

Covid-19 and Productivity Impact and Implications

By Paul Mortimer-Lee
and Adrian Pabst (eds.)



Covid-19 and Productivity: Impact and Implications

National Institute of Economic and Social Research
Occasional Paper LXII.

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Registered charity no. 306083
ISBN: 978-1-9162584-4-0



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THE NATIONAL INSTITUTE OF
ECONOMIC AND SOCIAL RESEARCH

Occasional Paper

LXII

**Covid-19 and Productivity:
Impact and Implications**

Paul Mortimer-Lee and Adrian Pabst (eds.)

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ECONOMIC AND SOCIAL RESEARCH

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Contents

<i>List of figures</i>	iv
<i>List of tables</i>	viii
<i>About the editors</i>	ix
<i>About the contributors</i>	x
<i>Foreword</i>	
<i>Bart van Ark</i>	xiv
<i>Preface</i>	
<i>Paul Mortimer-Lee and Adrian Pabst</i>	xv
1 Covid-19 Questions for Labour Productivity	
<i>Jagjit S. Chadha</i>	1
2 The Covid-19 Shock and Productivity: A Sectoral View	
<i>Kemar Whyte</i>	9
3 Unemployment: the Dog that Didn't Bark (Yet)	
<i>Rory Macqueen (with contributions from Larissa Da Silva Marioni)</i>	23
4 Firm Indebtedness, Investment and Productivity	
<i>Issam Samiri</i>	34
5 International Trade, FDI and Productivity	
<i>Gabriele Ballicu, Ana Rincon Aznar, Catherine Robinson and Manuel Tong</i>	47
6 The Digital Divide and Technology Adoption in Covid Times	
<i>Gabriele Ballicu, Ana Rincon Aznar, Catherine Robinson and Manuel Tong</i>	71
7 Firm Creation, Geography and Productivity	
<i>Barry Naisbitt</i>	88
8 The Impact of Covid-19 on Early Years Education and Beyond	
<i>Claudine Bowyer-Crane</i>	106
9 Governance, Institutions, and the Policies of Productivity	
<i>Adrian Pabst and Andy Westwood</i>	120
10 UK Industrial Policy in the Era of Covid-19	
<i>Konstantinos Myrodiadis</i>	142
<i>List of Occasional Papers</i>	152

List of figures

Figure A	Covid-19 in context – a comparison with previous recessions	xvi
Figure B	Unemployment revisions following extensions to the furlough scheme	xvii
Figure C	Ratio of regional productivity to the UK average	xviii
Figure D	Income and asset inequalities (source: ONS and Bank of England)	xix
Figure 1.1	UK Output, Productivity, Employment and Investment at the end of 2021	2
Figure 1.2	Recent Trends in GDP Per Head in the UK	4
Figure 1.3	Exogenous Supply with Demand	4
Figure 1.4	Endogenous Supply with Demand	5
Figure 2.1	Growth rates of UK labour productivity and components	12
Figure 2.2	Growth rates of UK labour productivity and components by sector	13
Figure 2.3	Contributions to productivity growth	15
Figure 2.4	Composition effects as a major driver during Covid-19	16
Figure 2.5	Productivity in non-market services	17
Figure 2.6	Illustrative effect of stay-at-home measures on sectoral GDP	18
Figure 2.7	Employment spillovers from a social consumption shock	20
Figure 3.1	GDP and unemployment after five quarters of recession	26
Figure 3.2	Furlough and potential unemployment	27
Figure 3.3	UK labour productivity since 2000	28

Figure 3.4	Share of under-25s in employment and furloughs	31
Figure 4.1	Total credit to non-financial corporations in the United Kingdom (per cent of GDP)	36
Figure 4.2	Debt service ratios (DSR) of non-financial corporations in the UK (per cent)	37
Figure 4.3	Total new corporate insolvencies	39
Figure 4.4	Kernel density of Workforce by labour productivity in constant prices of the workers' business by selected years (Great Britain)	42
Figure 5.1	UK Goods Export Growth 2016-2010	49
Figure 5.2	UK Goods Import Growth 2016-2010	50
Figure 5.3	UK Goods Export Growth 2020-2021 (year-over-year)	51
Figure 5.4	UK Goods Import Growth 2020-2021 (year-over-year)	52
Figure 5.5	UK Quarterly Export Growth by Region (Q2 and Q3 2020 vs. 2019)	54
Figure 5.6	UK Quarterly Import Growth (Q2 and Q3 2020 vs. 2019)	54
Figure 5.7	UK Quarterly Export Growth by Sector (Q2 and Q3 2020 vs. 2019)	55
Figure 5.8	UK Quarterly Import Growth by Sector (Q2 and Q3 2020 vs. 2019)	56
Figure 5.9	UK Inward FDI: Number of Projects 2019-2020	59
Figure 5.10	UK Inward FDI: Number of Jobs Created 2019-2020	60
Figure 5.11	UK Inward FDI: Capital Investment 2019-2020 (US \$ Millions)	60
Figure 5.12	UK Inward FDI: Number of Projects by Region 2019-2020	61
Figure 5.13	UK Inward FDI: Number of Projects per source 2019-2020	62
Figure 5.14	UK Inward FDI: Number of Projects 2020 (year-on-year growth)	62

Figure 5.15	UK Outward FDI: Number of Projects 2019-2020	63
Figure 5.16	UK Outward FDI: Number of Jobs Created 2019-2020	64
Figure 5.17	UK Outward FDI: Capital Investment 2019-2020 (US \$ Millions)	65
Figure 5.18	UK Outward FDI: Number of Projects by Region 2019-2020	65
Figure 5.19	UK Outward FDI: Number of Projects per Destination 2019-2020	66
Figure 5.20	UK Outward FDI: Number of Projects 2020 (year-over-year growth)	67
Figure 6.1	Measures of digitalisation in the UK and major EU economies	83
Figure 7.1	Cumulative number of registrations by week	89
Figure 7.2	Annual change in new registrations by country (per cent, year to October)	93
Figure 7.3	Regional Labour Productivity in 2019 (index relative to UK = 100)	97
Figure 7.4	Annual Growth in Labour Productivity in Selected Sectors (per cent)	98
Figure 7.5	Labour Productivity relative to 2019Q4 (real GVA per hour worked, 2019 prices)	100
Figure 8.1	Areas of the EYFSP teachers were concerned about before school started in September 2020	107
Figure 8.2	Average minutes of childcare per day by gender of parent and age of child	109
Figure 8.3	Key Stage 1 pupils' learning is more dependent on parental involvement than older pupils	112
Figure 8.4	Possible lifetime earnings under different scenarios	114
Figure 9.1	Gross domestic product growth, hours worked growth, output per hour worked growth, 2020 relative to 2019	125

Figure 9.2	Contributions of capital deepening, labour composition and MFP to market sector output per hour worked growth, UK, US and Canada, 1987 to 2019	126
Figure 9.3	The organisation of the UK's health and social care system	127
Figure 9.4	Real GDP per hour worked index (2019Q1 = 100), US, UK and France	129

List of tables

Table 2.1	Domestic Final and Intermediary Demand for Products (shares)	19
Table 4.1	Change in total credit to private non-financial corporations (per cent of GDP) in the United Kingdom and other G7 economies	35
Table 4.2	Net financing raised by the UK's private non-financial corporations through various instruments from March 2020 to May 2021 (in £ millions)	38
Table 4.3	Proportion of SMEs in distress (either arrears or default on pre-existing loans) by sector, between January 2020 and January 2021 (per cent)	40
Table 4.4	Firm-level labour productivity (mean and median) and the firm' employment, age and ownership	41
Table 7.1	Per centage change in new business registrations by industry (year to October compared to a year earlier)	90
Table 7.2	GVA per worker in 2018 (£000)	96

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Foreword

Bart van Ark

This Occasional Paper on the impact and implications of Covid-19 on productivity by the National Institute of Economic and Social Research (NIESR) comes in the immediate aftermath of the pandemic. There is never a perfect time to reflect on the impacts of a crisis on the economy, employment and livelihoods. In the midst of the storm we are often blind, as data is scarce and in flux, and the long-term impacts get easily overhyped. And once the crisis is in the rear-view mirror, the focus is more on lessons from the past than real-time intervention to mitigate long-term effects.

However, during the Covid-19 crisis we benefited from advances in data sciences providing more real-time evidence than ever. We now have a better understanding of the short-term effects which are well documented in this book. The authors also explain how this time around important policy lessons from past crises have helped to avoid worse in damage to businesses and jobs. Finally, the book identifies some emerging trends – in part originating from before the crisis but strengthened by it – such as behavioural changes in remote work, an acceleration of digitisation, a change in business dynamics, and a new balance between resilience to shocks and international trade, FDI and supply chain dependencies.

The long-term impacts of the pandemic are still highly uncertain. This is especially true for productivity which only changes course in a significant manner over longer periods of time. This contribution from NIESR, which is a key partner in The Productivity Institute, highlights many key facets helping policy-makers and businesses to respond to the post-crisis challenges in a timely fashion and make productivity a key part of the UK's long-term recovery.

Preface

*Paul Mortimer-Lee and Adrian Pabst*¹

The Covid-19 pandemic has exposed many of the structural factors of the UK's poor productivity performance. While the exact timing of the productivity slowdown is contested, there is no doubt that UK productivity has been markedly lower in the years 2009-2019 compared with the period leading up to the global financial crash. Since then, output per hour growth was the second slowest across G7 advanced economies (ONS, 2022). And so the impact of Covid-19 has been exacerbated by long running weaknesses at the heart of the UK economic model and the policymaking process. That said key policy interventions during the Covid-19 crisis probably helped to avert a depression and greater damage to lives and livelihoods.

In the preface we summarise the key findings of our Occasional Paper on the impact and implication of the Covid-19 shock for UK productivity.

Impact on UK labour productivity

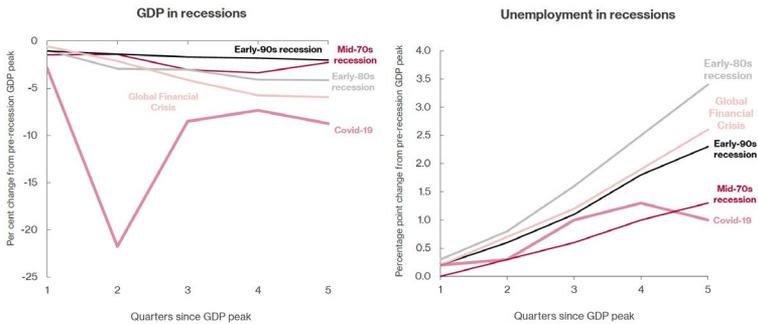
- Unlike previous recessions, hourly labour productivity did not fall sharply in the Covid-19 crisis (see Figure 2.1).
- Large composition effects as lockdowns affected low-productivity sectors more adversely within both manufacturing and services (see Figures 2.2, 2.3 and 2.4).
- Official measures of non-market services suggest a sharp decline, in particular in health and education (see Figure 2.5), but due to the way prices are calculated in the health sector (as the ratio of nominal expenditures to the measurement of activity), inflation in the health sector has been overestimated and the output of health services has almost certainly increased.

1 We are grateful to Jagjit Chadha for his comments and suggestions, and to Konstantinos Myrodiadis, Neil Lakeland, Matt Panteli and Issam Samiri for their help with editing this work.

Impact on the labour market

- Despite the largest post-war fall in GDP, unemployment rose by less than 1 percentage point and has fallen since the start of 2021, largely thanks to the Coronavirus Job Retention Scheme (furlough).
- The furlough scheme kept the unemployment peak unusually low, potentially reducing unemployment path dependency and long-term scarring compared to previous crisis episodes (Figure A).

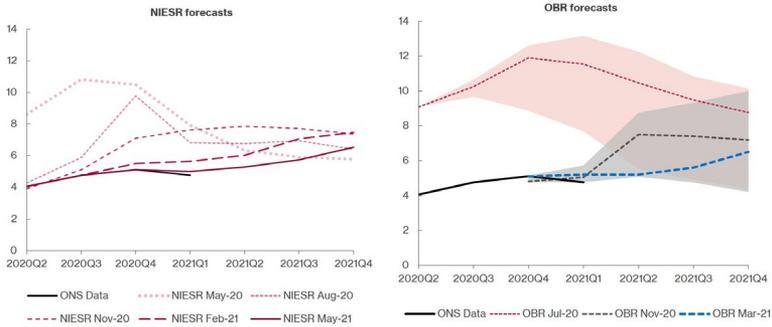
Figure A Covid-19 in context – a comparison with previous recessions



Source: NIESR

- Unemployment forecasts were revised downwards everytime the furlough scheme was extended (Figure B); NIESR called for a timely and not last-minute extension to reduce uncertainty for both businesses and workers.

Figure B Unemployment revisions following extensions to the furlough scheme



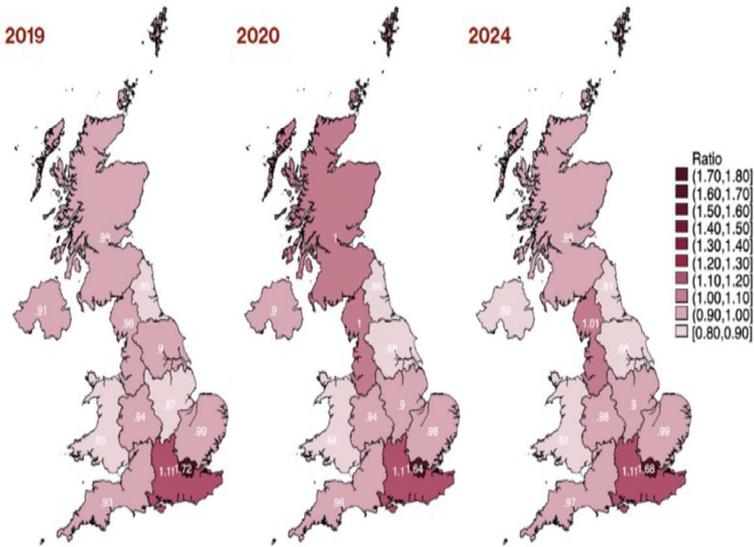
Source: NIESR

- The rise in unemployment has been far smaller than would be expected based on the experiences of previous recessions: without government intervention, a further 2.1 million jobs could have been lost and unemployment would have risen by about 6-7 per cent to about 10 per cent.
- The greater degree of furloughing among young workers owes more to their concentration in affected sectors (mostly service sectors where physical contact is harder to avoid) than to their lower productivity (see Figure 3.4)

Impact on regions, sectors and trade

- During the coronavirus crisis, productivity disparities between and within regions widened, while asset and income inequality increased (Figures C and D; cf. Bhattacharjee and Lisauskaite 2020a and b; Bhattacharjee et al., 2021a and b; Bhattacharjee et al., 2022).

