

Putting Together the Pieces of the Productivity Puzzle: Review Article of *Productivity Perspectives* and *Productivity and the Pandemic*

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Abstract

The productivity puzzle in the UK may have taken a turn with the arrival of the COVID-19 crisis although we do not know at this point whether it will be for the better or the worse. The two edited volumes discussed in this review article are distinguished by the first being produced just before the pandemic, and the second in the midst of it. Together, the volumes address a broad range of economic, social and policy issues related to the productivity puzzle in the UK, with a strong focus on organizations, management, entrepreneurship, innovation and skills. In addition to examining productivity growth at the firm level, the volumes also analyze differences in productivity and income between firms, workers and regions. There is also a strong plea for a system-based approach to policy making for productivity. On the whole, the contributors take a cautious approach on how much the pandemic will change productivity performance in the medium-term, but they argue strongly in favour of active policy intervention to mitigate the damage arising from the pandemic and create better conditions for a sustained productivity revival.

The global slowdown in productivity growth in the past decade has brought productivity back at the forefront of the debate on economic growth. Perhaps nowhere else is this more the case than in the United Kingdom. Over the past decade we have seen an explosion in research on the UK productivity puzzle.² The two edited volumes discussed in this review article are examples of this heightened interest in pro-

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² For some broad overviews of the UK productivity puzzle, see Haldane (2018), Mason, O'Mahony and Riley (2018), Riley, Rincon-Aznar and Samek (2018), Zymek and Jones (2020), van Ark and Venables (2020), and Goldin *et al.* (2021).

ductivity issues in the UK. The first volume *Productivity Perspectives* was published in 2020 by Edward Elgar and edited by Philip McCann from the University of Sheffield and Tim Vorley from Oxford Brookes University. The second volume, *Productivity and the Pandemic: Challenges and Insights from COVID-19* was published in 2021 also by Edward Elgar and edited by the same two individuals. The volumes include a broad range of perspectives on the productivity puzzle brought together by the Productivity Insights Network (PIN) between 2018 and 2020. The network is an initiative funded by the Economic and Social Research Council (ESRC) in the UK which was created to initiate, facilitate and encourage cross-disciplinary research dialogues to address the productivity puzzle.³ PIN has been led by professors Philip McCann and Tim Vorley, the editors of the volumes, who are widely recognized experts of regional economic development. Unsurprisingly, regional disparity within the UK is therefore one of the perspectives which is widely addressed in both volumes.⁴

The two volumes, which consist of 37 articles (including the two introductory articles) written by 55 authors mostly from business schools across the UK both bring together the existing stock of knowledge and report on some new research on productivity in the UK. The insights from PIN are already making an impact in determining the future research agenda on productivity in the UK, as it has inspired the agenda of The Productivity Institute (van

Ark and Venables, 2020) and other new research endeavours. The insights will also have a significant impact on the UK policy agenda which focuses on the post COVID-19 economic recovery, the levelling up of disadvantaged regions across the nation, and the government's intentions to revive the economy in the post-Brexit era to build a new global Britain.

While the two volumes have a primarily academic focus on what is called the “productivity puzzle” in the UK, the contributions are of great interest for a wider audience. First, most articles are written in a very accessible manner. There are very few articles with complex mathematics or very data-heavy analysis. Second, even though the contributions are primarily focused on the UK situation, there are useful internationally comparative insights and important learnings for the productivity agenda in other countries.

The main challenge for any reader who wants to go through these volumes from cover to cover is that one needs to allow a good deal of time and focus for some intense reading of about 650 pages. For this reviewer, it's been like drinking from a fire hose. The two collections provide a treasure of hypotheses on the productivity puzzle and there are literally hundreds of references to relevant sources. To some extent this breadth of topics covered is the nature of the beast. In many respects the UK productivity slowdown since the 2008 global financial crisis is like a death by a thousand cuts or, to stay with the theme of

³ For an overview of PIN's contributors and published work see: <https://productivityinsightsnetwork.co.uk/>.

