

1. Introduction to *Productivity Perspectives*

Philip McCann and Tim Vorley

In recent years, and in many countries, productivity as a theme has emerged from being a rather technical topic discussed in relatively narrow academic and policy circles to a topic which is discussed in the popular media. Part of the interest in the topic is a result of the productivity shocks faced by a great number of industrialised countries in the wake of the 2008 global financial crisis. These shocks had very real implications for numerous people in terms of employment, living standards, savings and wealth acquisition, as well as pay and progression. More specifically, many people's expectations regarding their careers and livelihoods were fundamentally undermined by the ramifications of the crisis.

In many countries, decades of robust and steady economic growth were followed by a sudden contraction of demand, cutbacks in public expenditure and a flatlining of productivity growth. Different countries emerged from these shocks in different ways. Stalled productivity growth was reflected in some countries by rapid employment downturns and falling real estate prices while others experienced high employment levels but with high levels of non-standard and precarious forms of employment. Since then, inequalities between people and places have been rising in a large number of countries, and in recent years there has been a growing awareness of these shifts. Increasingly, more and more people are aware that discussions about productivity relate closely to their possibilities for gainful employment, career development, housing acquisition, as well as leisure opportunities. These economic changes have also been manifested in profound societal changes as the ramifications of the productivity shocks went well beyond purely economic discussions, spilling over into public and social media, the legal arena, as well as local, national and international politics.

In terms of the academic and research world, however, the experience of the last decade has thrown serious doubt as to the depth of our

understanding of these issues. The relationships between productivity growth and inequality appear to be more complex than has been previously understood. While inequality provides incentives for growth driven by improvement there is emerging evidence that beyond a certain critical point inequality starts to limit opportunities for advancement and growth (Bernstein 2013). At the same time, the long-standing relationship between productivity growth and wage growth also appears to be fraying. Meanwhile, in terms of geography there is evidence that some regions are becoming increasingly locked into the production of non-tradeables (i.e., low productivity activities producing low-value goods and services for primarily local consumption) while other regions are enjoying an increasing ability to specialise in high wage activities producing high-value tradeables for exports. This partitioning poses profound challenges for efforts aimed at rebalancing the economy, but as yet our understanding of these are still embryonic.

It may well be that these partitioning processes are related to differential patterns of knowledge spillovers and knowledge diffusion processes. We know that the diffusion and adoption of ideas and best practice is essential for the economy (CBI 2017, 2018) but there is growing evidence that these processes are not working effectively within the UK (Haldane 2018). Yet, whether this lack of diffusion is due to the nature of local economies themselves (Haldane 2019) or to overarching structural problems is still a matter of debate, as is the question as to why these differences appear to be so large within the UK.

Overlaying all of these issues is the question of new technologies. New technologies are poised to transform whole areas of work and to reshape local markets (Ciarli et al. 2018; MGI 2019), while the UK Office for National Statistics (ONS) suggests that up to 1.5 million jobs may be at risk from new forms of automation (ONS 2019). Moreover, this is on top of the downward shift in employment possibilities for lower-skilled workers, which has already been wrought by the combination of technological change and globalisation (Autor 2019; Bacchetta and Stolzenburg 2019). Indeed, evidence from the UK over more than four decades demonstrates that the impacts of structural and technical change have been profoundly asymmetric across UK cities and regions (Martin et al. 2019), and there are reasons to suspect that this will continue to be the case. At the same time, and largely contrary to many people's expectations, the ability of governments to respond to these challenges and to shield workers from the changes is also very limited due to exactly these same pressures on governance systems themselves which have been

brought about by these new technologies (MCG 2017a, 2017b). Government itself at all levels will also need to heavily adapt in order to weather these storms (MCG 2018).

As such, the complexity and variety of both the long-run technological and institutional changes in the global economy alongside the immediate post-crisis ramifications mean that it has become increasingly clear that productivity and productivity-related issues are too complex to be analysed and understood entirely from the vantage point of one particular subject, discipline or research methodology. Rather, the variety of productivity-related outcomes and the difficulties for analysis and policy designs to successfully anticipate and respond in advance to these shocks have led to an emerging consensus that many different social science disciplines can provide different insights as well as empirical or analytical connections, which if understood and interpreted in a broader light, can help us to not only find more of the individual pieces of the productivity puzzle, but also help us to assemble these into something of an emerging picture.