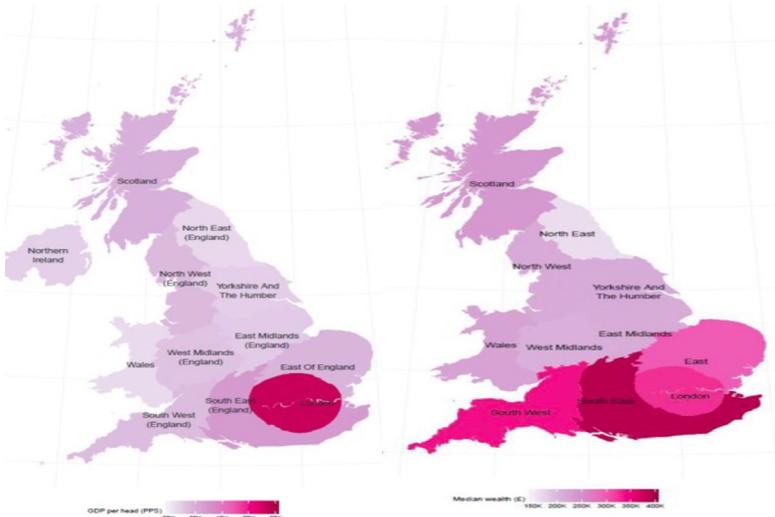
Figure C Ratio of regional productivity to the UK average



Source: NIESR

- The sectoral findings highlight the importance of the ICT and electronics sectors which appear to have attracted the lion's share of foreign investment before Covid-19; since then, the investment in the environmental (green) technology sector has risen in importance.
- The regional analysis of both inward and outward direct investment flows suggests that the more affluent regions continue to be the ones that reap the investment returns and job creation.

Figure D Income and asset inequalities



Source: ONS and Bank of England

Impact on firm creation

- Covid-19 and the associated lockdowns have been accompanied by a boom in firm creation in the UK, with the number of new business registrations 44 per cent higher in 2020 than in 2019 and with year to October 2021 new registrations 18 per cent above the equivalent period in 2020.
- Wholesale and retail trade new business registrations in 2020 ran at twice the level of the same period a year earlier and further expanded by almost 30 per cent in 2021.
- New firms have initially below average productivity levels, but if new firms survive the early years and develop into high growth firms, they have a positive effect on overall productivity growth.

Implications for SMEs and gaps in financial markets

- UK SMEs are more likely to be in the lower end of the productivity distribution; they have accumulated more debt than larger firms during the pandemic and tend to suffer from

steep financing costs due to increasing levels of leverage, higher perceived bankruptcy risk, limited access to bond markets and absent/lower credit ratings.

- This diverging credit landscape threatens the ability of smaller UK firms to invest in ways that improve their productivity and enables them to get closer to the productivity frontier, thus improving the country's overall productivity (debt overhang).
- Intangible investments, which are important to improve the firms' 'absorptive capacity' are more threatened by risks of debt overhang, given that they usually cannot be used as collateral for new debt contracts.

Implications for digitalisation

- Covid-19 led to a differential adoption in digital technology across sectors, regions, and households; this was exacerbated by the unequal geographic access to ultra-fast broadband, the varying abilities of firms to adopt new digital technologies and the heterogeneity in households' resources.
- The UK appears to be at the frontier in terms of consumer purchases and amongst the leading nations with regards to banking and selling online, but domestic internet access lags behind the Nordic nations and business-to-business online purchases are less established.
- For the UK digital economy to succeed complementary investment in skills and intangible capital are required on the top of tangible investments in infrastructure and other forms of tangible capital.

Impact on education

- Covid-19 caused massive disruption to education from Early Years settings all the way to post-16 education; the closure of early years settings meant that many young children did not receive the high-quality educational support that has been shown to have a significant impact on later educational outcomes.
- Total learning losses could equate to lifetime earning losses of between £8,000 and £22,000 per pupil (see Figure 8.4).

- The pandemic has already widened the disadvantage gap in terms of educational outcomes and has significant implications for social mobility; for example, learning loss for pupils in primary school in the first half of the Autumn term 2021/22 was higher for maths than reading, and higher for children from areas of disadvantage; in maths and reading respectively, the learning loss for children in disadvantaged areas was 4.3 months compared to 3.4 months and 2.2 compared with 1.7 for their more advantaged peers.
- The long-term effects of this missed learning will lead to an under-skilled workforce and reduce the country's productivity, with the "Covid generation" having lower skill levels and less earning potential, particularly from areas of social disadvantage.

Implications for governance, institutions and policy

- Covid-19 exposed four structural factors in British policymaking, especially (i) overcentralisation; (ii) weak, ineffective institutions and policy churn; (iii) policy silos; and (iv) short-termism that undermine the acceleration of productivity growth (cf. Pabst and Westwood, 2021).
- But the pandemic also demonstrated the potency of targeted policy interventions such as the various support schemes and the growing role of regional government in designing and delivering policy responses.
- Industrial policy highlights the case for a radical redesign of the UK's policy landscape, with a more interventionist and granular approach now seen as a key factor in bringing about stronger, sustained productivity growth.
- But the government's current 'Plan for Growth' is based on a short-term and top-down approach that lacks the strategic vision and the engagement with SMEs, regional authorities, and local communities to succeed.
- The concentration of power, policy discontinuities, and implementation inconsistencies in policymaking impede an effective industrial policy to improve productivity.

This analysis raises fundamental questions for policymakers at all levels in the UK, for example:

- Furlough may be a good example of macroeconomic policy (including aggregate demand policies) to mitigate adverse loops between demand and supply to limit long-term scarring.
- But the last-minute extensions exacerbated uncertainty while the long duration in 2021 may have delayed some sectoral recomposition.
- If productivity gains are concentrated in already high-performing businesses and are not reinvested to create employment and wage growth, economy-wide gains could be limited and short-lived.
- The shortfall in business investment, which has only climbed partially back to pre-Covid level, is likely to generate a long-term negative impact on productivity.
- The bankruptcy risk of SMEs has worsened during the pandemic, resulting in steeper financing costs, which could impair their ability to improve productivity after the end of the pandemic; the Recovery Loan Scheme for businesses (RLS) could help improve the financing conditions faced by SMEs.
- Support policies for new firms, such as business leader mentoring, sales and export advice, perhaps angel investing programmes, could be developed to encourage the longevity of start-up businesses that might otherwise fail to survive the early years and build a more sustained business community.
- Demand and supply can interact and result in higher output and employment volatility may cause firms to defer immediate investment plans.
- Policies for investment in frontier sectors should be embedded into a more strategic vision, new initiatives to attract FDI across the country are needed, R&D spending should be increased and allocated in a way to achieve the 'levelling-up' ambitions.
- The Early Years Education sector requires much greater investment, starting with a return to 2010 levels of support for Sure Start centres.
- Higher investment in digital infrastructure and skills is needed to address the skills mismatch that was exacerbated after Brexit and Covid-19, notably more STEM graduates but also vocational and technical training (e.g. by tripling the funding for mixed HE/FE colleges).

- A new industrial policy needs to be 'bottom-up', set new societal objectives (i.e., quality jobs, the environment and wellbeing), and be subject to regular evaluation independent of central government; it should be co-shaped and designed in consultation with business, especially SMEs, regional authorities, and local communities if it is to be effective and have long-term success.
- The National Infrastructure Bank located in Leeds is welcome, but its remit should be widened to that of a national development bank that can fund energy-efficient, socially affordable housing, provide assistance to SMEs and help with export finance, with a capital stock increased from £14bn to £50-100bn.
- Local councils need more decision-making powers and resources that are independent of HM Treasury, e.g. full business rate retention or a share of income tax receipts.

To conclude: the UK has one of the poorest productivity performances and highest spatial inequalities among the OECD's 38 advanced economies and this has been made worse by Covid-19. If policymakers return to the same economic structures post-pandemic that failed to resolve the productivity problem pre-pandemic, then the UK is set for another decade of a low-growth, low-productivity and low-wage economy.

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Covid-19 Questions for Labour Productivity

Jagjit S. Chadha

Introduction

This year may finally see our emergence from the shadow of the Covid-19 pandemic. It is therefore a suitable moment to reflect on the prospects for productivity, which ultimately drives prosperity. The data in Figure 1.1, although it will almost certainly be heavily revised, can be used to draw some tentative inferences. The precipitous fall in GDP was the cost of both the pandemic and the response to contain its spread. The UK has probably returned to pre-Covid levels of economic activity.

The story on labour productivity is a little more complicated. There were significant compositional effects during lockdowns as less productive firms, such as socially interactive services, were more directly affected but, if we put those effects to one side, productivity may not be so far below its pre-crisis level. With the help of the Coronavirus Job Retention Scheme, the pattern of aggregate employment looks to some extent like a traditional recession with employment lagging output and slowly returning to its pre-crisis level. The real gap seems to be around business investment that has only climbed part of the way back to its pre-crisis level, leaving the capital to output ratio well below its long run historical level.¹

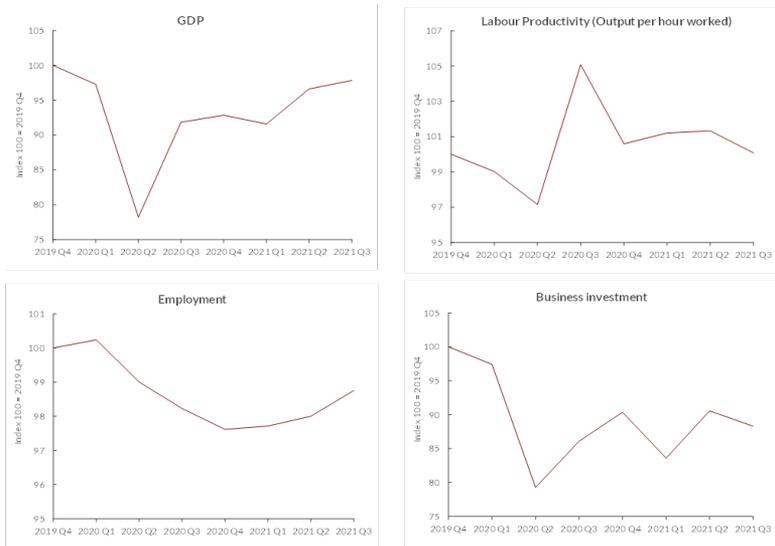
And it is this shortfall that may be the trigger for any long-term negative consequences for productivity. Given the close association between capital accumulation and productivity, it would seem that promoting investment in various forms of capital (physical and

1 See Chadha (2017) for an examination of the landscape of the UK economy in particular Figure 4 for the secular decline in the capital-output ratio.

2 | Impact and Implications

otherwise) across the country may be the best way to ensure a stable and robust recovery.² The question then for policy is how to do just that on a sustained basis.

Figure 1.1 UK Output, Productivity, Employment and Investment at the end of 2021



Source: ONS, NIESR calculations.

Managing Growth

The canonical macroeconomic models of economic fluctuations do not have a role in explaining trends and patterns in productivity. Indeed, productivity trends are largely treated as exogenous. This means that the capacity of the economy is treated as a constraint on demand and, as a result, policy concentrates on ensuring that demand does not exhaust notions of fixed supply. This paradigm has dominated the approaches to monetary and fiscal policy in the post-war period. Attempts to boost activity by a succession Chancellors,

2 A version of these comments was outlined at the November 2021 Workshop, Productivity and Structural Change, organised by the Bank of England, the Money-Macro-Finance Society, the Productivity Institute and NIESR. I am grateful for comments from Bart van Ark and Paul Mortimer-Lee on an earlier draft.

for example, by Barber, Lawson and Brown, have ended in bust rather than any sustained increases in prosperity. We face a similar question now as we, hopefully, approach the end of the Covid-19 pandemic as it appears that supply is constrained, and demand may need to be reined in if we are to avoid an escalating inflation risk. Yet, at the same time there is considerable evidence to suggest that aggregate productivity growth is neither fixed nor unaffected by well-designed policy interventions; that said, it is more of a question for the medium term rather than for the day to day of politics.³

The global financial crisis was associated with marked decline in the growth rate of productivity. Figure 1.2 illustrates this development in terms of GDP per head (per hour gives a similar story) and suggests that on current projections, it is possible that the Covid-19 pandemic may have some persistent impact on the level of productivity if not the trend itself.⁴ The question facing us is the extent to which the declines in productivity are part of a general phenomenon facing advanced economies or whether the UK is suffering from a specific set of circumstances that are amplifying the impact of any global slowdown.

