, are more significant than ICT or any other recent innovations.⁶ A contrasting position comes from technological optimists. They claim that the ICT revolution is unfinished and the underlying rate of technological progress has not slowed. In any case, they note that there is still scope for countries and firms to lift their performance to the technological frontier, irrespective of how fast this frontier is growing.⁷

Recent OECD research appears to provide grounds for backing the technological optimists.⁸ This research shows that the main source of the productivity slowdown is not a slowing of innovation by the most globally advanced firms, but rather a slowing of the pace at which innovation spreads throughout the economy. The OECD refers to this as 'a breakdown of the diffusion machine'.

Indeed, the OECD notes that, in the 21st century, productivity growth among the most globally productive firms has been strong. But the gap between these frontier firms and the rest has widened. In the manufacturing sector, labour productivity at the global frontier increased at an average annual rate of 3.5% over the 2000s compared to 0.5% for non-frontier firms. In the services sector, the gap between the frontier and the rest was larger, with productivity of the frontier firms growing at 5% and others at -0.1%.⁹

Encouraging innovation

A question that this raises for policymakers is how to encourage the diffusion of knowledge and technologies among all firms. One candidate must be to improve the effectiveness of government actions to support innovation. These interventions need to be thought out carefully. There has to be a strong case for them, and monitoring and evaluation are essential. There is a need to better understand not only who receives government assistance but also what difference this makes to the rate of innovation and productivity growth. The innovation system should encourage the diffusion of good practice, not protect incumbents and hold back reallocation.

Part of the puzzle may also reflect the returns to innovation. Innovation is often expected to help businesses generate more output from the same resources (time, money and people) or, alternatively, the same output with fewer inputs. Product innovation can also bring additional value to customers, which can in turn be good for the innovating business. Yet innovation can be a costly exercise, potentially requiring investments in R&D, retraining employees, and the promotion of new or improved products to customers. By definition, innovation also exposes businesses to the risk of failure. New products may fail to catch on, or process changes could disrupt systems that were previously working efficiently. And even where an innovation is a success, rivals may copy it and compete away the benefits.

Knowledge-based capital is also likely to be important. This capital is a critical, if often overlooked, factor. Making the most of innovations requires complementary investment in knowledge-based capital, such as improved management and production techniques, and R&D that helps firms to absorb new technologies. Managerial practices are one part of what the OECD calls 'organisational capital'.¹⁰ This includes the allocation of decision rights, the design of incentive systems, and supplier and customer networks. This organisational capital often plays a complementary role to physical capital.

The importance of organisational capital can be illustrated in the case of ICT, which has been shown to make a strong contribution to labour productivity growth yet often requires accompanying investments in human capital and business process reorganisation. In other words, the benefits from spending on new technology are fully realised only when firms move beyond simply 'computerising' or 'web-enabling' existing processes. They also need to adapt their business practices and train their workers.

The efficiency of resource allocation and global connectedness also seem to matter. On the first, as Ben Broadbent of the Bank of England has noted, it takes time for unproductive sectors and firms to shed labour and capital, and for fast-growing and new firms to mop up these resources.¹¹ There is concern that the UK economy has been poor at reallocation, with the global financial crisis seeing an increase in the number of 'zombie firms' making losses but not being shut down. It is important not to impede the firm turnover process, particularly as new firms provide an important source of competitive pressure and can raise productivity in the medium term.

Being open to the world can also help to diffuse good practice. Global markets provide important opportunities for domestic firms. This goes beyond the traditional 'make, pack and export' story to also include collaborating in global value chains—where production activities are spread across countries. Global value chains are becoming an increasingly important feature of international trade, and this is where the transfer of new technologies now often occurs. This global dimension is also an important feature of labour markets. Done right, migration can bring important connections and help to increase labour market density, increasing competition in the labour market and firms' access to the skills they need.

But it is also important to invest in improving domestic workers' skills. Workers' skills need to keep pace with changes in demand due to new technologies (Goldin and Katz have referred to this as the 'race between education and technology'¹²). This is an area where the UK could potentially make some gains—with the OECD's PISA rankings for the performance of 15-year-olds indicating that the country could do better in achieving education outcomes for maths, reading and science.¹³ This points to the importance of public sector productivity, as this sector not only directly represents around 20% of the economy but also underpins productivity growth throughout the private sector.¹⁴

Concluding remarks

The UK government has recognised the role that improved productivity performance can play in driving economic growth and higher living standards. Indeed, this year's summer Budget was accompanied by a 'productivity plan' with recommendations in 15 areas. Not all of these areas are proximate to the outcomes of improved growth and living standards, but one area in particular, what the government called 'high quality science and innovation, spreading fast', highlights the importance of improving the diffusion of knowledge and technologies among firms.

Looking forward, this challenge of improving diffusion and, in turn, lifting productivity is only going to become more important. The changing demographic outlook will not only affect productivity through changing the composition of the workforce and environment for savings, but will also make lifting productivity more important. With a decreasing share of the population being of working age, it will be more difficult to increase national incomes through increasing labour force participation rates or hours of work. Success or failure will increasingly depend on productivity growth. And, as the OECD has shown, this productivity growth requires a well-functioning diffusion machine.

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¹ HM Treasury (2015), 'Fixing the foundations: creating a more prosperous nation', Cm 9098, July.

² Office for National Statistics (2015), 'LPROD01: Labour Productivity, Q2 2015: Table 1'.

³ OECD (2015), 'Level of GDP per capita and productivity (GDP per hour worked, constant prices)', OECD.Stat.

⁴ Dolphin, T. and Hatfield, I. (2015), 'The missing pieces: solving Britain's productivity puzzle', IPPR, August.

⁵ Bean, C. (2010), 'Measuring recession and recovery – an economic perspective', Royal Statistical Society (RSS) Statistics User Forum Conference, London, 27 October.

⁶ Gordon, R. (2012), 'Is US economic growth over? Faltering innovation confronts the six headwinds', Working Paper no. 18315, NBER, Cambridge, Mass.

⁷ OECD (2015), 'The future of productivity'.

⁸ Andrews, D., Criscuolo, C. and Gal, P. (2015), 'Frontier firms, technology diffusion and public policy: micro evidence from OECD countries', OECD Mimeo.

⁹ Andrews, D., Criscuolo, C. and Gal, P. (2015), 'Frontier firms, technology diffusion and public policy: micro evidence from OECD countries', OECD Mimeo.

¹⁰ OECD (2013), 'New sources of growth: knowledge-based capital – key analyses and policy conclusions – synthesis report'.

¹¹ Broadbent, B. (2012), 'Productivity and the allocation of resources', Durham Business School, 12 September.

¹² Goldin, C. and Katz, L. (2010), *The Race between Education and Technology*, Harvard University Press.

¹³ OECD (2012), 'United Kingdom – Country Note – Results from PISA 2012'.

¹⁴ HM Treasury (2015), 'Fixing the foundations: creating a more prosperous nation', Cm 9098, July.