The Economic and Social Research Council (ESRC) in the UK funded the Productivity Insights Network (2018–2020) specifically in order to initiate, facilitate and encourage these kinds of cross-disciplinary research dialogues to address the productivity puzzle. The Productivity Insights Network has also actively engaged partners and collaborators from business, industry, government and civil society. While the focus has been predominantly on the productivity puzzle in the UK, the debate draws on international evidence and experience, so as to effectively calibrate the UK findings and to better understand the extent to which aspects of the productivity puzzle are UK-specific or reflective of more general phenomena.

The chapters in this volume are written by the Co-Investigators working as part of the ESRC-funded Productivity Insights Network. Each chapter identifies the state-of-the-art in our current knowledge and understanding of productivity drivers and inhibitors as they relate to both the international evidence as well as the UK-specific evidence. Collectively, the chapters delve into the range of issues that constitute productivity as a multi-dimensional concept, and represent a milestone in bringing together cross-disciplinary perspectives on productivity and the productivity puzzle.

Chapter 2 by Philip McCann reviews the wide-ranging evidence on the drivers and inhibitors of productivity from both the international and the UK arena. This review is set against the backdrop of slowly evolving thinking and ideas about productivity that have emerged over the last seven decades. Much of this thinking has faced challenges in recent

years and new ideas are emerging, especially related to the ‘weightless’ knowledge-economy dominated by the consumption and production of intangible goods and services. In this context, the evidence suggests that similar productivity-related challenges are being faced by a large number of advanced industrialised economies whose growth rates have steadily fallen over recent decades. There appear to be some common features of this slowdown which are faced by many countries, including post-crisis demand shocks, ageing and demographic change, intergenerational wealth effects, as well as the asymmetric effects and take-up of information and communications technologies (ICT).

At the same time, however, the particular experience of the UK productivity slowdown suggests that there are UK-specific features which are rather different to many other countries. In particular, the geographical and regional differences in productivity are very marked in the UK, and it is very difficult to account for these differences simply by using standard economic arguments. These interregional differences are evident both in terms of productivity levels and growth rates as well as the local level of post-crisis resilience. These observations suggest that the UK’s internal knowledge diffusion processes do not work effectively and this itself raises fundamental questions regarding the overall structure and governance of the UK economy, as well as questions about the long-run productivity-related policy challenges to be addressed.

Chapter 3 by Vania Sena examines the issues involved in measuring productivity. The main purpose of this chapter is to summarise the current discussions on the measurement of productivity across the economy as well as at the firm level and to assess their relevance to the debate on the cross-regional productivity differentials. The chapter offers an assessment of the existing research gaps in this area and identifies a number of areas that require further research. Finally, the chapter touches on some of the main ESRC-funded data resources that can be used to measure firm-level productivity and its drivers and tries to identify the main gaps in the existing data collections.

The chapter demonstrates that there are a lot of data resources within the ESRC data portfolio that can be used to analyse drivers of productivity. These include data resources from government departments and the ONS and studies funded directly by the ESRC. However, both types of data are poorly signposted with the result that researchers tend to use only those resources they are familiar with, which leads to a lot of path dependence in this area. Moreover, most of these data cannot be linked as the data were collected only for a specific purpose and no attention has been paid to the possibility of linking them to other data sources. The problem is particularly severe in the case of the longitudinal studies

which should be designed in such a way that they can be linked to government data, as is the case in many other member countries of the Organisation for Economic Co-operation and Development (OECD).

Chapter 4 by Richard Harris examines the productivity relationships between foreign direct investment (FDI), markets and investment, and from the detailed micro-econometric literature concludes that there is no consensus emerging on what explains the UK's productivity puzzle. Harris found that total factor productivity (TFP) declined almost exclusively in the (distributive and hospitality) service sector and in smaller plants in the study period. However, when the data are subdivided into plants that opened, closed and continued throughout 2007–12, he found that continuing plants in both manufacturing and services experienced significant falls in TFP. Manufacturing new plants had much higher TFP that helped to offset the decline experienced by continuing plants, while in services such offsetting did not happen. A large part of the reason for the fall in TFP was as a result of a 2008–12 negative 'shock', and not changes in foreign ownership or spatial factors – although these are important determinants of TFP levels.