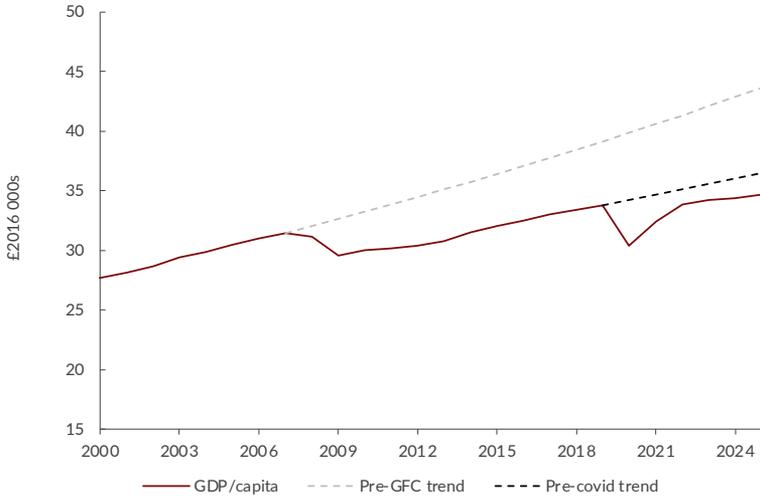
These questions then lead us to consider three key issues connected to productivity developments. What activities and which countries comprise the productivity frontier? How has the UK been converging to international best practice through trade and technology transfers? And finally, how do we encourage the most promising regions and sectors to adopt international best standards in productivity practice. Each of these questions is highlighted by the immediate impact and recovery from the Covid-19 pandemic and will be addressed by the Productivity Commission hosted at NIESR.⁵ For the moment though our analysis so far does not suggest that the structure of the economy has been disrupted into a new space, rather we seem likely to return to the same economic structures that failed to meet the productivity challenges prior to Covid-19 crisis.

3 A good start is Syverson (2011).

4 The projections are taken from the November 2021 NIESR UK Economic Outlook: <https://www.niesr.ac.uk/publications/recovery-stalling-not-soaring>

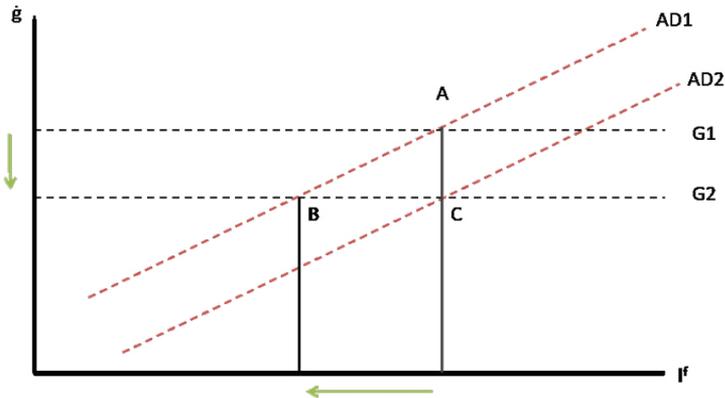
5 See <https://www.niesr.ac.uk/partner/productivity-commission>.

Figure 1.2 Recent Trends in GDP Per Head in the UK



Source: ONS, NiGEM database and NiGEM forecast.

Figure 1.3 Exogenous Supply with Demand



Note: l is labour force and \hat{g} is the trend rate of economic growth.

In the standard framework outlined in Figure 1.3, the level of economic growth (\hat{g}) is independent of labour employed (labour

force, labelled as l^f) or other measures of economic inputs. But aggregate demand will tend to increase with employment and may shift out with expansionary monetary and fiscal policies from AD1 to AD2, where AD signifies aggregate demand. In this setting, an exogenous fall in the economic growth rate from G_1 to G_2 would move the economy from A to B where there would be lower levels of factor employment. Unless. Of course, if expansionary policies were used to boost aggregate demand and create a high employment low growth equilibrium at C. One may wish to interpret the period since the financial crisis through this lens.

Figure 1.4 Endogenous Supply with Demand

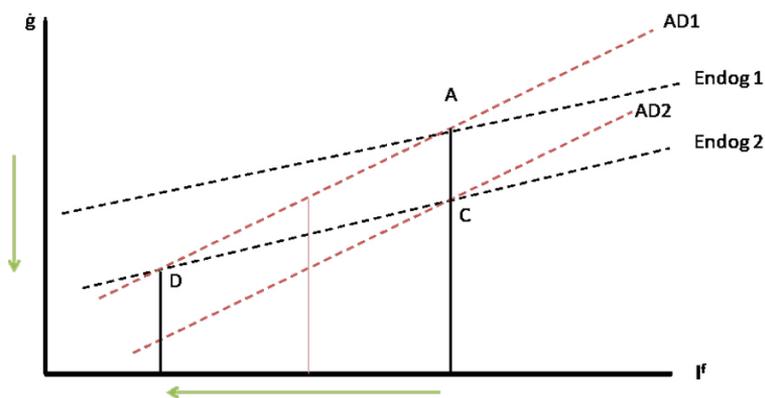


Figure 1.4 further shows that if growth is also some function of demand for factor inputs such as the labour force, e.g. arising from investment, trade, public good provision, then if there is the same downward shock to productivity growth, then the observed reduction in growth and labour employment will be amplified and can actually fall to point D. This is because a growth is no longer exogenous to the factors employed. If, as in this case, the active labour force falls when demands falls it reduces trend growth for example from the loss of firm specific knowledge.

But even here with appropriate demand management policy, the level of employment per se can ultimately be independent of the growth rate, as lower levels of economic growth can still provide full employment if aggregate demand rises to match fully employed

labour supply – prior to Covid-19 and since the global financial crisis we had full employment with lower growth and we look set to return to that level again. Even if the Covid-19 shock scars growth prospects then full employment can be obtained with expansive demand management policies and to an extent this is what we may have in prospect. But that high employment will not be accompanied by rapid increases in productivity and prosperity unless sustained policies shift up the endogenous growth path.

In this world, when there are demand shocks and an upwards sloping growth curve, output and employment volatility will tend to be higher. And, if we allow expectations of this variance to matter for the decision rules of firms, this may then have an effect on ongoing investment as firms may defer their immediate investment plans, particularly if carrying debt in the face of uncertainty. Persistently poor productivity performance may well then be a low equilibrium trap. It is one that has arguably trapped the UK, in particularly some of its regions. The point is that a failure to control output fluctuations through active demand management may have permanent, or at least long-lived, consequences for growth and employment patterns. But if we consistently rely on aggregate demand to reach full employment, we may then run into other traps that we now see. These will hamper future demand management options, as fiscal space may evaporate and monetary policy may get stuck at the Effective Lower Bound with quantitative easing acting to distort bond prices.

Conclusion

A new class of models are taking us away from a strict distinction between supply and demand. From the supply side, Guerrieri, Lorenzoni, Straub and Werning (2020) and Baquee and Farhi (2020) have explored a disaggregated model with multiple sectors, multiple factors, input-output linkages, downward nominal wage rigidities, credit-constraints, and a zero lower bound. Here various complementarities can mean that a negative supply shock can be amplified through a further negative shift in demand. However, annoyingly, it does not follow, with this approach, that demand management is necessarily more effective. It depends. Fiscal policy needs to be targeted e.g. furlough or skills training and monetary policy directed at firm births and exits. This means a more granular

approach to nurture a return to higher productivity. In Chadha et al. (2021) monetary and fiscal policy matter because they can combine to support financial conditions and support bank lending.

We may also face higher order problems. This is because uncertainty itself, resulting from significant news, might delay and defer investment and the extent to which this interacts with human and physical investment. Capital allocation may be quite impressively allocated from the City to the rest of world but how well does capital find its way to small and medium sized enterprises outside the South East and is the scale of ambition for the national infrastructure bank sufficiently large? The large public debt overhang will pose some difficult questions for tax and fiscal policy choices as the current framework places too much emphasis on reaching budget balance over the horizon of a parliament which may not correspond to the economic cycle. If taxes are out of sync with the economic cycle, they may interact with the firm dynamics of birth and death, particularly for indebted firms, and lead to a contraction in firm dynamism.

Financial structure may matter more than we might think and beyond firm-level decisions, Bunn et al. (2021), for example, show that positive household labour supply responses to negative income shocks are amplified for households carrying mortgage debt. If we fail to pay attention to a set of sustained policy interventions that are designed to promote higher levels of investment, the danger is not so much that Covid-19 affects productivity but that we simply go back to doing things how we did and that we do not build sufficient momentum to improve our national prosperity as we might think we deserve.

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The Covid-19 Shock and Productivity: A Sectoral View

Kemar Whyte¹

This section sheds light on the effects of Covid-19 on UK productivity by focusing on how labour productivity evolved in major sectors, drawing comparisons with the previous recession. We analyse the data on labour productivity by major sectors of the UK economy in response to the Covid-19 pandemic to show the 'within' and 'between' effects on sectors. The fall in output during 2020 was almost five times the size of the fall during the GFC. Despite this huge economic fallout, labour productivity, measured by output per hour, increased by 0.8 per cent in 2020, as the fall in hours worked was slightly larger than the fall in output. Further, contrary to the 2008-2009 crisis, 2020 saw an increase in productivity in all major sectors, except finance and insurance.

Introduction

The Covid-19 pandemic struck the world economy amid a decade that witnessed a broad-based decline in productivity growth. In most advanced economies, productivity growth slowed since the early 1990s. The prolonged deceleration in productivity growth before the pandemic sparked a debate on how it would evolve in the future given advances in digital technologies and the automation of production processes. Recent studies have stressed the importance of time lags in the adoption of new technologies. These lags may extend due to complexity in generating productivity growth from the recent round of new digital technologies since the early 2010s. These technologies include mobile, ubiquitous access to broadband, the rise of cloud storage, and advances in robotics and artificial intelligence (see De Vries et al., 2021). Other scholars advanced adoption barriers and transition costs as the reason for the disconnect between disappearing productivity growth and rapid technological change (Remes et al., 2018).

1 (with contributions from Hande Küçük and Cyrille Lenoel)

While productivity growth has been slowing for decades, the sharp downturn following the pandemic is alarming. The Covid-19 crisis generated concern that productivity may further decline due to the disruption in international and domestic supply chains, business bankruptcies, higher unemployment, and lower capital accumulation, having effects beyond the short-term (Baldwin and Weder di Mauro, 2020). From a theoretical perspective, the impact of large recessions on total factor productivity (TFP) is ambiguous ex-ante. On the one hand, models of knowledge accumulation (e.g., Grossman and Helpman, 1991) suggest that a fall in the proportion of the labour force dedicated to research and development following a negative output shock could lead to a long-lasting negative impact on productivity levels. More recently, using elements of endogenous growth theory, Benigno and Fornaro (2018) show how unemployment and weak aggregate demand might reduce firms' investment, leading to low productivity and low growth. The resultant stagnation trap sees depressed aggregate demand push nominal rates closer to the zero lower bound, limiting monetary policy's room for manoeuvre. On the other hand, models of Schumpeter's creative destruction (e.g., Caballero and Hammour, 1994) argue that recessions potentially have a cleansing economic effect by eliminating inefficient firms, thereby generating higher productivity and GDP growth.

The Covid-19 pandemic triggered a drastic change in the way the economy operates as households and businesses had to adjust to lockdowns and restrictions that led to unprecedented falls in economic activity and hours worked. The Covid-19 crisis put economies in suspended animation with potentially long-lasting effects on productivity due to persistent demand deficiencies, capital shallowing and labour scarring. However, the crisis also created opportunities to increase productivity through rapid advances in automation, digitalisation, and remote working. It is crucial to understand how much of this change, including implications for productivity growth, will persist in the long-run.

The pandemic and associated lockdowns had asymmetric effects across sectors of the economy, with those relying on social contact with consumers facing the worst consequences. Economic activity has been relatively less affected in sectors where workers have had the necessary technology and security to continue operating while being physically separated from the workplace. There were also important differences in the extent to which sectors adopted new technologies to adjust to the structural changes posed by

the pandemic. Accordingly, this section aims to shed light on the effects of Covid-19 on UK productivity by focusing on how labour productivity evolved in major sectors, drawing comparisons with the previous recession.

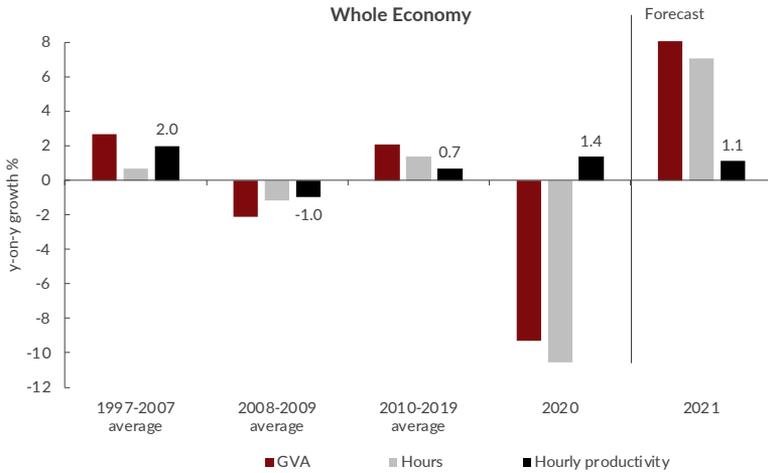
Recessions can affect aggregate productivity through two different sectoral developments. The first is through recessions' impact on within-sector productivity and the other from recessions inducing sectoral reallocations of input factors between sectors. In general, the effect through sectoral reallocation is unclear, given that labour can transition between various low and high productivity sectors, with an ambiguous net effect on productivity (Furceri et al., 2021). Pro-cyclical reallocation occurs when more productive industries are disproportionately affected by recessions (Barlevy, 2003). Whilst countercyclical reallocation occurs when input factor reallocation during a downturn leads to the destruction of less productive jobs and labour moving into more productive uses (Mortensen and Pissarides, 1994). Against this background, we analyse the data on labour productivity by major sectors of the UK economy in response to the Covid-19 pandemic to show the 'within' and 'between' effects on sectors.