⁴ For earlier work on UK regional disparities, see also McCann (2016).

the productivity puzzle, a bag full of jigsaw pieces.⁵ To be fair, innovation and management deficiencies, skills shortages and mismatches, failing institutions and persistent and (on some counts) rising regional disparities in productivity performance are leading themes.⁶ The excellent introductions by the editors to both volumes leave the reader with the clear notion that there is no silver bullet to resolve the productivity puzzle. The UK is in need of a comprehensive policy approach with clear, consistent choices, and long-term political commitment. But what that agenda should exactly look like remains rather unclear.

In the remainder of this review article, I will first provide some guidance to the reader on where to find what in both volumes. I will then proceed by organizing some of the key insights from the 37 articles (including the two introductory articles) into five main buckets: (1) organizations; management; entrepreneurship and innovation; (2) skills; labour markets and well-being; (3) regional disparities; (4) the impact of COVID-19; and (5) policy and institutions. Finally, I will make a modest attempt in the final section on what the two volumes provide in terms of pointing the way forward for future research and policy development on productivity.

Structure of the Two Volumes

The first volume, *Productivity Perspectives*, contains 16 articles contributed by 21 authors.⁷ In the introductory chapter, the editors position the productivity slowdown in the light of the other big story of the early 21st century, namely rising inequality. They argue that “the relationships between productivity and inequality appear to be more complex than has been previously understood” (McCann and Vorley, 2020:2), and implicitly subscribe to the reversal of the Kuznets curve in the UK for the past three decades. More specifically, societal benefits from productivity growth, for example in terms of broad-based gains in living standards and well-being, may have lessened because of factors such as a decline in knowledge spillovers and a slower (geographical) diffusion of knowledge. This kind of partitioning has raised inequities between firms, individuals and regions over the past two decades.

Many of the chapters in the first volume approach the topic of productivity and inequality by addressing who has access to and benefits from investment (domestic and foreign), skill creation and innovation. Several chapters point to difficulties in acquiring the appropriate skills and raise concerns about the distributional effects from

⁵ The timing of the start of the productivity slowdown has still not been exactly sorted out. While the contributors in this volume treat the 2008 global financial crisis as the critical marking point, it has been suggested elsewhere that a statistical break in the UK’s productivity path should be put in 2007, that is before the global financial crisis began (Fernald and Inklaar, 2020). This implies that while the financial crisis may have contributed to the severity of the slowdown, many of the seeds for a productivity slowdown were likely in place well before then.

⁶ Evidence suggests that the gap in output per hour between London and the rest of the UK has slightly declined since 2008, in particular because of a disproportional rise in working hours in less productive sectors in London. However, productivity differentials within the nine statistical regions in England, as well as in Northern Ireland, Scotland and Wales seem to have increased (Zymek and Jones, 2020).

⁷ The table of contents is available at <https://www.e-elgar.com/shop/usd/productivity-perspectives-9781788978811.html>.

increased labour market flexibility and new contractual and non-contractual arrangements between employers and employees. The last three chapters also address policy challenges related to equity including the siloed nature and geographical fragmentation of policy responses in the UK.

Shortly after the completion of the first volume, the world was hit by the COVID-19 pandemic causing one of the largest economic shocks of the post WWII period, and causing the largest decline in UK GDP (9.9 per cent in 2020) since the Great Frost in 1709 (ONS, 2021). The PIN researchers courageously took up the challenge to put together a second volume, *Productivity and the Pandemic: Challenges and Insights from COVID-19*, in which 46 contributors, including 12 authors who also contributed to the first volume, produced 21 articles addressing the implications of the pandemic for productivity in the short- and medium-term.⁸

The contributions to the second volume were mostly written during the summer of 2020, when the first wave of COVID-19 infections was behind us but with the second and third wave still coming. It was obviously difficult for authors to go far beyond describing the situation at that point in time and speculate about the possible impacts on productivity during the post-pandemic period. In the knowledge of where we are today, almost one year later, it seems most authors were correct in choosing to build on the insights from the pre-pandemic productivity slowdown

as many factors (e.g. labour and skills shortages, increased disparity in who benefits from productivity growth) have returned in full force or even more strongly since the economy has begun to open up. Most contributors have been cautious in not overstating the upsides for productivity coming out of the pandemic (“never waste a good crisis”) and have been adamant about the massive policy challenges to mitigate negative effects from the COVID-19 crisis and create better conditions for a productivity revival in the longer term.