The chapter discusses the role of competition, firm entry and exit (i.e., Schumpeter-type 'churning'), in past and future trends in globalisation and regulation, including the impact of Brexit, on productivity, accounting for likely different responses across sectors and spatial locations. It is clear that more work is required in order to provide a deeper understanding of the specific shock effect of the Great Recession on UK productivity, so as to better understand its causes, and to identify whether it has resulted in permanent changes in TFP, and to build resilience for the future. This requires us to identify the extent to which location and factors such as clustering and agglomeration impact on productivity, and why some locations have more 'leading/frontier' firms compared to others.

Chapter 5 by Robert Huggins and Hiro Izushi examines the relationships between innovation, knowledge and technology and their impacts on productivity. Knowledge diffusion and innovation systems are acknowledged as a vital component for improving productivity and economic development, with cluster and agglomeration being key themes of economic theory and policy. Less is known, however, with regard to innovation systems and cluster 'failures' and the extent to which this occurs due to a lack of effective coordinating and governance mechanisms. Open innovation practices are advocated as an important source of productivity gains, but the evidence to support this is patchy. This poses challenges for understanding the *regional innovation paradox*, which refers to the inability of lagging regions – that is, those with low productivity – to effectively

utilise public support. It is argued that such regions lack the absorptive capacity in both the public and private sectors to make good use of such funding, but how can we overcome this? A gap normally separates the production-possibility frontier, that is, the innovations available to maximise productivity, and their use, and there is a long tail of low productivity firms which seem to be largely outside of the key knowledge diffusion processes. On this point, the analysis by the McKinsey Global Institute points to three principal drivers of the productivity slowdown, namely, weakened (post-crisis) demand, the waning of ICT effects, and limited take-up of digitisation, and the evidence suggests that not all firms and industries have taken full advantage of ICT for productivity. The long-run decline in the ratio of patents to workers engaged in research and development (R&D) suggests the possibility of increased difficulty in producing innovations, even though many countries have not experienced rises in patent enforcement costs. Another possibility is that the composition of industrial sectors has moved towards an increase in the activities of those sectors that are less likely to patent inventions. Another idea is that the costs of new knowledge are increasing, not decreasing. As McKinsey argues, 'there is disagreement around the impact current technological innovation is having on the economy and what potential it has to once again boost productivity growth' (MGI 2019). Yet, understanding the reasons for the gaps between firms, sectors and regions remains a significant challenge for researchers and policymakers and, in particular, identifying whether this is due to poor management, a lack of knowledge, a lack of absorptive capacity or a lack of diffusion effects is still difficult. Why does the UK in so many ways, and especially related to economic geography, appear to be so different from other countries such as Japan, the Netherlands, Finland, New Zealand or Canada?

Chapter 6 by Andrew Henley discusses the link between entrepreneurship, small firm business growth and productivity. The UK self-employment rate grew from under 8 per cent in 1980 to around 15 per cent in 2015, with growth particularly marked since the 2008 global financial crisis. Microbusiness numbers (i.e., below ten employees) show a similar pattern, although it is still the case that around 75 per cent of the UK self-employed are business owners, as opposed to working as freelancers or subcontractors. In terms of the productivity debates, in principle there is no guaranteed connection between small and medium-sized enterprise (SME) growth and productivity-enhancing improvement in value added. The reasons are that SME owners or decision-makers may often suffer from 'don't turn business away' syndrome, and therefore operate away from the efficiency frontier. This has arguably contributed, at the level of policy design, to a preoccupation with 'fast growth'

or 'high growth' firms. In contrast, it may be that thinking about absorptive capacity is useful. Absorptive capacity, which refers to the ability of the business to translate knowledge into performance, is largely a concept explored in the management and innovation literature. It seems likely that SMEs display high heterogeneity in terms of their absorptive capacity, but we need to understand more about this. Yet, aside from understanding its association with indicators of workforce skill, R&D intensity and access to knowledge spillovers, the issue of absorptive capacity has tended to be avoided by mainstream productivity analyses.

Research is nowadays edging towards an understanding of productivity drivers in SMEs but a thorough analysis (in the British context) requires matched/linked datasets which include both data on the firm and on the characteristics/capabilities of owner-managers. Building from the somewhat limited evaluations of more 'holistic' approaches to improving SME leadership and management (e.g., the Lancaster LEAD programme), there still remains an important unresolved question as to whether it is specific management practices which raise productivity or whether it is the promotion of improved SME leadership mindsets, networking and ability to access tacit knowledge. These questions are important because small business formation and performance still appears to display high levels of spatial dependence. While it is straightforward to model and describe this, there is still a need for significant work in terms of explaining spillovers. In particular, there is scope for more research to understand how local norms and entrepreneurial culture considerations influence small business performance.