UK Labour Productivity by Major Sectors During Covid-19 Crisis

Our preferred measure of labour productivity is output per hour. This preference is because the alternative measure, output per employee, underestimates productivity as the fall in employment during the pandemic was much more limited than the fall in hours due to the furlough scheme. We start by comparing the growth rates of aggregate labour productivity, total output per hour, over different episodes depicted in Figure 2.1. The first observation relates to the productivity puzzle – the significant slowdown in annual productivity growth post-GFC, dropping from an annual average of 2.0 per cent during 1997-2007 to 0.7 per cent during 2010-2019. The second observation is about how the Covid-19 pandemic impacted hours worked and output compared to the economic downturn of 2008-2009. The fall in output during 2020 was almost five times the size of the fall during the GFC. Despite this huge economic fallout, labour productivity, measured by output per hour, increased by 1.4 per cent in 2020, as the fall in hours worked was slightly larger than the fall in output. As a result, annual productivity growth has not declined as it did during the GFC and has regained its post-GFC average, but

with completely different patterns in output and hours. The decline in productivity growth during the financial crisis reflected a larger fall in output than hours.

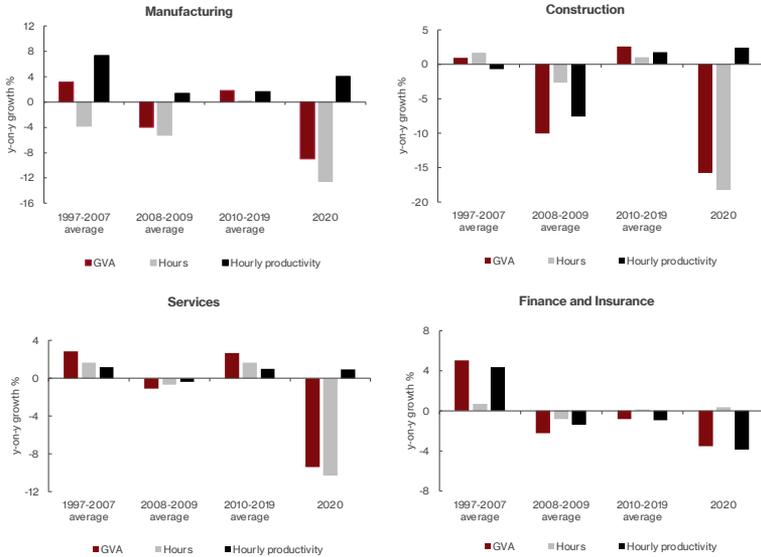
Figure 2.1 Growth rates of UK labour productivity and components



Source: ONS and NIESR calculations

The Covid-19 pandemic impact on the sectors of the UK economy was uneven due to the nature of the containment measures. The impact of the pandemic was mitigated in sectors where contact is easier to avoid, or remote working is an alternative to customer interaction, such as in finance and insurance (Küçük, Lenoel, Macqueen, 2021a). Figure 2.2 shows the breakdown of hourly productivity by four major sectors, i.e., manufacturing, construction, finance and insurance, and services excluding finance and insurance, highlighting sectoral differences in labour productivity due to Covid-19. We look at services excluding finance and insurance so we can isolate the impact on those industries that would have been directly affected by pandemic containment measures.

Figure 2.2 Growth rates of UK labour productivity and components by sector



Source: ONS and NIESR calculations

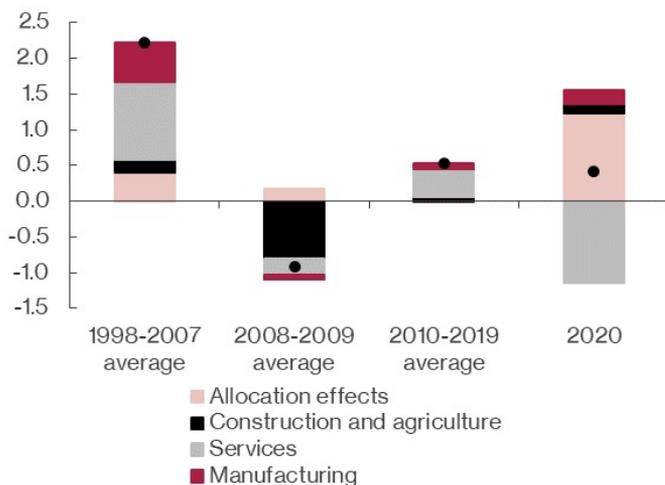
Contrary to the 2008-2009 crisis, 2020 saw an increase in productivity (as measured by a ratio of Gross Value Added, GVA, to hours worked) in all major sectors, except finance and insurance. There was a larger fall in hours worked than output. The lockdown restrictions during 2020 meant total hours worked fell in all major sectors, except within finance and insurance, where remote or teleworking was a feasible alternative to face-to-face work. Interestingly, hourly productivity in the manufacturing sector increased by 4.0 per cent during the pandemic, posting a growth rate significantly higher than its post-GFC growth rate of 1.6 per cent. The growth rates in hourly productivity in construction and services excluding finance and insurance (2.4 and 0.9 per cent, respectively) were more in line with their post-GFC averages, while finance and insurance posted a significant fall (-3.8 per cent) in hourly productivity during 2020. While there was a general decline in the volume of bank transactions, a decline in card payments, and a fall in the use of ATM cash machines resulting in a fall in sectoral GVA, finance and insurance hours worked increased (Ozili and Arun, 2020).

The observed fall in GVA within finance and insurance is likely to reflect spillover effects. Spillovers mainly impact downstream sectors like the private traded sector, finance, and utilities, as discussed below. These sectors are vulnerable to the loss of demand for their services from the shutdown of other sectors (Lenoel and Young, 2020 and 2021). The manufacturing sector, which is more integrated in supply chains and therefore more susceptible to spillovers, also experienced significant declines in both hours worked and output. Notwithstanding, manufacturing's growth rate of hourly productivity increased to 4.0 per cent in 2020.

Allocation Effects

The increase in hourly productivity seen in 2020 to a certain extent reflects compositional or allocation effects, i.e., a shift of production from lower productivity firms toward higher productivity ones (Figure 2.3).² We employ the commonly used shift-share method to analyse these effects, by decomposing aggregate labour productivity growth into the contributions of within-sector productivity gains and structural changes caused by resource reallocation among sectors (see for e.g., De Vries et al., 2021).

2 See also section 7 which provides further details on productivity across regions and industries.

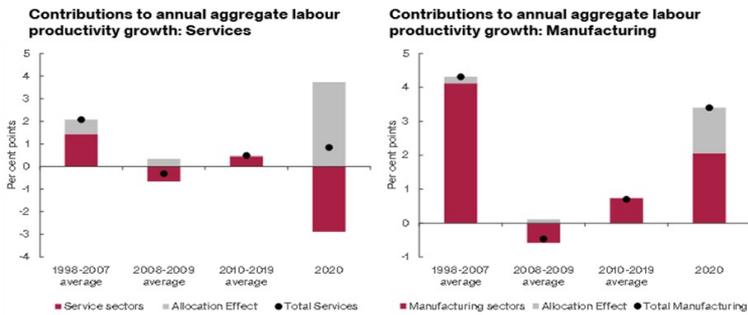
Figure 2.3 Contributions to productivity growth

Source: ONS and NIESR calculations

Figure 2.4 shows the contribution to annual aggregate labour productivity growth in the services and manufacturing sectors. It shows that the positive contributions from services and manufacturing shown above were also largely due to allocation effects within these respective sectors. In particular, the services sector shows a large fall in productivity for those industries that continued trading. However, the allocation effect (i.e., a shift of production from smaller and lower productivity industries toward higher productivity ones) means that productivity rose for the services sector as a whole. As the economy re-opens, we expect that those less productive industries will resume trading and therefore temper the observed rise in overall productivity. Interestingly, manufacturing sector hourly productivity increased by 2 per cent irrespective of the allocation effect in 2020. It is too soon to comment on sectoral productivity data, which are likely to be subject to significant revisions, but this might partly reflect accelerated use of new technologies, including digitisation and automation, as firms adjusted to the pandemic. However, if productivity gains concentrate in high-performing businesses and are not reinvested to create employment and wage growth, economy-wide gains could be limited and short-lived. The recovery in business investment might also be weaker than expected

if weak pre-pandemic trends continue due to the effects of Brexit (Crafts, 2019), deteriorated balance sheets, or persistent demand deficiencies, which could exert downward pressure on productivity growth.

Figure 2.4 Composition effects as a major driver during Covid-19



Source: ONS and NIESR calculations

Measurement of non-market services

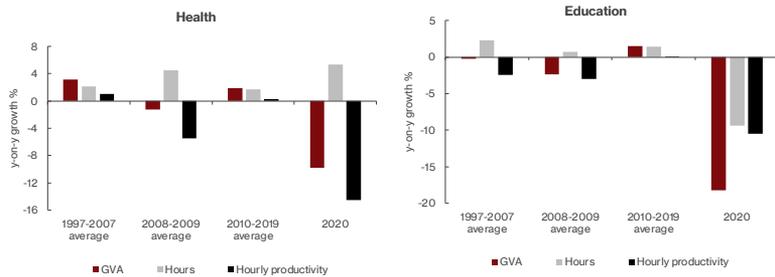
Covid-19 created enormous challenges for economic measurement as significant parts of the economy closed down due to lockdowns, and there were significant changes in the way the economy operates (see, for example, Athow, 2020). Measurement of non-market services such as health has been notably more challenging during the pandemic. Even during normal times, it is challenging to measure non-market services accurately. This difficulty arises because it is usually not straightforward to assign a value to their output that reflects a market assessment of the utility of the services being supplied. From a statistical standpoint, there are numerous issues involved in producing estimates for health and education. For example, there is no direct measure of output volume, so productivity becomes very difficult to assess accurately. These issues have become even more problematic during the pandemic, as previous health service output measures concentrated on services interrupted as the National Health Service (NHS) prioritised treatment of Covid-19.

Figure 2.5 shows a sharp decline in output and productivity in the health sector in 2020, despite the evident increase in some NHS activities during the pandemic, such as critical care, the new test

and trace system, and the rollout of vaccination programmes. Coyle et al. (2021) discuss the implications of deriving separate UK health service productivity measures based on quality adjustments. They also stress that independent of measurement errors, significant changes in the provision of health services due to Covid-19 exposed the limited capacity of the NHS and is likely to have potentially lasting effects.

As is the case with the health sector, there are several practical and conceptual difficulties associated with using output indicators for education, that have become even more difficult during the pandemic. The closure of schools has had an impact on the ONS' measures of activity and output volumes. For example, in "normal times", there is minimal variation in the number of students attending school in a year; this is no longer the present case. Further, remote learning, facilitated by teachers providing classes and material online, would not have been directly captured in the existing conceptual framework. Questions arise whether learning "counts" to the same extent as a student attending classes in person. (See Section 6 for a discussion of Covid-19, education and potential implications for productivity in the medium to long-term).

Figure 2.5 Productivity in non-market services



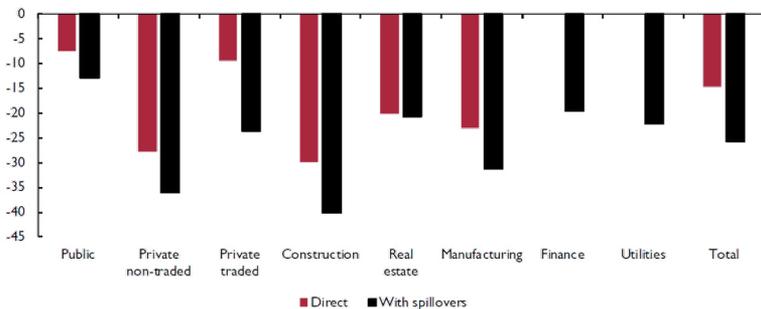
Source: ONS and NIESR calculations

Covid-19 and Sectoral Spill-over Effects

While the first wave of the pandemic from March to June 2020 led to severe disruptions in nearly every sector, the second wave from October 2020 to March 2021 mainly affected activities related to social life: eating at a restaurant, going to a movie, or staying at a hotel.

Lenoel and Young (2020) describe the effect of the first lockdown on sectoral GDP by distinguishing between the directly impacted sectors, like private non-traded services (PNTS), and sectors indirectly impacted, like finance and utilities. Direct exposure to Covid-19 restrictions in upstream sectors feeds through, and limits demand in downstream sectors and for activities possible from home. The feed-through mainly impact downstream sectors like the private traded sector, finance, and utilities, which have less direct exposure to Covid (Figure 2.6). Accordingly, a lockdown that directly reduces GDP by 15 per cent could reduce GDP by around 25 per cent after taking spill-overs into account.

Figure 2.6 Illustrative effect of stay-at-home measures on sectoral GDP



Source: Lenoël and Young (2020).

The key relationship is the supply and use table presented in Table 2.1, which forms the basis of NIESR's dynamic sector model that allows analysis of sectoral spill-overs (Lenoel and Young, 2021). The table shows how the demand for intermediate and final goods and services (shown by the columns) flows across different products (shown by the rows). According to this relationship, the direct spill-over effects from a reduction in PNTS products would be most acute in private traded services (share of 37 per cent shown in column P's

intersection with Row I), manufacturing (share of 29 per cent shown in column C's intersection with row I) and construction (share of 12 per cent you do it).

Lenoel and Young (2021) illustrate the impact of a forced reduction of social consumption by assuming a reduction in (final and intermediate) demand in private non-traded services (PNTS) equivalent to 1 per cent of GDP.³ Including the indirect effects of all sectors feeding into each other, the sectors most affected by a 1 per cent of GDP social consumption shock were imputed rent (decline in GVA of 0.4 percent), manufacturing (-0.36 percent), private traded sector (-0.25 percent), construction (-0.25 percent) and agriculture and utilities (-0.25 percent).