Many chapters in the second volume address the implications of COVID-19 building on the analysis in the first volume, including the impacts on management, innovation and entrepreneurship. There are also new spotlights directly related to the effects of the crisis, such as online consumption, mental health issues, housing, and macroeconomic demand and supply effects. The direct implications of these developments for productivity performance are sometimes harder to detect than was the case in the first volume. However, some chapters in the second volume explicitly deal with the role uncertainty (e.g. Sena and Bhaumik, 2021; and Ernst, 2021) and resilience (Cook and Vorley, 2021) for productivity in the medium- to long-term.

Next, I provide an overview of five key topic areas that are recurring in the volumes.

⁸ The table of contents is available at <https://www.e-elgar.com/shop/usd/productivity-and-the-pandemic-9781800374591.html>.

Organizations, Management, Entrepreneurship and Innovation

As the majority of the contributors to both volumes are academics from UK business schools, it comes as no surprise that there is much focus on the internal processes within organizations and the impact of business investment, finance, management and innovation on firm productivity. As many of the authors also focus on regional performance and inequalities, there is much attention given to micro-businesses and small and medium-sized enterprises (SMEs), which dominate the business landscape in the most disadvantaged regions.

Several chapters address which shows weak productivity record of small firms in the UK. For example, Harris (2020) points to the decline in total factor productivity (TFP) in small firms, especially in the distributive and hospitality services. Henley (2020) discusses the challenges with regard to absorptive capacity in micro-enterprises, which refers to the notion that firms need to build capabilities to translate knowledge into innovation, and Mason (2020) reviews the scale-up challenges of SMEs and the lack of high growth firms. Indeed, the UK has seen a rapid rise in self-employment from 8 per cent of the workforce in 1980 to 15 per cent in 2015. While some of that increase includes gig-economy workers and other employee transitions to contract workers, 75 per cent of the UK self-employed represent business owners rather than freelancers or subcontractors (Hen-

ley, 2020). At the same time, the UK lags behind most other advanced OECD economies in creating scale-up companies.⁹

On innovation, Huggins and Izushi (2020) build on the theme of absorptive capacity by arguing for a stronger connection between the theory of innovation and productivity, based on endogenous models of economic growth, and innovation management models, based on behavioural and institutional-based conceptual frameworks. Innovation behaviour is in part determined by the formal and informal institutions but also interact with cultural, psychological and human agency characteristics. For example, the authors argue that “the concentration of large-scale coal-based industries in regions has left a lasting psychological imprint. The selective out-migration of more optimistic and resilient individuals seeking new economic opportunities results in an indigenous population in the home region lacking in its entrepreneurial spirit and innovative capabilities.” (Huggins and Izushi, 2020:113).

Lack of finance for growth, partly from banks but particularly from venture capital funds, is often pointed to as a key inhibitor for scaling up small firms in the UK. Mason (2021) points to specific constraints in the UK, such as the large amount of time which venture capital firms spend on raising capital rather than working with their investee companies, the lack of funding for multiple rounds of investment, and deficiencies in operational and entrepreneurial experience in venture capital firms. The latter

⁹ Scale-ups are defined as companies with at least ten employees at the start of the observation period that achieve 20 per cent annual growth in revenue or employment per annum over a three-year period (Coutu, 2014).

also seems to play out in regional disparities, providing a significant disadvantage to innovative SMEs outside London and the southeast of England.

There is also an extensive literature which shows that management capabilities are one of the causes of the long-tail of less productive firms in the UK.¹⁰ Henley (2020) reports on research which finds that entrepreneurial firms are no more productive than nonentrepreneurial firms.¹¹ Detailed interventionist studies show that better management of human resources and organizational changes have raised productivity in entrepreneurial firms. Mason (2020) argues that top management teams (TMTs) are key to scaling up of small firms, but are often not put in place because of cost considerations and short-termism.