Chapter 7 by Colin Mason picks up on the issues raised in Chapter 6, examining the scale-up challenges facing SMEs. The UK has high numbers of both small firms and start-ups, although there is a widespread consensus that it lacks sufficient scale-up companies, which, in turn, is argued to be damaging to overall UK productivity. An emerging line of enquiry conceptualises the notion of key 'growth triggers' as a fundamental determinant of firm growth. Understanding why and how some firms are able to capitalise on these growth opportunities or overcome these 'growth triggers', or 'critical junctures', is central to our understanding of 'high growth firms' (HGFs). The focus of HGFs is often on what some have termed 'mid-level innovation', which refers to twists on existing ideas, rather than something which is genuinely radical. It is also argued that HGFs often follow a distinctive business strategy, seeking specific market niches with little in the way of effective competition. This is achieved in three ways: first, by favouring business rather than consumer markets; second, by developing close relationships with a small number of large customers; and third, by emphasising customer

service as a key basis of differentiation in the market, which, in turn, requires a significant emphasis on staff training.

The literature identifies four key founder-related variables that are associated with high growth, namely: (1) start-up motivation, with the desire to exploit a market opportunity much more important than push-related motives; (2) amount of education and subject along with soft skills such as search, foresight, imagination and communication; (3) experience, and in particular the role of prior entrepreneurial experience, is a distinct advantage; and (4) the size of the management team, with larger teams being linked to high growth on account of their greater resources and expertise.

In the UK various studies have reported that gazelles are much more prevalent in London and the South East than in other regions although HGFs can be found in all types of location, including both core regions and peripheral regions, and in both large cities and rural areas. Gazelles in the South East have a much higher turnover and create twice as many jobs on average than those in Scotland and account for a much larger share of job creation. However, the evidence from the UK and other countries also suggests that even amongst gazelles there are major differences in sectoral and geographical growth patterns.

The low numbers of HGFs suggest that they face significant barriers to growth. Several barriers to scale up have been identified in the literature, including access to markets and a lack of entrepreneurial experience, although the two key ones are access to finance and access to management talent. A further explanation for the lack of scale-ups in the UK is that many entrepreneurial firms with the potential to scale up get acquired at an early stage by larger businesses either because they have raised venture capital and their investors now seek an exit or because they are unable to access finance to grow, or both. At the same time, there is limited evidence on the post-acquisition performance of such firms, although several studies suggest that acquisition has a negative impact and hence adverse implications for productivity.

Chapter 8 by Maria Abreu examines the role of skills, education and labour markets in enhancing productivity. The literature on the returns to schooling has found an individual average rate of return of around 6.5 per cent across a majority of countries, but there is also significant variation depending on the measure of schooling used, with the returns tending to be higher for higher income groups. Within the UK there are persistent regional differences in the percentage of pupils achieving five A*–C GCSEs (including English and Maths), with the highest values in London (60 per cent), and lowest in the East and West Midlands (55 per cent), and this gap has increased since the 1970s. The UK Employer Skills

Survey shows that skill gaps reported by employers are lowest in London and the South East, and highest in the East and West Midlands, and Yorkshire and the Humber.

One of the issues this raises is the role of migration in reshaping local and regional labour markets, and from the research it becomes clear that different roles are played by international versus purely domestic inter-regional migration. There is a large amount of research on human capital externalities and migration propensities arising from cognitive skills, but there is very little research on the relevance of non-cognitive skills (personality, interpersonal skills, attitudes to risk, adaptability) and how these interact with education and skills training along with migration behaviour. Although job-skill surveys, such as the UK Employer Skills Survey (UK CES) and the Skills and Employment Survey, have large sample sizes and are regionally representative, there is relatively little research at the regional level on these important issues.

Chapter 9 by Katerina Lisenkova discusses the evidence on the relationships between productivity, ageing and demographic trends. The most recent US and European evidence suggests that an increase in the proportion of workers aged 55 to 64 is associated with an economically and statistically significant reduction in the growth rate of labour productivity and TFP. Workers (aged 40 to 49) have a strong positive impact on patent applications and older workers (aged 50 to 59) have a strong negative impact on patent applications. However, these productivity-age relationships are not so straightforward because of the different employment roles that people play. Aspects of productivity, such as experience, leadership and managerial skills, and knowledge of human nature, usually improve with age but they are much harder to measure. Productivity is also difficult to measure at the level of the individual, since it is typically a group phenomenon resulting from the combined sets of skills and experience of teams.