Table 2.1 Domestic Final and Intermediary Demand for Products (shares %)

		Products									
		A	B	C	F	G	I	K	L	P	
Intermediate consumption	Agriculture and utilities	A	50	20	14	2		2	4	8	
	Mining and quarrying	B	5	33	33	7		2	11	23	
	Manufacturing	C	10	6	64	1		1	5	11	
	Construction	F	1	2	26	43	1	3	3	18	
	Public	G	5		32	4	16	11	3	30	
	Private non-traded services	I	3		29	12	2	13	8	37	
	Finance	K	1		5	4	2	9	21	58	
	Imputed rent	L	3		1	26		1	63	7	
	Private traded services	P	2		22	2	4	6	6	66	
	Final consumption	Household (and NPISH)		6		33		6	22	6	14
General government			1		2		91	5			2
Gross Capital formation					27	46	1	4			25

Source: NISEM estimated supply and use table.

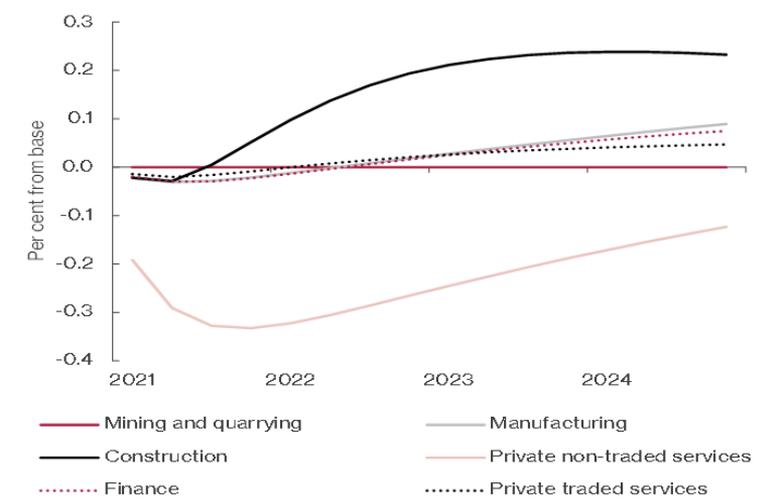
After a few quarters, the negative demand shock reduces wages and unit total costs because of the opening of an output gap compared to the baseline. Inflation declines and supportive monetary policy leads

3 The shock is assumed to occur in the first quarter, and then to decay at a rate of 50 per cent every quarter, to model social contact restrictions being imposed suddenly but lifted more gradually during the pandemic.

to lower real interest rates that supports investment in all sectors except in PNTS. Construction is sensitive to the reduction in the user cost of capital, which explains why the construction sector benefits from an increase in GVA of about 0.5 percent compared to baseline after a year. GVA in sectors other than PNTS and construction is close to the baseline as soon as the 4th quarter.

Private non-traded services are one of the most significant UK sectors by employment, accounting for 28 per cent of jobs. The negative shock to this sector in the social consumption shock scenario reduces employment by up to a third of a percent in that sector (see Figure 2.7), around 31,000 jobs. After initially declining, employment increases in the other sectors that benefit from a reallocation of labour, leaving total employment unchanged after three years. The only exception is mining and quarrying, where both employment and output are unaffected by the social consumption shock. The aggregate consumption shock also leads to a reallocation of labour away from PNTS, but of a smaller magnitude: employment is lower by 14,000 in PNTS in the social consumption shock, compared to 5,000 in the aggregate consumption shock.

Figure 2.7 Employment spillovers from a social consumption shock



Sources: ONS and NiGEM simulations.

These simulations show how a social consumption shock induced by lockdown restrictions can spill over to the rest of the economy, and lead to persistent labour reallocation. Lenoel and Young (2021) report that productivity, defined as output per head, is highest in finance and lowest in the construction and private non-traded services sectors. Thus, while the reduction of the employment in private non-traded services and the rise in the employment in the finance sector in response to a social consumption shock would raise total output per head, *ceteris paribus*, the reallocation to the construction sector, one of the lowest productivity sectors, could offset this effect.

Overall, it is clear that there is considerable sectoral heterogeneity in labour productivity growth during the pandemic. Labour productivity, as measured by GDP per hour worked, rose by 0.8 per cent in 2020, with substantial sectoral heterogeneity as output and hours responded significantly differently across sectors. Allocation effects supported the rise in labour productivity both at the sector and at the aggregate level. However, targeted policies will be necessary to avoid unevenly distributed productivity gains. A comprehensive approach is necessary to facilitate and encourage the reallocation of resources toward more productive sectors and aid firms' capabilities to reinvigorate technological innovation and adoption.

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3.

Unemployment: the Dog that Didn't Bark (Yet)

Rory Macqueen (with contributions from Larissa Da Silva Marioni)

Introduction

In this chapter we examine the relationship between productivity and employment in the UK, with a particular focus on Covid-19, considering in particular the relationship between the Coronavirus Job Retention Scheme (CJRS) and labour productivity at high and low frequencies.

The cyclical nature of labour productivity has been at the heart of macroeconomic thought for decades but without a permanent consensus being reached as to its relationship to the business cycle. In a standard classical model in which businesses flexibly employ more (fewer) workers in response to positive (negative) demand shocks, they prioritise retaining their most productive workers. As a result, productivity is counter-cyclical: the average productivity of the workforce falls (rises) as GDP growth strengthens (weakens) and the unemployment rate falls (rises), as suggested by Wesley Mitchell as early as 1913.¹

If, however, businesses retain staff in downturns but use them less intensively – so-called labour hoarding – productivity will fall in a recession and rise again when the economy recovers i.e. pro-cyclical productivity which moves in the same direction as GDP and the opposite direction to unemployment. This response to demand at the so-called 'effort margin' may be incentivised by hiring and firing costs, other labour market institutions which enable or encourage labour hoarding so as to minimise unemployment, or worker-specific capital which firms risk losing if they lay staff off. Robert

1 This naturally abstracts from the cyclical nature of capital per worker and total factor productivity when considering how unemployment and productivity may be interrelated over the business cycle.

Solow considered macroeconomics important for explaining the pro-cyclicality of productivity, something also discussed by Arthur Okun and others in the 1960s.²

Early Real Business Cycle theories were based on cyclical TFP shocks, which - with TFP a major element in labour productivity - may also imply pro-cyclical labour productivity. Using a later generation DSGE model, Dossche et al (2021) find that greater labour movement frictions are associated with greater pro-cyclicality of productivity as well as more stable employment, which matches cross-sectional evidence from OECD countries.

Recent US scholarship has focused on a structural break in the cyclicity of productivity, from pro-cyclical to counter-cyclical. Fernald & Wang (2016) credit Stiroh (2009) with being the first to document a shift during the so-called Great Moderation. They identify a structural break in the mid-1980s and attribute US labour productivity's turn from pro-cyclical to counter-cyclical in part to greater labour flexibility making it easier to hire and fire less productive workers in response to fluctuating demand, rather than making use of the pro-cyclical 'effort margin'. Here are potential longer-term relationships between unemployment and productivity not observed at business cycle frequencies or in de-trended data. As discussed in November 2020's National Institute Economic Review, we may also expect to see reduced labour productivity following a recession as a result of long-term unemployment, citing research by Rothstein (2019) and Tumino (2015), on employment prospect scarring, and by Crafts (1985) on the permanent unemployment effects resulting from the loss of skills during 1930s unemployment. Recent research from the US National Bureau of Economic Research (Dinerstein et al., 2020) has estimated a 'skill depreciation rate' of 4.3 per cent a year.

If recessions are productivity-damaging beyond the periods for which they last,³ limiting the extent and duration of their impact on employment should be a primary aim of policy. Strong mitigating policy interventions and a strong hiring recovery may then limit long-term damage to productivity through the labour market. Taken

2 Cited in Fernald & Wang (2016)

3 Damage to productivity potentially caused by recessions is not limited to the impact of recessions on unemployment, of course, but may also come through different channels, as discussed in Sections 1 and 2.

together would be likely to work in the opposite direction to the positive impact from creative destruction (see discussion of firm creation in Section 7).

Positive effects have been predicted from automation of tasks affected by social distancing under Covid-19, but evidence is thin so far. If this does materialise, it could be characterised as a permanent positive productivity shock which emerged endogenously in response to a temporary negative productivity shock (social distancing).

Employment During Covid-19

Unemployment typically lags the output cycle but nevertheless, on the evidence of previous recessions, would have been expected to have risen further (see Figure 3.1) than it did. Despite the largest fall in GDP in 300 years, unemployment rose by less than 1 per centage point and has fallen since the start of 2021, largely thanks to the CJRS.

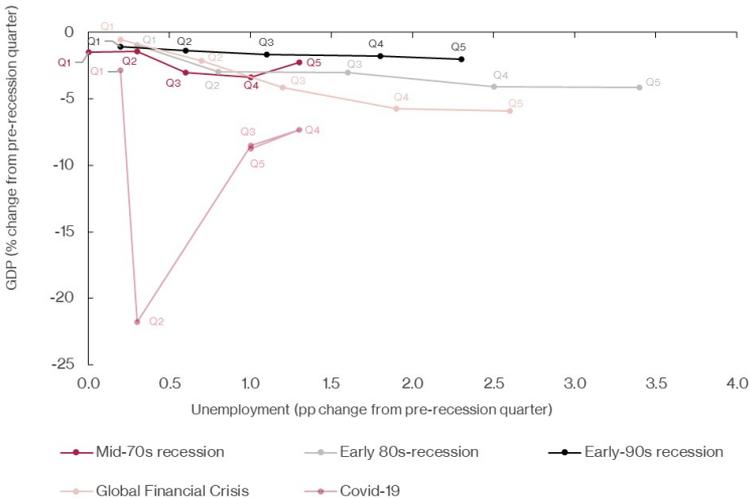
Several reasons have been given for interpreting headline unemployment figures with caution. One report warned in January 2021 that hundreds of thousands may be 'hidden' by official figures.⁴ The Office for National Statistics (ONS) has had to adapt its data collection process so that surveys are completed by telephone rather than face-to-face. This led to a change in weightings which were implemented from October 2020 onwards, including backdating so that time series are consistent. Internationally comparable definitions of unemployment require people to tell the person conducting the survey that they have been actively seeking work in the last two weeks, so with government restrictions limiting the potential for active job-seeking it is possible that people without a job during the pandemic may have been classified as 'economically inactive' rather than unemployed.

According to the ONS' Labour Force Survey, the number of people aged 16 or over in the UK in employment fell by 872,000 between the period November 2019 to January 2020 and a year later the number of unemployed people rose by 395,000 but the number of economically inactive by 551,000 (for more information see Bhattacharjee et al, 2021). A rise in non-response from non-UK

4 Alliance for Full Employment, 'The Ongoing Wave', January 2021

nationals in the survey noted in research at the Economic Statistics Centre of Excellence (O'Connor and Portes, 2021) led to a further change in ONS methodology from July 2021.

Figure 3.1 GDP and unemployment after five quarters of recession



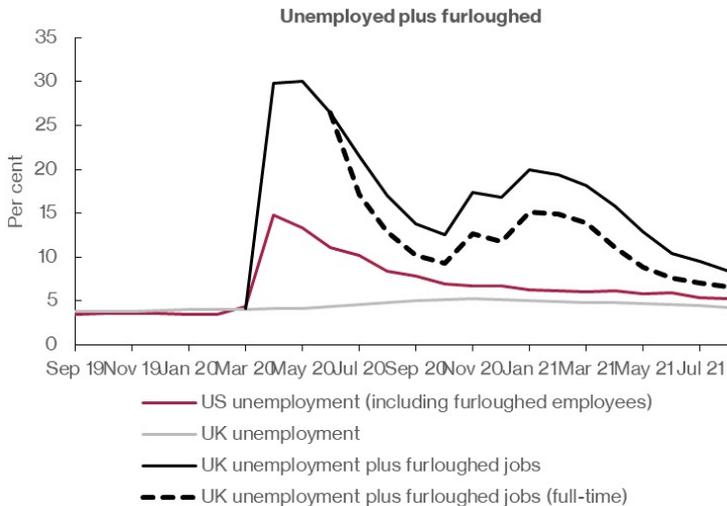
Source: ONS, NIESR calculations

Despite these caveats, and with the benefit of methodology revisions, the rise in unemployment has been far smaller than would be expected based on the experiences of previous recessions. Using a rule-of-thumb Okun's Law coefficient of 0.4,⁵ GDP 7 per cent below pre-Covid trend in the second quarter of 2021 would have implied an unemployment rate of 6.5-7.0 per cent, rather than the 4.7 per cent recorded. Benito (2020) used Beveridge Curve analysis to estimate in the early months of the pandemic that, without government intervention, a further 2.1 million jobs (some 6 per cent of those economically active) could have been lost.

5 Taken from Prof. Jonathan Haskel's 19 July remarks 'Will the pandemic "scar" the economy?' <https://www.bankofengland.co.uk/speech/2021/july/jonathan-haskel-speech-on-scarring-in-the-economy-at-the-university-of-liverpool>

The government has changed policy several times since then, extending the operation of the CJRS repeatedly. NIESR forecasts for what would happen after the CJRS was due to be withdrawn – before policy was changed – give some insight into expectations for how the labour market might have looked without it: forecasts for peak unemployment have reduced from 10 per cent as fiscal support has been extended. In July 2020 the OBR expected unemployment to reach between 8.9 and 12.6 per cent in the final quarter of that year, while their central forecast in October 2021 was for a peak of 5.25 per cent in Q2.

Figure 3.2 Furlough and potential unemployment



Source: ONS, HMRC, FRED, NIESR calculations

Clearly the introduction and extension of the CJRS (and related support for the self-employed) is principally responsible for the apparently benign labour market impact of Covid-19. An upper bound for estimating unemployment in the absence of the CJRS is given by adding all those furloughed to the unemployment figures, as in Figure 3.2 where every job furloughed is added to the unemployment

total.⁶ This enables rough comparison with the US unemployment figures, where furloughed staff receive unemployment insurance (temporarily enhanced during the pandemic to a level higher than many employees' salaries) and are counted in the unemployment figures, rather than continuing to be recorded as employees. The proportion of the workforce furloughed was much higher in the UK than the US, due to generally stricter restrictions on activity and a larger fall in GDP. The number of unemployed-plus-furloughed has also taken longer to fall back to pre-Covid levels, congruent with the UK's slower recovery from the initial Covid-19 shock.