While the strong focus on micro-businesses and SMEs in these chapters is aligned with the notion of a long tail of low productivity firms in the UK, I think the volumes miss out on discussing the disproportionate contribution that large firms make to productivity. Despite the negative impact of a long tail of less productive (often smaller) firms on aggregate productivity, much is offset by better productivity performance of the larger firms. The presence of large productive firms can also help to integrate smaller firms in to regional, national and global supply chains, and invest in capabilities or business development at the tail end of the distribution of firms.

Skills, Labour Market and Well-being

Four chapters in the first volume address the challenges regarding the contribution of human capital to productivity. (Abreu, 2020) provides an excellent overview of the challenges from the level of early childhood education, primary and secondary schooling, higher education to adult skills. On the performance of the first three categories, the picture that emerges is rather consistent in that, on average, the UK is not far away from the OECD average. But the disparities in terms of access and performance in education are relatively large between socio-economic groups and regions in the UK.

There is mounting evidence that underperformance across large swaths of the population, even at the level of early childhood and primary schooling, can seriously constrain the productivity performance of individuals and the organizations they work in at a later stage in life. The skills problem in the UK is exacerbated by the widely documented underperformance in adult skills and further education (FE), where it underperforms more broadly compared to other countries. A lack of attention to non-cognitive skills and underfunding outside the formal education system are some of the issues which need to be urgently addressed.

Lisenkova (2020) discusses the demographic challenges for the labour market related to aging of the workforce, and New-

¹⁰ See, for example, Bloom and Van Reenen (2007) and Haldane (2017).

¹¹ Entrepreneurial firms are defined as being less than 7 years old, employing fewer than 100 people and which are also new market entrants (Van Praag and Versloot (2007)).

some and Vorley (2020) provide a broad overview of labour market issues, including new workplace arrangements, labour market flexibility, and other changes in employment relationships. Both chapters point to major data gaps, such as the scarcity of employer-employee datasets and data on non-standard work in the UK, which need to be addressed before more definitive statements on the impact of aging and workplace settings on productivity can be made. Both chapters also point at the need for better data on skill requirements by employers in order to reduce mismatches in skill provisions.

Although touched upon in various contributions, the article by McSorley (2020) is the only chapter that explicitly addresses the topic of productivity and well-being. The chapter describes that the link between productivity and wages has weakened. While productivity growth may be necessary for raising wages, it does not seem to be sufficient to sustain living standards widely across the economy. Job quality and employee engagement provide positive incentives to workers to raise their productivity and positively impact on their living standards and well-being. This also brings back a decades-old debate on the causality between productivity on the one hand and well-being and living standards on the other. While research at the macroeconomic level mostly focuses on the causality running from productivity to higher wages, income and living standards, in much of the innovation, sociology and human resources literature the interest is pri-

marily in the reverse causality.¹² McSorley argues that productivity needs to be a key component of an inclusive growth agenda, and suggests that demand-side policies as well as digital and other forms of technological diffusion to support rather than undermine inclusive growth are key elements for better securing that link.

Regional Disparities

On all dimensions discussed so far the high degree of regional disparities in the UK has been looming in the background. McCann's article in the first volume (McCann, 2020) summarizes the peculiar pattern of geographical inequalities in the UK, which is described in much more detail in his earlier work (McCann, 2016). In sum, the UK's geographical inequalities are not so much the result of the well-known differences in productivity performance between agglomerations and smaller towns and rural areas. Instead there is a true regional disparity in the UK whereby London and the Southeast not only outperforms all other UK regions but also most other agglomerations in OECD countries. In contrast, most other regions in the UK (including many cities) systematically underperform relative to London and the Southeast as well as to comparable regions in terms of population and level of economic activity in other countries. In fact, many UK regions have levels of productivity more comparable with regions in Central and Eastern Europe than regions nearer by in Northern and Western Europe.

The contributions by Gardiner and

¹² See also, for example, OECD (2018), and Isham, Mair and Jackson (2020).