We know that education and training can also help to slow or even reverse the decline in productivity with age. However, fewer training opportunities are offered to older workers because the beneficial effects of training can only be used for shorter periods. However, as the population becomes progressively older this will influence the sectoral composition of demand and supply towards services, especially towards low productivity growth and labour-intensive health, care and leisure services. These shifts will also be felt differently in different places because there will be major differences across regions and local labour markets in terms of the decline in the ratio between the local working-age population and the local non-working-age population. Regional differences in ageing will depend crucially on human-capital migration

interactions, and these in turn will have major implications on the potential for the long-run fiscal devolution regarding health and social care.

Chapter 10 by Leaza McSorley discusses the links between inequality, well-being, social inclusion and productivity growth. While productivity growth remains the most direct method of increasing the wages of typical workers, the evidence from the literature suggests that the links between productivity and pay are weakening, due to both increases in compensation inequality and also reductions in labour's income share. OECD-wide evidence suggests that the benefits of higher levels of future economic growth and productivity in certain sectors will be broadly shared across the population as a whole. Indeed, there is now a growing risk of a vicious cycle setting in, whereby people with fewer skills and poorer access to opportunities may be increasingly confined to operate in low productivity and precarious jobs. In this regard, a major change in recent years has been the fact that young people have now replaced the elderly as the group most at risk of relative poverty, and following on from Chapter 8, these compositional as well as demographic shifts imply fundamental long-term changes in the overall distributions of income, wealth and growth.

Evidence from Germany and the UK suggests that better managed firms recruit and retain workers with higher average human capital, thereby indicating that there may be a link between better managed firms and worker productivity. At the same time, there is also evidence that lower worker happiness is systematically associated with lower worker productivity. Indeed, within the UK, in spatial terms the changes in productivity are also strongly reflected in terms of people's well-being and quality of life. The regional patterns of productivity that are evident in the UK, and which are discussed in detail in Chapters 1 and 3, are also very closely related to the regional patterns of multi-dimensional living standards. Many people in the UK 'enjoy' multi-dimensional living standards far below what would be expected of a country like the UK. Finding ways to stimulate the benefits of productivity growth which can be shared widely across income groups, sectors and regions would appear to be a key priority.

Chapter 11 by Kirsty Newsome and Tim Vorley examines productivity-related issues in work and in workplace settings. The flatlining of UK labour productivity suggests that these types of issues ought to be central to our understanding of the productivity puzzle. Yet, there is a dearth of empirical evidence on workplace social dynamics and performance outcomes. If we consider the effects on productivity of job quality, job sustainability and the decent work agenda, the recent Taylor Review of

Modern Work Practices highlights the importance of job quality and decent work, although the precise links with productivity are still somewhat unclear. A growing research agenda is exploring the relationship between job quality and productivity outcomes, as evidenced in the Skills and Employment Survey, yet more could be done to explore the relationship between better job content and productivity. In terms of sectoral analyses, we know which are the low job quality and low productivity sectors, but what is still unclear is the possibility for better job quality solutions. In particular, it is important to understand more about the regional dimension of job quality solutions, such as those of the Scottish Fair Work Commission, and what options there are for state sponsorship of better work.

Obviously, the dynamics of the employment relationships in terms of the negotiating parties, their respective power and the regulatory context all play a role, requiring a comparative analysis of the institutional apparatus and arrangements for high productivity economies. There are calls for better management, but precisely what better management means is itself open to question. In particular, is the employment relationship itself a source of inefficiency, what are the implications of insecure work, and what is the role of employee voice in promoting change and innovation? There is some evidence linking employee voice and productivity outcomes as well as union presence and productivity, but the research is patchy and dated. Moreover, new artificial intelligence (AI) technologies are likely to bring about profound changes in employment roles and relations in the coming years, so the whole research agenda needs to move forward significantly.

Chapter 12 by Ben Gardiner and Richard Lewney examines the UK regional and city productivity debates. The research findings demonstrate that there is a persistent prosperity gap between the Northern regions and the rest of the UK, which was mostly driven by a performance gap rather than an employment gap. The gap in skills, as proxied by highly qualified workers, is the indicator which mirrors the performance gap most closely, while measures of investment, agglomeration and research-innovation also show persistent gaps between the North and its comparators. The chapter demonstrates that the results of recent research (Martin et al. 2018, 2019) show that Northern cities led productivity growth over 1971–91; Southern cities then led after 1991. However, at the same time, the rate of productivity growth slowed across almost all cities between these two periods. This research also demonstrates that there is evidence of considerable structural convergence across cities and a general tendency for the degree of specialisation of cities to fall (Martin et al. 2018).