Figure 3.3 UK labour productivity since 2000



Source: ONS, NIESR calculations

6 In reality, it is likely to be the case that many of those furloughed would not have become unemployed if the CJRS had not been implemented. It also does not take into account the macroeconomic consequences of an alternative approach. (Figure 3.2 is also based on furloughed employments rather than people, some of whom are known to have been furloughed from more than one job.)

The CJRS and Productivity

As a result of government measures preserving employments with no or reduced work hours, an unusually large gap opened between measures of productivity by output-per-hour and output-per-worker (Figure 3.3).

The gap between the two reflects the fall in average hours per worker caused by furloughed staff's absence from the workplace. Average actual weekly work hours for full-time workers fell from 37 shortly before Covid-19 to below 31 in the second quarter of 2020 and were at 35.5 a year later.

The combination of this fall in worked hours, enabled by the CJRS, and an increase in inactivity and unemployment, led total actual hours worked to fall from 1,050 million in the final quarter of 2019 to 845 million in the second quarter of 2020.

Fiscal intervention in the form of furlough has meant a significant break with the usual productivity impacts of a recession. The CJRS incentivises labour hoarding at the extensive margin by protecting jobs which would otherwise have been lost – potentially lower-productivity jobs, as discussed earlier – but it simultaneously disincentivises labour hoarding at the intensive margin. Compared with a standard recession in which retained staff come to work and are worked less hard despite deficient demand because of the costs of firing and re-hiring, the part-time CJRS enables employers to only use staff for the hours that they are required.

By largely removing any incentive to hoard labour - as measured by hours rather than employment - this ought to move the hourly productivity response closer to the flexible classical model of Mitchell and others. If this is the case, the CJRS will have supported per-hour productivity by enabling businesses to furlough the least productive among their staff for the time they are not required and retain the more productive.

The CJRS, Young Workers, and Productivity

Productivity is one potential explanation for the much larger than average fall in youth employment. While the employment rate for all those over 16 fell slightly in the first year of the pandemic – from 62 per cent to 60 per cent – the fall among 16-17 year olds was from 24 per cent to 16 per cent.

Benito (2020) suggested that, as social distancing reduces average productivity in in-person services and newly-acquired debt hangs over firms, lower productivity as a result of social distancing results in firms making their least productive workers redundant: something which could translate into rises in youth unemployment. Young workers tend to work in sectors with lower productivity but it may also be the case that their productivity is lower than other workers in these sectors, having had less time to accumulate skills and experience, making them more vulnerable to being laid off or – especially with the part-time CJRS scheme – being furloughed. This was supported by data showing that a greater proportion of young workers and old workers were furloughed than those in between.⁷

It is nevertheless possible that this greater propensity to be furloughed results simply from the fact that young people disproportionately work in sectors most exposed to Covid-19. Labour Force Survey (LFS) data show that during the period April to June 2020, the highest number of young people were employed in wholesale and retail trade (22.7 per cent), accommodation and food service activities (15.3 per cent) and human health and social work activities (9.7 per cent). In this sense their rising unemployment rate is also part of the rising aggregate productivity picture, through sectoral compositional effects (discussed in Section 2), because these sectors also have lower than average productivity.

While we know that many young people were furloughed due to their being employed in face-to-face service industries, if lower productivity did play a role in young people's relatively poor employment experiences at the start of the pandemic we would also expect that to be reflected in a greater proportion of young people being furloughed within sectors.

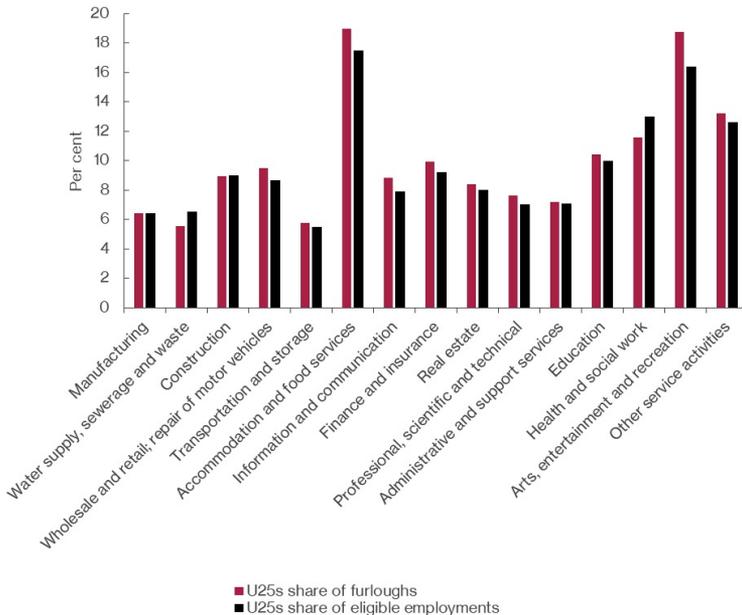
Figure 3.4 provides little evidence to support the theory that young people were furloughed more because of their relative inexperience and therefore lower productivity. While both the under-25 shares of employments and shares of furloughing are highest in the 'accommodation and food services' sector, within sectors there is no systematic picture of under-25s making up a larger share of furloughs than their share in employment. We might tentatively conclude

7 See, for example, 'An overview of workers who were furloughed in the UK: October 2021', Office for National Statistics, 1 October 2021

that the greater degree of furloughing among young workers owes more to their concentration in affected sectors than to their lower productivity.

There are many caveats to this: data for CJRS use and eligibility by age and sector are only available from the summer of 2021 and the picture may have been different when furlough use was heaviest in 2020. Nonetheless, with the CJRS removing almost any incentive to hoard unproductive workers in the face of a negative demand shock, it may be surprising that there is not a stronger indication of their being targeted for furloughing within sectors.

Figure 3.4 Share of under-25s in employment and furloughs



Source: HMRC CJRS statistics, NIESR calculations. Sectors with fewer than 2,000 eligible employments excluded.

Conclusion

In the short term the CJRS may have acted to raise productivity by supporting the furloughing of low-productivity workers, but evidence for that is so far lacking. In the long term the CJRS may have

raised productivity by protecting skills and job matches, as found, for example, by Jibril et al (2021), though it could also be argued to the contrary that by protecting those matches it has acted to retard the reallocation of capital, which could have had an offsetting negative effect.

Comparing outcomes in the UK and US may shed light on this in future, as the US approach may have allowed faster labour reallocation. The Institute for Government suggest that widespread concerns “that workers would have lost skills and become detached from the labour market during lockdowns and that businesses would have cancelled investment, harming productivity... have been calmed by a quicker than expected recovery – and, in particular, a stronger labour market with lower-than-expected unemployment” (Pope et al, 2021): it would seem plausible that government intervention will prove to have supported long-term productivity by protecting the UK economy from the degree of damage implicit in earlier forecasts of dire unemployment figures and major hysteresis.

Other long-term labour market consequences for productivity from Covid-19 have been posited, for which there is so far little evidence either way, but which could prove to outweigh any effects of the CJRS. The permanent automation of temporarily impossible or unprofitable jobs referred to above may drive productivity up (see Van Ark et al (2021)). A permanent increase in working from home could affect productivity in either direction (see Kucuk et al (2021)). Finally, and hopefully offsetting some of the disadvantage experienced by young workers in 2020 and 2021, there were more young people in full-time education in 2020 than in 2019 which, in the long term, could aid their productivity and that of the UK economy.

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Firm Indebtedness, Investment and Productivity

Issam Samiri¹

Introduction

This section provides an outlook on the indebtedness of UK firms and some of its implications for their ability to invest and improve productivity. The pandemic has raised the debt levels of UK firms, with smaller firms' debt levels raising more than their larger corporate counterparts. This may threaten the ability of small- and medium-sized enterprises (SMEs) to make productivity-enhancing investments and get closer to the productivity frontier in the post-Covid period, thus maintaining national productivity in the UK in a low growth trajectory.

UK firms entered the pandemic with high levels of debt to GDP in historical terms. The pandemic related cash flow pressures pushed smaller firms to increase their indebtedness by relying heavily on government-sponsored loan programmes. In addition, the UK capital markets indicate a diverging credit landscape, with low rated firms facing increasingly worse financing conditions relative to their better-rated counterparts. This diverging credit landscape implies that small and medium enterprises (SME) and low rated firms may face difficulties making productivity-improving investments as the UK economy recovers from the pandemic. A credit landscape that is unfavourable to SMEs can seriously threaten the prospects of productivity growth in the UK, given its productivity context.

Haldane (2018) noted that while many UK firms operate at the productivity frontier, the country has a long 'tail' of low productivity firms that struggle to adopt the best practices of their more productive counterparts. Crucially, the UK's low-productivity firms tend to be smaller and younger, which implies that they are more likely to emerge from pandemic with more debt, have no access to bond

1 The author is grateful to Jagjit Chadha, Hande Küçük, Barry Naisbitt and Rory Macqueen for helpful comments and suggestions.

markets and suffer from worse credit ratings. Many low productivity firms, facing difficult financing conditions, are disincentivised from making productivity-improving investments.

When firms are credit-constrained, they tend to deprioritise intangible investments as these are harder to use as collateral securing new debt. Intangible investments are crucial to improve the diffusion of 'best-practices' technologies to the low productivity tail (Harris & Yan, 2018). Lower intangible investments by low-productivity firms may contribute to more years of stagnating aggregate productivity as the economy emerges from the pandemic.

Table 4.1 Change in total credit to private non-financial corporations (per cent of GDP) in the United Kingdom and other G7 economies

	1998-2008	2008-2019
Australia	19.4	-10.3
Canada	1.4	28.2
France	20.8	31.9
Germany	3.8	-4.7
Italy	27.9	-9.5
UK	31.3	-19.6
US	12.6	3.2

Source: Bank of International Settlements (BIS) total credit statistics, author's calculations

Corporate Indebtedness Following the Global Financial Crisis: a moderate deleveraging cycle

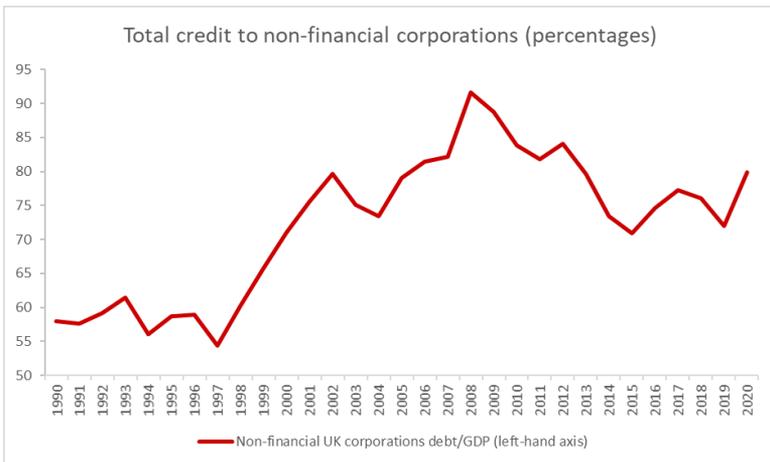
The indebtedness of the non-financial corporate sector in the UK increased in the decade leading to the Global Financial Crisis (GFC). UK non-financial corporations² started a slow-paced deleveraging process following the GFC, with the debt to GDP ratio falling from its peak of 92 per cent in 2009 to 72 per cent in 2019. Non-financial corporate indebtedness decreased in the UK more than in other comparable advanced economies in the years following the GFC (Table 4.1).³ This is partly a reflection of the larger increase in non-financial corporate sector debt in the decade leading up to the GFC

2 Incorporated entities excluding financial services.

3 See Naisbitt (2020) for more on the global vulnerability from debt in the coronavirus crisis.

and the economic effects of the GFC. Debt service ratios (DSR), defined as the ratio of debt service cost over net operating income, also decreased in the UK in the years following the GFC, as shown in Figure 4.2. This decrease is a result of the moderation in debt growth and a much lower interest rate environment maintained by the central bank.

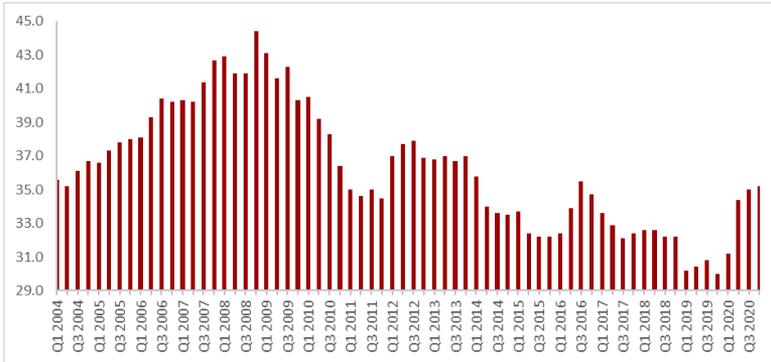
Figure 4.1 Total credit to non-financial corporations in the United Kingdom (per cent of GDP)



Source: Bank of International Settlements total (BIS) total credit statistics

The pandemic and business indebtedness in the UK: More debt overall, more so for smaller businesses

Although firms' indebtedness has decreased since the GFC, corporate debt remained relatively high in historic terms in the years leading up to the pandemic (Figure 4.1). When the pandemic struck, the need to close the cashflow gap created by the pandemic-related economic disruption led to further demand for debt.