Lewney (2020) in the first volume and Gardiner, Lewney and Martin (2021) in the second volume dive deeper into the differences in productivity growth between types of cities and towns as well as rural areas making use of the Cambridge Econometrics Local Area Database. While largely confirming the broad pattern of the London and Southeast productivity advantage, certainly in terms of productivity levels, there are also substantial differences in growth performance between cities and towns across the UK. For example, some cities which are smaller in size than the UK's eleven core cities outside London performed as well on productivity growth as London did over the past decade. And while the core cities were on average weaker in growth terms than the average for smaller cities, they clearly outperformed small towns and rural areas with villages. Within regions there are still large differences between localities though often related to specific well-performing hotspots with a small number of star companies (in some cases only one) with limited spillovers to other firms in the region. This again points to the challenges of startups and SMEs across the UK discussed above.

Whatever the precise reason for the regional disparities, the persistent nature of these disparities creates a significant policy challenge, referred to as the “regional innovation paradox”. This paradox points to the inability of underperforming regions to effectively utilise the government pro-

grammes for innovation and entrepreneurship because they miss the essential capabilities to absorb the new investments. This observation has important implications for the levelling-up agenda in the UK aimed at improving the fortunes of disadvantaged regions. Large fiscal transfers, moving government offices out of London, or building high speed rail services from London to the North may help, but do not in themselves create the absorptive capacity for regions to regenerate growth.

At the end of the day, the question arises is what is required to rebalance the economy in terms of reducing sectoral and spatial disparities. Gardiner and Lewney (2020) argue we need a better understanding of how underutilized resources can be productively used, what the innovation capabilities of different sector activities are, and how to identify the skill requirements for rebalancing. But even before that come other important questions such as what rebalancing should actually achieve, whether the levels of inequality are in fact efficient or the result of market or policy failures, and how economic efficiency related to what is socially or politically acceptable.¹³

The Impact of COVID-19

Enter COVID-19. As mentioned above, the contributions in the second volume were written in the summer of 2020, and while most insights on future impacts on productivity were still speculative¹⁴ the au-

¹³ See, for example, Floerkemeier, Spatafora, and Venables (2021) for a discussion.

¹⁴ The impacts of the pandemic on productivity have also been discussed by, for example, Bloom *et al.* (2020) and Riom and Valero (2021).

thors wisely took a cautious approach.

Some of the chapters in the second volume build on insights from the first volume, outlining the short-term disruptions of the pandemic against the long-term underlying trends. For example, Henley, Vorley and Gherhes (2021) point at the risk of the long tail of unproductive firms being most affected by government restrictions and more dependent on the business support programmes put in place during the pandemic. This creates the risk that more zombie-type firms will continue to exist in this segment of firm size. Mason and Hruskova (2021) point at the damage the pandemic does to knowledge sharing among firms, and Mason (2021) provides an interesting complementary argument to his analysis of business financing in the first volume (Mason, 2020), namely that angel investors backed out relatively early in the pandemic, providing another disadvantage to SMEs relative to larger firms.

Other contributors directly address the impact of COVID-19 on productivity. For example, Mills, Whittle, and Brown (2021) uses insights from behavioural economics to identify longer-term impacts of the acceleration in technology and the use of data-driven business models on consumer's online shopping behaviour. While disruptive in terms of its impacts on firms and workers, the exact implications for productivity will remain unclear until consumers will have adapted to a new "equilibrium" of on-line versus off-line consumption. Huggins and Thompson (2021) argue that while the concentration of innovation activities in cities will not evaporate because of the pandemic, the drop-off in commuting and the declining need for face-

to-face interactions might bring about behavioural changes that could become permanent and facilitate spatially distributed innovation systems.

Even with the possibility of opportunities for productivity improvements emerging from the pandemic, most contributors in the second volume point at the need for active policy intervention to not only realize the opportunities but also to limit the damage COVID-19 can do to productivity and prosperity. For example, the fragile link between productivity and well-being described above has become more exposed during the pandemic, requiring strong policy responses. Green (2021) describes how the pandemic caused educational disruptions and negatively impacted on skills formation. Kopaskar (2021) provides an account of the pandemic's impact on mental health and economic insecurity. Findlay, Lindsay, and Roy (2021) discuss employee experiences and engagement, and Jones (2021) looks at the rising mismatches in the job market during the pandemic. All these factors point at the possibility of substantial scarring effects on the labour market and rising inequalities because of the pandemic. Those effects are likely to be only reflected in the productivity numbers with a significant delay.