Meanwhile, structural change, and especially the shift from manufacturing to services, is shown to have had a negative impact on productivity growth across almost all UK cities (Martin et al. 2018), whereas within-sector productivity developments, while being positive and outweighing structural change effects, have also declined over the past 45 years, as well as varying across cities (Martin et al. 2018).

The effects of these changes mean that the growth of employment accounts for just less than one-third of gross value added (GVA) growth, which is driven more by the utilisation of higher-skilled labour. However, several high comparative advantage sectors (such as financial services, advanced manufacturing) comprise relatively large proportions of professional and skilled occupations, but they also have relatively high productivity and so their higher output growth tends not to create many jobs. Policies to promote the UK's sectors of high comparative advantage are likely to benefit the macroeconomic balance, but potentially may exacerbate UK sectoral and spatial disparities. This is because successful regions tend to have a larger than average share of the comparative advantage sectors and so boosting growth in these sectors will tend to further widen spatial disparities. As also demonstrated in Chapter 3, spatial externalities associated with (a non-London) city location are not as important as the benefits of being situated in the London and South East region. This raises crucial questions about the efficiency and effectiveness of the UK's internal knowledge diffusion processes.

Chapter 13 by Iain Docherty and David Waite discusses the evidence regarding the relationships between investments in transport infrastructure and productivity. Within the literature, there are very significant disagreements about the causal linkages between the outputs of infrastructure investments and economic gains. Decades of research have not been able to precisely pin down the causal relationships between transport investments and economic performance as effectively as policy-makers might like. Displacement versus additionality is always a crucial discussion, and identifying the additionality of infrastructure investments may depend on threshold effects related to issues such as agglomeration, more general features of connectivity, system-design effects such as monocentric versus network switching systems' characteristics, as well as potentially different impacts on tradeables versus non-tradeables production locations.

Yet, although precisely quantifying the economic impact of transport investment is difficult, there is still substantial empirical evidence in favour of the assertion that locations with poor quality transport are at a

disadvantage when compared with those places with high quality transport infrastructure. From this broader perspective, new transport infrastructure can have multiple economic effects at different scales such as engendering: a reorganisation or rationalisation of production, distribution and land use; an extension of labour market catchment areas; increases in output resulting from lower costs of production; the stimulation of inward investment; the unlocking of previously inaccessible sites for development; and a 'catalytic' effect which triggers growth through the elimination of a significant transport constraint. Given these features it may be the case that the cumulative impact of several relatively small improvements to the transport system can often be at least as big as that of the large 'megaprojects'. As a result of these analytical difficulties, the UK Department for Transport regards estimates of the actual economic uplift – for example, improved productivity and additional overall GVA – generated by transport schemes to be at best *evolving*, and often *indicative*. This is not only because of the uncertainties about the causal mechanisms highlighted by the underpinning research, but also because the actual numbers generated in such estimations can vary significantly with relatively minor adjustments to the assumptions used.

Chapter 14 by Tim Vorley and Jen Nelles discusses issues of governance, institutions and organisations from a systems perspective. In particular, when considering each of these issues, this chapter argues that adopting systems thinking offers the potential to change the tone of the productivity debate. By focusing on the intersections and interdependencies of the productivity puzzle, as opposed to pursuing ever more granular analysis of thematic questions, such approaches offer the possibility of providing a basis for next-generation policy design. However, realising the promise of new multidisciplinary horizons in productivity research by asking new questions and advancing new perspectives is about much more than the research itself. The chapter argues that it demands a new openness, which if achieved will enable the modelling and exploration of new frontiers of productivity policy by drawing on research and evidence in new and creative ways.