Figure 4.2 Debt service ratios (DSR) of non-financial corporations in the UK (per cent)

Source: Bank of International Settlements (BIS) total credit statistics

While £75.5 billion of net financing was raised by the UK's private non-financial corporations between March 2020 and May 2021 (Table 4.2), approximately £75 billion was raised through the government Covid-19 lending schemes.⁴ The UK government offered three loan packages to help UK firms weather the pandemic induced economic disruption: the Coronavirus Business Interruption Loan Scheme (CBILS), the Coronavirus Large Business Interruption Loan Scheme (CLBILS) and the Bounce Back Loan Scheme (BBLs). The CBILS was designed to provide financial support to smaller businesses, with loans of less than £5 million, while the CLBILS was dedicated to larger businesses with a turnover of more than £45 million by providing loans of up to £200 million. The BBLs provided businesses with readily available liquidity up to £50,000. These loan schemes were all issued by a selection of lenders with a full government-backed guarantee for the CBILS and BBLs loans and partial government-backed guarantee (80 per cent) for the CLBILS loans. They came to an end in March 2021. Of the £75 billion borrowed through these schemes, only £5.6 billion was borrowed by larger businesses through the CLBILS. A further Recovery Loan Scheme (RLS) opened to applications on 6th April 2021. This scheme provides financial support of up to £10 million to businesses across the UK to help them recover and grow following the pandemic. For

4 British Business Bank figures.

loan facilities above £250,000, the RLS provides lenders with up to 20 per cent protection of outstanding balances after the proceeds of business assets have been applied.

Table 4.2 Net financing raised by the UK's private non-financial corporations through various instruments from March 2020 to May 2021 (in £ millions)

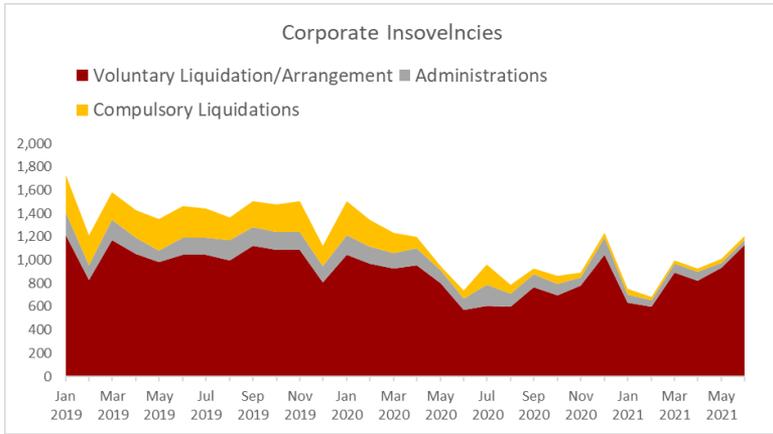
Net commercial paper issuance	- 4,284.0
Net bond issuance	23,409.0
Net shares issuance	28,338.0
Net loan issuance	28,033.0
Net total financing	75,496.0

Source: Bank of England, author's calculations.

One feature of business borrowing during Covid-19 has been the rapid increase in borrowing by small and medium enterprises (SMEs). Average monthly net bank lending to SMEs between January and October 2020 was forty times higher than the 2016-2019 period average. The indebtedness of smaller firms, which tend to be concentrated in the sectors most affected by public health measures, has increased relative to larger firms.⁵ This increase in debt might adversely affect the future willingness and ability of SMEs to raise external finance and reduce hiring and investment.

Debt service ratios are increasing but remain moderate by historical standards in the corporate sector as of the end of 2020 (Figure 4.2). Given the higher overall indebtedness of the corporate sector and the effect of the Covid-19 economic disruption on firms' revenues, moderate debt service ratios are mainly attributable to the low interest rate environment maintained by a very accommodative monetary policy and a healthy appetite for risk from investors. These moderate debt service ratios mitigate the effects of increased indebtedness. Nevertheless, the relief provided by the current low interest rates is dependent on an accommodative monetary policy and the current appetite for risk that maintains narrow risk premia relative to historical standards. Debt service ratios can quickly deteriorate if UK firms decide (or are obliged) to rollover their current debt levels at higher borrowing rates in the future.

5 Financial Stability Report, Bank of England, December 2020.

Figure 4.3 Total new corporate insolvencies.

Source: Insolvency Service Official Statistics - June 2021, UK Insolvency Service.

Default Rates and the Cost of Credit: a diverging landscape

While rates of new corporate insolvencies remained subdued in 2020, they have picked up in 2021 (Figure 4.3). UK lenders reported that default rates on corporate loans increased for SMEs in the first half of 2021 while they remained stable for large corporates (Bank of England Credit Conditions Survey, 2021 Q2). This trend of higher default rates among SMEs looks likely to continue, as the proportion of SMEs in distress increases (Table 4.3). Reflecting these realities, the Bank of England Credit Conditions Survey reports that spreads on corporate loan lending to SMEs widened in the first half of 2021 while spreads on loans to larger corporates narrowed in the same period.

The picture emerging from the corporate bond market confirms the trends in the loan market. Better-rated corporates can issue bonds at increasingly lower yields relative to their worse rated peers. Golan (2020) reports that the ratio of BBB-rated to A-rated bond yields widened from 1.2x at the start of 2020 to around 1.45x by September 2020. This corroborates a corporate debt picture of a diverging ability to raise financing within the UK's corporate sector.

Table 4.3 Proportion of SMEs in distress (either arrears or default on pre-existing loans) by sector, between January 2020 and January 2021 (per cent)

Sector	January 2020	January 2021
Agriculture	1.63	2.04
Real Estate	1.97	2.93
Other	3.54	5.28
Transport & Storage	4.31	7.94
Accommodation & Food	7.38	11.85

Source: Bank of England Financial Stability Report – July 2021

Lenders foresee a divergence in the credit quality of smaller and larger firms, with smaller businesses expected to witness higher default rates relative to historical averages. Moreover, capital markets imply a divergence in the credit quality of rated corporates, with better rated corporates expected to suffer lower default rates. This is reflected in the price of risk, as larger/better rated firms have been accessing credit with increasingly favourable terms relative to their smaller/worse rated counterparts.

Distribution of Productivity Across Firms: a story of two tails

When considering firm-level productivity in the UK, two very different pictures emerge. The UK productivity frontier lies in a hub for global innovation that profits from its involvement in Global Value Chains (GVC) (Haldane, 2018). This high productivity hub comprises firms that tend to be larger, older, and are more likely to be internationally owned. On the other side of the productivity distribution lies a "long tail" of low-productivity firms that tend to be smaller, younger and UK owned (Table 4.4).

Table 4.4 Firm-level labour productivity (mean and median) and the firm' employment, age and ownership. 2018 Data covering the non-financial business economy of Great Britain, which is approximately two-thirds of the UK economy. Labour productivity is defined as GVA per worker.

GVA per worker (£000)		
Employment band	Mean	Median
1 to 9	38	21.5
10 to 49	43	29
50 to 99	47.5	34
100 to 249	50.5	36
250 to 999	55	36.5
1,000 and over	45	27.5

GVA per worker (£000)		
Age band	Mean	Median
2 years or younger	41	24.5
3 to 5 years	50	28
6 to 10 years	49.5	25.5
11 to 20 years	52	29.5
21 years or older	49	31.5

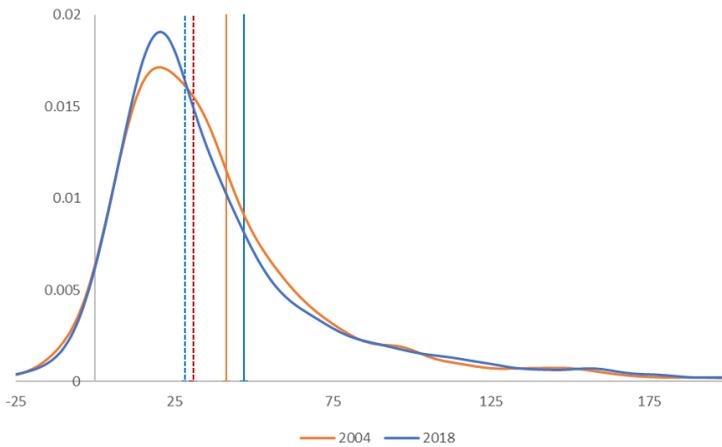
GVA per worker (£000)		
Ownership	Mean	Median
Domestic	41	25.5
EU Owned	66	40.5
Non-EU Owned	79	42.5

Source: Office for National Statistics - Annual Business Survey (ABS), Inter-Departmental Business Register (IDBR). Office for National Statistics (2020).

Figure 4.4 shows that the gap between the top- and bottom-performing firms has increased in the UK between 2004 and 2018. This figure provides the distribution of the workforce by the labour productivity of the worker's business in the years 2004 and 2018, where labour productivity is defined as GVA per worker in constant prices. The dispersion of the firm-level labour productivity has increased during the 2004-2018 period. While the average firm

constant prices labour productivity has increased from £41,500 in 2004 to £47,000 in 2018, the median has dropped from £31,000 in 2004 to £28,500 in 2018.

Figure 4.4 Kernel density⁶ of Workforce by labour productivity in constant prices of the workers' business by selected years (Great Britain). The dashed vertical lines represent year medians, and the straight vertical lines represent year averages



Source: Office for National Statistics - Annual Business Survey (ABS), Inter-Departmental Business Register (IDBR). Office for National Statistics (2020).

Haldane (2018) attributes the long tail of lower productivity firms to a lack of diffusion of 'best-practices' technology from the frontier. In addition, the post-Brexit context may limit the ability of frontier firms to be part of global value chains (Davies & Studnicka, 2018). In this context, the ability of low productivity firms to get closer to the frontier is key to the overall growth of UK productivity.

Smaller firms tend to operate in the sectors most affected by the public health measures.⁷ As a result, they have increased their debt more than larger firms (as shown above). SMEs tend to be concentrated

6 Kernel density estimation (KDE) is a non-parametric way to estimate and smooth the probability density function of a random variable.

7 Financial Stability Report, Bank of England, December 2020.

in the lower end of the productivity distribution are more likely to emerge from the pandemic with a decreased ability to borrow. This compounds the pressure on the low-productivity SMEs and hinders further their ability to get closer to the productivity frontier. Given the profit and revenue pressure on less productive SMEs, the increase of their indebtedness, and the negative outlook regarding their credit quality, debt overhang represents a considerable risk to the prospects of improving the fortunes of the 'large tail' of low-productivity firms in the UK.

Debt Overhang and Risks to Productivity Improving Business Investments

At the start of the pandemic, UK firms were carrying relatively high debt levels by historical standards, with a debt to GDP ratio close to 70 per cent. These levels of indebtedness have increased further since the outbreak of the pandemic to reach 80 per cent by the end of 2020. In addition, smaller firms have increased their indebtedness more relative to larger corporate entities.

Government support helped UK firms remain in business and maintain some of their investments during the pandemic period (Jibril, Roper and Hart, 2021). Nonetheless, a debt overhang can hinder future investment by firms. If the current trends of increasing debt service ratios continue, less of the firms' cashflows can be dedicated to investments and hiring. In addition, high leverage can increase the risk perceived by investors bringing new capital to the firm, thus increasing the firms' financing rates and crowding out new investment opportunities with a positive net present value (Krugman, 1988).

The extent of the debt overhang from the build-up of debt in the years before the GFC is one explanation for low business investment in the period that followed the GFC. Kalemli-Ozcan, Laeven, & Moreno (2018) and Barbiero, Popov, & Wolski (2020) show that the negative effect of excessive leverage on investment by European firms (including UK firms) in the post-GFC period was both sizeable and persistent.⁸ The increased level of indebtedness of UK firms that has resulted from the experience of the pandemic might adversely affect the ability of UK businesses to invest and hire over the next

8 Other explanations for low investment in the post-GFC period include higher levels of uncertainty (Baker and Bloom 2013).

few years. This could especially be the case for SMEs that have accumulated relatively more debt than larger corporates since the start of the pandemic.

An SME in the United Kingdom is more likely to emerge from the pandemic at a significant disadvantage in the credit markets. UK SMEs are also more likely to lie in the lower end of the productivity distribution. This situation does not help the low-productivity SMEs to make productivity-improving investments and get closer to the productivity frontier. In the UK context, diffusion of best practices away from the frontier toward the large tail of low-productivity firms is key to overall productivity improvements. The disadvantageous situation of SMEs in the credit market could threaten such diffusion.

The existing literature indicates that the limited pledgeability of intangible capital has significant consequences on the financing of intangible investments. Falato et al. (2020) argue that the shift towards intangible capital contributed to shrinking firms' debt capacity and led to more corporate cash holding; Döttling et al. (2020) show that high intangible capital firms rely less on debt financing and use retained earnings and delayed employee compensation as alternative forms of financing. This dependence of intangible investments on internal financing makes them susceptible to situations where high debt payments burden the firms' earnings. While evidence from the great recession shows that intangible investments have been more resilient than tangible investments in the UK (Corrado et al., 2016), this comes in a long-term context in which intangible capital has been replacing tangible capital in advanced economies since the mid-1970s (Martin et al., 2018; Falato et al., 2020). The relative resilience of intangible investments during the great recession is partially explained by the combination of a long-term trend favouring intangible capital and a higher dependence of tangible investments on debt financing conditions. However, as the UK economy recovers from the consequences of Covid-related restrictions, the ability (or wiliness) of UK SMEs to accumulate intangible capital may be more threatened by debt overhang than their ability to make tangible investments, especially if credit remains available, thus favouring investing in tangible assets while existing debt burdens internal financing.

Intangible investments are crucial to improving the firms' 'absorptive capacity', which measures the ability of firms to internalise external knowledge (Harris & Yan, 2018). In addition, Haldane (2018) argues that the lack of diffusion from the high-productivity frontier to

the low-productivity tail is key to improving the UK's aggregate productivity. This underlines the importance of 'absorptive capacity' and, in turn, the importance of intangible investments to the chances of higher productivity growth in the UK.