Most importantly, the second volume brings up the impact of uncertainty and the need for resilience in times of crisis. Harris (2021) points at the greater vulnerability of global supply chains to shocks and the possible incentives for automation to reduce uncertainty and for reshoring to strengthen resilience. Sena and Bhaumik (2021) look at firms' supply chain decisions in times of uncertainty, expressing concerns about the

effects from finance constraints for companies to invest in a restructuring of supply chains. They call for government to align their fiscal policies at national, regional and local level with the requirements of industrial policies in times of uncertainty.

Ernst (2021) explicitly questions the emphasis by businesses and policy makers on static efficiency gains and cost savings in past decades, supported by a combination of technological change, deregulation and globalization. This has overexposed economies to economic shocks causing a potential threat to long-term sustained growth in productivity. Ernst argues for a reset of the policy framework to balance efficiency gains and resilience needs by adopting a longer-term view. He also supports creating redundancies and buffers to deal with crises, focusing more on the provision of public goods, raising agility in bringing technological solutions to bear (as happened, for example, in health care technology during the crisis), and improving communication and expectation management.¹⁵

Cook and Vorley (2021) point at the need for greater resilience in innovation policy and argue for a broader set of criteria in assessing the effectiveness of innovation policies including a widening of objectives in terms of societal, environmental and health related targets and a greater emphasis on diffusion and adoption of innovations.

Policy and Institutions

Throughout the two volumes the impor-

tance of policy for productivity is prominent. Given the diversity of topics covered, it is obvious that the policy recommendations also refer to a large number of domains touching on productivity. Those include education and training, innovation, fiscal policy, housing, transportation and infrastructure, health care, energy, agriculture, and regulations in labour, product and capital markets.

Many of the policy issues come together in the final three chapters of the first volume, where the preference for a systems approach to policy is a recurring theme. Vorley and Nelles (2020:278) argue that “productivity is . . . about more than the coordination of policy areas, in that it is about the capacity to respond to dynamic economic challenges that change over time and in relation to the actions of other individuals, industries and economies”. A systems approach to policy allows for a focus on intersections and interdependencies of policy domains rather than a siloed approach. The arrival of COVID-19 has provided a push to this change, as siloed policies have turned out to be useless in times of crisis as Nelles, Vorley and Brown (2021) discuss in their contribution in the second volume.

Cook, Hardy and Sprackling (2020) provide a useful review on how key policy domains related to productivity, in particular business support, innovation and skills, have evolved since the late 1990s. They describe the five driver framework (investment, innovation, skills, enterprise and competition) for productivity introduced under the Labour government in

¹⁵ See, for example, Coyle, Dreesbeimdieck and Manley (2021).

the 1990s and early 2000s, and the creation of the nine Regional Development Agencies (RDAs) to advance the growth and productivity agenda at the level of devolved nations (Northern Ireland, Scotland and Wales) and English regions. The Conservative-Liberal Democrats government abandoned the RDAs in the late 2000s and instead set up 39 Local Enterprise Partnerships (LEPs). The LEPs allowed for more specific place-focused strategies, supporting a more targeted approach of business support for growth companies with scale-up potential and creating more room for mentoring and peer-to-peer networks. But it also caused a greater centralization of key budgets and oversight by the UK government.

Cook, Hardy and Sprackling (2020) argue that the goal of simplifying the plethora of policy tools for productivity growth has not been achieved as the agenda has in fact become more complex. Policy devolution has in part transferred decision making to regional and local levels, but also caused horizontal and vertical fragmentation across policy domains and between different levels of government respectively. Underfunding, especially during the period of macroeconomic austerity after the global financial crisis, has made it more difficult to implement adequate policies at the level of LEPs.

The final chapter in the first volume by Dymski (2020) provides an interesting comparison of the UK with the policy environment in California (a state of comparable size to the UK economy). Any comparison of countries and regions with vastly different economic, social and political structures runs the risk of oversimplifying. How-

ever, the chapter does clearly show the risks of the top-down and overly centralized approach to science and technology in the UK. In California, the allocation of funds for science and technology is largely left to the business community in collaboration with a generally well-funded public post-secondary education system which collaborates at the local level and is networked nationally and internationally. The article also points to underfunding of regional and local policy initiatives risking an effective devolution of policies for policies. But not all is sunshine in California, as Dymski mentions the failure of California's policy mechanisms to deal with the large degree on economic inequalities in the state, flying in the face of the concept of inclusive productivity growth discussed below.