Yet, even more than advocating a systems lens for researching productivity and productivity policy, the chapter contends that considerable effort needs to be made by academics and policymakers to bridge the divide between research and policy. The central challenge is to ensure that evidence from the research base better informs the design and development of policy. Arguably, a systems perspective differs from the dominant mindset of both academics and policymakers, with neither group accustomed to working in this way. If the systems perspective is to

become an effective approach it will demand new ways of working and thinking about the productivity puzzle. To achieve this, and put systems thinking into practice through models, demands policy experimentation and adaptation based on the evidence. It also suggests that a broader range of issues and arenas need to be incorporated into productivity research than has traditionally been the case. As this volume details, many issues which in earlier eras were not perceived as being particularly relevant for productivity research are nowadays increasingly understood as being crucial. These include issues such as governance, trust in institutions, social engagement, distributional issues of many different kinds, power relationships, and new forms of technological change involving intangible assets.

Chapter 15 by Jonathan Cook, Dan Hardy and Imogen Sprackling undertakes a systematic analysis of the shifting UK policy landscape in which productivity and productivity-related policies have been set. The chapter reviews how the policy and institutional landscape has changed from 1997 to 2018, and the extent and ways in which productivity is referenced in policies and programmes, or in the specific intermediate factors that may be expected to influence productivity. Many policy areas potentially relate to productivity, so for practical reasons, the review therefore focuses on a defined set of policies and institutions. Moreover, the chapter only traces how policies have changed, and has not sought to examine the effectiveness of policies.

The focus of the chapter is on policy domains of business support, innovation and skills between 1997 and 2018, with a particular focus on the interface between the national and subnational policy settings as they relate to economic development. The approach to this work involves mapping the key institutions, policies and programmes in each policy domain since 1997, which then provides the basis for the second step, namely, the selection, review and coding of documentation, including budget reports and speeches, spending reviews, policy reviews and strategies, academic articles and grey literature. While the chapter discusses the UK-level policy narrative, its treatment of sub-UK policy is focused on England. This is because many aspects of UK business, innovation and skills policy are devolved, and there exists significant variation between nations.

Chapter 16 by Gary Dymski discusses the links between the UK 'productivity paradox' and the UK's governance system for science and technology policy, from the perspective of the lessons arising from the experience of California. This international comparative framing of the governance-productivity interface provides a context in which to consider the efficacy of the UK's explicit adoption of a UK industrial strategy in

2017. Such a policy adoption demonstrates the national priority accorded to reversing the productivity slowdown, although the comparative assessment suggests that this industrial strategy relies on a problematic top-down and overly centralised science/technology approach, which was first articulated in 1993. The UK productivity paradox arises because UK productivity growth has declined consistently despite consistent adherence to this particular science/technology approach. Meanwhile, the effort to implement this industrial policy is undercut by the UK's continued commitment to macroeconomic austerity policy. Moreover, adoption of this strategy has furthered the decades-long pattern of instability in the ministerial and research council structures tasked with coordinating national policy. The coordination of a contradictory top-down science/technology approach by shifting structures of national government guidance, combined with the impact of austerity macroeconomic policy on devolved subnational governments, is unlikely to permit national or local seedbeds of innovation and employment growth to flourish. In effect, challenges of organisation and governance in UK industrial and science/technology policy must be addressed as a precondition to moving past the UK productivity paradox. A brief consideration of parallel developments in California, a state widely admired as a seedbed of economic growth and innovation, reveals some possibly useful insights for the UK.

Taken together, the chapters in this volume provide a wide-ranging, comprehensive and detailed set of perspectives on the productivity-related challenges facing countries such as the UK. The different insights offered by these various perspectives will provide observations and lessons which will be useful to academics, researchers, business leaders and policymakers all concerned with the challenges associated with raising productivity. These insights, observations and ideas are much needed, given that the UK is currently undertaking a shift towards a more active industrial policy along with more devolved governance and policy systems.

REFERENCES

- Autor, D., 2019, 'Work of the Past, Work of the Future', NBER Working Paper No. 25588, National Bureau of Economic Research, Cambridge, MA, February, <http://www.nber.org/papers/w25588> (accessed 22 October 2019).
- Bacchetta, M. and Stolzenburg, V., 2019, 'Trade, Value Chains and Labor Markets in Advanced Economies', World Trade Organization, https://www.wto.org/english/res_e/booksp_e/gvc_dev_report_2019_e_ch2.pdf (accessed 22 October 2019).