How From Here To There?

In this final section, I aim to sketch the key elements of future areas of research and policy development for productivity together, assuming the two are deeply intertwined. In doing so I rely heavily on the key insights from the two volumes above. However, while the volumes leave few stones unturned, there are still some key elements of the agenda that have been underexposed. Hereby, I will also rely on the current research agenda of The Productivity Institute (Van Ark and Venables, 2020), which has been inspired by the work of the Productivity Insights Network to quite some extent.

Science, Technology and Innovation

The first main area of focus for the future productivity agenda is science, technology and innovation. Most contrib-

utors emphasized innovation to support the adoption and absorption of technology. This seems to be the correct focus, especially in light of technology diffusion. However, the role of science and technology for productivity should not be underplayed, in particular not in the light of rise of data science and other digital technology applications.

Related to this, both volumes focused extensively on the role of SMEs and microbusinesses for innovation. This may leave the impression that the productivity puzzle is mostly or even exclusively about the long tail of smaller and less productive companies. While R&D spending is heavily concentrated in large incumbent firms, the limited presence of spillovers through supply chains and integration in regional innovation ecosystems are important factors adding to the productivity puzzle in the UK.

Skills, Labour Markets and Inclusive Productivity Growth

The second main area of focus for the productivity agenda is skills, labour markets and inclusive productivity growth. The critical importance of skills, arising from general and vocational education as well as formal and informal programmes for adult skills, is well covered in both volumes. The potential scarring effects of the pandemic can have long-lasting effects on cohorts of the future workforce, and the policy agenda should also explicitly address those challenges for productivity effects in the longer-term. While flexible and other new types of work arrangements are explicitly covered in the chapter by Newsome and Vorley (2020), they do not explicitly deal

with the rising importance of gig economy jobs and other work arrangements linked to new technologies. The future productivity agenda should explicitly address how such new arrangements are related to worker engagement and how gig workers can benefit productivity growth in material terms through wages as well as in less tangible ways through employee engagement and worker satisfaction. Finally, I have explicitly added the term “inclusive productivity growth” to this area of focus. Inclusivity is critical from the perspective of generating a broad sharing of the benefits of productivity growth. However, it relates as much to what makes workers productive, including education, health, housing, and transportation (OECD, 2018).

Integrated Policies, Institutions and Governance

The third main area of attention in the productivity agenda focuses on integrated policies, institutions and governance. The systems approach, which is advocated by several contributors to the two volumes, is critical to integrate the horizontal and vertical elements of policies that are relevant to productivity. However, such approaches put a huge demand on the quality of policy making and the skill set of policy makers. Interdisciplinary thinking, a long-term focus, continuous learning, and willingness to experiment and to accept failures are just a few of the competencies that are required. Such traits are not only needed at the national policy level, but also at regional and local levels.

There is a risk of overengineering the policy environment, which could in turn lead to knee-jerk responses by (re)centralizing

policy initiatives trying to reduce fragmentation and complexity. To balance countervailing pressures between centralization and devolution, the research community needs to develop complementary interdisciplinary approaches to provide policy makers with the critical evidence on which they can base their policies.

Spatial Performance in a Global Britain

The fourth area of focus in the productivity agenda is the spatial performance in a global Britain. Understanding the causes of persistent regional disparities and how to unlock the sources for productivity growth are crucial pieces of that agenda. However, regional performance should not be looked at purely in the national UK setting but also be understood in light of the rapidly changing international context. Although the introductory chapters to both volumes and the scene-setting article by McCann (2020) in the first volume are helpful, the volumes could have benefited from greater depth on the international context of the UK productivity puzzle in the light of changes in the global economic environment and the UK response to those.

The divisive nature of the political discourse at the time of writing their contributions, may have made authors wary to take on the productivity implications of Brexit. But the ambitions of the political agenda for a new Global Britain need to be scrutinized for its implications on productivity of frontier and laggard firms. For example, the consequences of a redirection of trade flows between Britain and its key trading partners for productivity need to be better understood. New technological alliances may also have important implications for

the sectoral and spatial distribution of future productivity gains in the UK.