- Bernstein, J., 2013, 'The Impact of Inequality on Growth', Centre for American Progress, December, <https://www.americanprogress.org/wp-content/uploads/2013/12/BerensteinInequality.pdf> (accessed 22 October 2019).
- CBI, 2017, 'From Ostrich to Magpie: Increasing Business Take-up of Proven Ideas and Technologies', Confederation of British Industry, London, November, <https://cbicdnend.azureedge.net/media/1165/cbi-from-ostrich-to-magpie.pdf?v=20190808.1> (accessed 22 October 2019).
- CBI, 2018, 'Be More Magpie: How Your Business Can Solve Productivity Challenges with Tried and Tested Technologies', Confederation of British Industry, London, June, http://cbi.binarydev.net/index.cfm/_api/render/file/?method=inline&fileID=047CED5A-5107-4FA2-BFA5AEC4B8DA9A33 (accessed 22 October 2019).
- Ciarli, T., Marzucchi, A., Salgado, E., and Savona, M., 2018, 'The Effect of R&D Growth on Employment and Self-Employment in Local Labour Markets', SPRU Working Paper Series 2018-08, University of Sussex, March, http://www.isigrowth.eu/wp-content/uploads/2018/06/working_paper_2018_32.pdf (accessed 22 October 2019).
- Haldane, A., 2018, 'The UK's Productivity Problem: Hub No Spokes', Speech given by Andrew G. Haldane, Chief Economist, Bank of England, Academy of Social Sciences Annual Lecture, London, 28 June, <https://www.bankofengland.co.uk/-/media/boe/files/speech/2018/the-uks-productivity-problem-hub-no-spokes-speech-by-andy-haldane> (accessed 22 October 2019).
- Haldane, A., 2019, 'Is All Economics Local?', Speech given by Andrew G. Haldane, Chief Economist, Bank of England, Sheffield Political Economy Research Institute (SPERI) Annual Lecture, University of Sheffield, 7 May, <https://www.bankofengland.co.uk/-/media/boe/files/speech/2019/is-all-economics-local-speech-by-andy-haldane.pdf?la=en&hash=577BDED2260063C517798A13E4C53E17CF82CC26> (accessed 22 October 2019).
- Martin, R., Sunley, P., Gardiner, B., Evenhuis, E., and Tyler, P., 2018, 'The City Dimension of the Productivity Problem: The Relative Role of Structural Change and Within-Sector Slowdown', *Journal of Economic Geography*, 18(3), 539–70.
- Martin, R., Bailey, D., Evenhuis, E. et al., 2019, *The Economic Performance of Britain's Cities: Patterns, Processes and Policy Implications*, <https://www.cityevolutions.org.uk/the-evolving-economic-performance-of-britains-cities-patterns-processes-and-policy-implications-2/> (accessed 22 October 2019).
- MCG, 2017a, 'Government Productivity: Unlocking the \$3.5 Trillion Opportunity', Discussion Paper, McKinsey Center for Government, April, <https://www.mckinsey.com/~media/McKinsey/Industries/Public%20Sector/Our%20Insights/The%20opportunity%20in%20government%20productivity/Government-Productivity-Unlocking-the-3-5-Trillion-Opportunity-Full-report.ashx> (accessed 22 October 2019).
- MCG, 2017b, 'How the Public Sector Fits in the Productivity Puzzle', McKinsey Center for Government, October, <https://www.mckinsey.com/~media/McKinsey/Industries/Public%20Sector/Our%20Insights/How%20the%20public%20sector%20fits%20in%20the%20productivity%20puzzle/How-the-public-sector-fits-in-the-productivity-puzzle-final.ashx> (accessed 22 October 2019).

- MCG, 2018, 'Delivering for Citizens: How to Triple the Success Rate of Government Transformations', Discussion Paper, McKinsey Center for Government, June, <https://www.mckinsey.com/~media/mckinsey/industries/public%20sector/our%20insights/delivering%20for%20citizens%20how%20to%20triple%20the%20success%20rate%20of%20government%20transformations/delivering-for-citizens-how-to-triple-the-success-rate-of-government-transformations.ashx> (accessed 22 October 2019).
- MGI, 2019, *The Future of Work in America: People and Places, Today and Tomorrow*, McKinsey Global Institute, <https://www.mckinsey.com/~media/McKinsey/Featured%20Insights/Future%20of%20Organizations/The%20future%20of%20work%20in%20America%20People%20and%20places%20today%20and%20tomorrow/MGI-The-Future-of-Work-in-America-Report-July-2019.ashx>
- ONS, 2019, 'Which Occupations are at Highest Risk of Being Automated?', <https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/articles/whichoccupationsareathighestriskofbeingautomated/2019-03-25> (accessed 22 October 2019).