The comparative perspective on productivity performance between regions and nations also needs to extend to the industry level. While there are some references in both volumes to the impact of new trade relationships for productivity growth in the most exposed sectors, a more systematic analysis would be welcomed. This work would not just be relevant to better understand whether exposed sectors will continue as key drivers of productivity and whether, for example, certain manufacturing industries, despite their small share in output (and even more so in employment) still matter disproportionately for stimulating productivity growth at the aggregate level. It would also be relevant to understand which type of industrial activities within regional and national supply chains or global value chains may add most to a productivity revival. The direct and indirect effects of foreign direct investment and the degree to which such investment strategies are technology-sourcing or technology-exploiting, as discussed by Harris (2020) in the first volume can also be addressed in this context.

Measurement of Productivity

The fifth area of focus is on measurement of productivity and productivity-related matters, including aspects of inclusive productivity growth. The contribution by Sena (2020) in the first volume provides an outstanding review of definitional and measurement issues, including a very useful overview of 69 data sources from the Office of National Statistics and other data providers which are of relevance

for productivity research. The author argues that these data sources provide great opportunities for improved measurement of productivity-related drivers at a granular level. However, she calls for a significant intensification of efforts by the Office of National Statistics and the research community to match the various data sources and build longitudinal firm-level and household datasets by which employer and employee activities can be linked and followed over time.

Such matched and linked datasets will be essential for a better understanding of the geographical dynamics and the various elements of absorptive capacity within firms and regions. The call by Waind, Ritchie, and Bailey (2021) in the final contribution to the second volume shows the potential of how linked data from the Administrative Data Resources (ADR) have been used to provide critical and timely information on the effects of the pandemic on the economy and people's lives.¹⁶ Official government data sources can be also be mapped on semi-public datasets such as the Decision Makers Panel at the Bank of England and a large range of private data sources in the area of labour markets and business statistics.¹⁷

A critical extension of the measurement agenda for productivity includes the factors related to inclusive productivity growth. McSorley (2020) in the first volume calls for improved measures of social infrastructure, which could simply mean an extension of physical infrastructure to support

social objectives, such as health care, housing and education. More broadly, social infrastructure, could also measure the extent to which broad access to factors such as health care, education or housing is guaranteed. This would help to not only better understand the costs and benefits of social infrastructure in purely monetary terms but also in terms of its effect on well-being and living standards.

Climate Change and Net-Zero Emission Policies

Finally, one key element that is largely missing from this rich collection of research on productivity are the challenges from climate change and net-zero emission policies. So far there has been surprisingly little discourse, let alone research, on the productivity implications of a net-zero agenda, and it is often assumed that in the long-term it might be beneficial. However, in the short-to medium-term it seems most likely that the resource-intensive transition from the highly productive and capital-intensive exploitation of fossil fuels to a non-fossil energy system will have negative effects on productivity growth. In addition, sectors that are heavily dependent on energy, such as basic goods industries but also the transportation sector will face high adjustment costs when switching to new energy sources impacting productivity. The potential productivity gains from green technologies are likely to come from mitigating the detrimental effects of climate change and, in the longer term, from productivity gains

¹⁶ See www.adruk.org.

¹⁷ See <https://decisionmakerpanel.co.uk/>.

across the economy once clean technologies are scaled up and innovations from the circular economy are widely adopted.

Conclusion

To conclude, these two volumes from the Productivity Insight Network represent a major achievement in bringing together a broad range of insights related to the productivity puzzle. Many of the articles reflect the business school background of the contributors, bringing different perspectives from management, finance, innovation as well as a good deal of economics together in one place. The next step for the research agenda is to build a truly integrated research agenda which aims to answer the many relevant questions from an interdisciplinary perspective. Indeed, the systems approach applies as much to policy making as it does to research, and academia, business and policy makers will need to look at the key issues together. Only in this way can the many pieces of the productivity puzzle be put together into a wholesome picture that could point the direction towards a new era of revived productivity growth.

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