In summary, SMEs: (i) are more likely to be in the lower end of the productivity distribution, (ii) have accumulated more debt than larger firms during the pandemic, and (iii) are more likely to suffer from steep financing costs due to increasing levels of leverage, higher perceived bankruptcy risk, limited access to bond markets and absent/lower credit ratings. This threatens the ability of these firms to invest in ways that improve their productivity and enables them to get closer to the productivity frontier, thus improving the country's overall productivity. Intangible investments that are important to improve the firms' 'absorptive capacity' are more threatened by this situation, given that they usually cannot be used as collateral for new debt contracts. These conditions do not help the 'long tail' of low-productivity firms in the UK get closer to the productivity frontier, thus threatening the prospects of significant overall productivity improvements as the economy recovers after the pandemic.

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5.

International Trade, FDI and Productivity

**Gabriele Ballicu, Ana Rincon Aznar, Catherine
Robinson and Manuel Tong**

Introduction

The Covid-19 pandemic resulted in a reduction in international trade during 2020 of around 33 per cent globally (UNCTAD, 2021)¹ – the largest fall since records began in 2000 (Romei, 2020). In the UK, exports and imports decreased sharply: UK exports to the world fell by 14.1 per cent and imports decreased by 17.1 per cent in just one year. In this section, we outline a number of findings in relation to UK trade performance as well as in relation to both foreign inward and outward investment and discuss potential implications for productivity. Disentangling the effects of the pandemic on both trade and productivity from those of Brexit is however a challenge, due to the divergent nature of both shocks (Tong, 2021).

Our analysis draws from a variety of data sources, including UNCTAD (the United Nations Conference on Trade and Development data), the UK Office for National Statistics, Eurostat, HMRC and fDi Markets. We analyse the trends in trade and investment both into and from the UK over the period 2016-2020. Of particular interest is the regional distribution of investment flows which enables us to offer some potential insights for UK levelling up.

Trade

There is considerable evidence that points to the existence of a positive and significant relationship between a firm's export decision and their productivity. However, there is no overwhelming consensus on the direction of causality. Costantini and Melitz (2009) stress that

1 There was a significant rebound in global trade figures over Q1 2021, with a 10 per cent growth relative to Q1 2020, mostly driven by the strong performance of East Asian exports (UNCTAD Global Trade Update, May 2021).

while earlier papers emphasised the prevalence of the “selection effect”, whereby the most productive firms are the ones that engage in exporting activities, a more recent strand of literature focuses on the positive effects of trade on firm productivity providing evidence of the “learning by exporting” hypothesis. In reality, the dominance of either effect is an empirical question determined by a range of institutional and environmental conditional factors which may vary over time and nation (Fouskas and Robinson, 2019).

Early work by Melitz (2003) demonstrates that as the most productive firms enter export markets, there is a process of inter-firm reallocation within industries towards more productive firms, which leads to aggregate productivity and welfare gains. Bernard and Jensen (1999) follow a similar argument and find that higher productivity firms become exporters, but the benefits of exporting for firms may be less clear. De Loecker (2007) finds productivity gains for Slovenian export entrants, with the productivity gap between exporters and non-exporters likely to be increasing over time. Van Biesebroeck (2005) draws similar conclusions for firms in African countries in that exporters are both more productive, and they also increase their productivity advantage after entering the export market. In their study of UK firms Fouskas and Robinson (2019) highlight the fact that the entry and exit decision to export is more fluid with many firms entering and exiting several times over a 10-year period. Thus, the learning by exporting argument is more fragmented than largely assumed.

Given these empirical findings, policies facilitating trade liberalisation, such as those promoting the European Union’s single market, are generally considered to boost productivity. Winters (2004) surveys earlier literature which overall advocates for this positive effect, via several mechanisms, such as import competition which stimulates technology adoption and elimination of inefficiencies, as well as lower barriers for imported intermediate inputs. In the same vein, Bernard et al. (2006) find that US industries with the largest reductions in trade costs exhibit the strongest productivity growth. Similarly, Bustos (2011) shows that trade liberalisation via MERCOSUR boosts firms’ productivity via the adoption of new technologies.

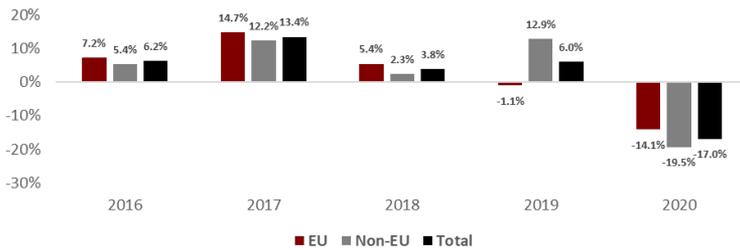
Even though available data may not allow us to determine with accuracy the impact of Brexit and Covid-19 on firms’ productivity performance, existing evidence from the literature is insightful. It illustrates the potentially detrimental effects that higher trade costs

might impose, in terms of reducing trading activity and exposure to international markets. Empirically, it is not straightforward to separate the two events as they largely coincide.

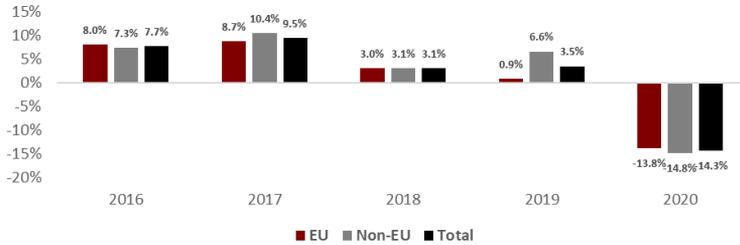
In terms of exports, we note early signs of a shift away from UK goods and services to the EU nations prior to the pandemic (in 2019), which was offset by growth in exports to non-EU nations. Figures 1 and 2 show the rate of growth in exports of UK goods to EU and non-EU countries. Figure 5.1 demonstrates that, UK exports to non-EU countries fell by a greater amount than EU exports in 2020, which appear to be more resilient - most likely due to their geographic proximity. Disaggregated data by sector suggests that the sharp decreases in non-EU exports were concentrated in extractive, primary sectors such as agriculture, forestry, and fishing (with an annual decrease of 17.8 per cent) and mining and quarrying (and an annual decrease of 28.1 per cent).

In contrast, Figure 5.2 shows that in the case of imports there were less differences between the EU and extra-EU imports into UK during 2020. The differences were mainly accounted for the decreases in imports of manufacturing goods. Manufacturing was the sector accounting for the largest share of total UK imports (63.3 per cent) in 2020.

Figure 5.1 UK Goods Export Growth 2016-2010



Source: ONS

Figure 5.2 UK Goods Import Growth 2016-2010

Source: ONS

Of all UK trading partners, China and the United States were the main contributors to the fall in UK exports in 2020, with 35.1 per cent and 25.6 per cent reductions compared with those of 2019, respectively. The decreases in exports to large EU countries such as France, Germany, and the Netherlands were also sizeable (23.6 per cent, 11.3 per cent, and 18 per cent, respectively).

UK imports from the US also fell significantly in 2020 (20.1 per cent), while imports from China increased (13.4 per cent), following a strong recovery of Chinese exports over the second half of 2020, which saw an increase in their world market share (UNCTAD, 2021). There were also significant reductions in imports from the UK's main EU trading partners, such as France (22.4 per cent), Germany (13.1 per cent), and the Netherlands (15.2 per cent).

A more detailed analysis of monthly trade statistics (highlighting year-on-year changes) is presented below. These also show that there was a continued fall in UK goods exports during most of 2020. However, we can see that goods exports to the EU fell mainly between the months of March and May 2020, as seen in Figure 5.3 goods exports to the EU fell by almost one third compared to the same months in 2019.

Extra-EU exports, on the other hand saw their largest reductions over the second half of 2020, with monthly falls ranging between 22.8 per cent and 38.6 per cent. Hence, these data show that the first 2020 lockdown seems to have had a larger impact on trade with EU countries. This is likely to be reflecting the timings of the waves of the pandemic experienced by each nation and the processes each country went through to adapt to lockdown.

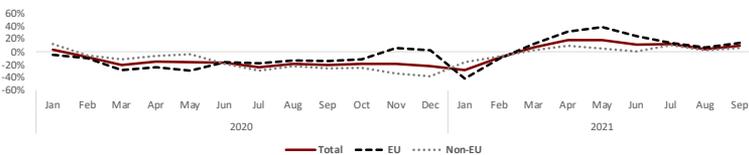
Nevertheless, there was a slight recovery of UK goods exports to the EU in the last two months of 2020 (5.9 per cent growth in November; 1.6 per cent in December). This recovery was likely due to the anticipation of the end of the Brexit transition period, after which UK-EU trade would take place under the new Trade Cooperation Agreement (TCA).

We can see that UK exports to the EU collapsed once the TCA came into force in January 2021, with a 42.5 per cent fall compared to January 2020. EU exports experienced a recovery in the subsequent months. Note, however, that these high growth rates might represent base effects after the sharp falls over the same periods in 2020 due to Covid-19. Year-on-year increases of UK exports during the third quarter of 2021 have been more moderate.

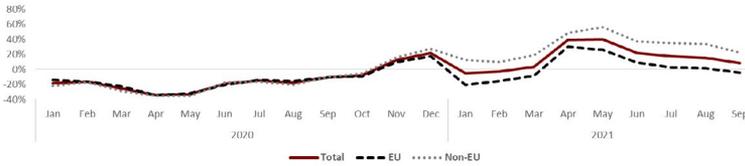
Figure 5.4 presents a slightly different picture for UK goods imports, with both EU and extra-EU trade falling mostly between March and May 2020 with year-on-year falls of around 30 per cent. Both EU and extra-EU goods imports follow a similar growth path during 2020, with a return to positive growth rates from November 2020 onwards. In the case of the EU imports, the recovery can be explained by the stockpiling undertaken by UK importers anticipating the new UK-EU trade conditions under Brexit.

Once the new Brexit rules came into force in January 2021, EU goods imports fell by 20.3 per cent compared with the same month in 2020, only returning to a positive growth trend from April 2021. Non-EU imports, although following a similar trend to EU imports, experienced a more robust recovery over the first half of 2021, driven by the rise of purchases from the UK's main extra-EU trading partners, like China and the United States. As with UK exports, a similar downward trend in year-on-year increments is observed in UK imports over the third quarter of 2021, relative to the same period in 2020, when lockdowns started to ease globally.

Figure 5.3 UK Goods Export Growth 2020-2021 (year-over-year)



Source: ONS and NIESR

Figure 5.4 UK Goods Import Growth 2020-2021 (year-over-year)

Source: ONS and NIESR

Trade statistics from Eurostat show that UK goods exports fell in line with those of France for instance (16 per cent reduction in 2020). However, Germany's exports were not as affected by the initial Covid-19 shock, decreasing only by 9 per cent during 2020. As for goods imports, the UK saw larger reductions than those in France and Germany, whose imports fell during 2020 by just 13 per cent and 7 per cent, respectively. These results are in line with each country's GDP performance during 2020. While UK economy fell by 9.7 per cent (ONS, 2021), Germany's GDP just dropped by 4.6 per cent, and France's by 7.9 per cent (Eurostat EU database, 2021).

The fall in UK intra- and extra-EU trade was more accentuated compared to that of the EU-27 trade during 2020. UK extra-EU exports experienced nearly a 20 per cent reduction with respect to the year before, whereas EU exports to the rest of the world fell by 9 per cent. UK exports to the EU suffered a decline of around 14 per cent, while intra-EU exports by member countries fell by only 7 per cent (Eurostat EU database, 2021).

Even though other European countries were similarly affected by widespread lockdowns during the Covid-19 second wave, the reductions were not as large as those experienced by the UK. For instance, German exports to the EU fell by just 6 per cent, whereas German exports outside the EU decreased by 10 per cent (Eurostat, 2021). Germany and other large EU countries have seen a recovery in their year-on-year growth of trade since the beginning of 2021, reaching a peak in April 2021. Such a reversal in trend was not seen in the UK until later in March 2021, with a growth peak reached in May.

One source of the differences observed in UK vs. EU trade performance might be the divergent treatment of exports in the UK-EU border. While border checks have not fully been enforced,

those controls have been enforced from 1st January 2021 for UK exports to the EU, which entails an extra cost for UK firms importing from the EU, estimated to be in the region of £660m (The Guardian, 2021).

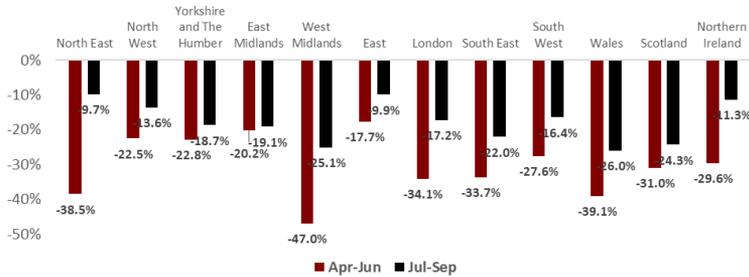
The Regional Perspective

The aggregate picture puts the UK's experience into international context but from a policy perspective the internal distribution of trade is increasingly of interest as we look to assess the winners and losers, regionally, from the economic consequences of the global pandemic. The UK is recognised as being amongst the most regionally unequal economies in the OECD (McCann and Ortega-Argiles, 2021) and consequently dramatic changes in economic activity have the potential to mitigate or exacerbate domestic inequality. Regional fortunes are influenced significantly by sectoral concentrations and so we consider in tandem the sectors that have been greatest affected.

Figure 5.5 shows the West Midlands was the region with the largest export fall during the second quarter of 2020, measured relative to the same quarter in 2019. This was mainly due to a decrease in exports in the machinery and transport industry (-58.3 per cent) along with mineral fuels. The West Midlands was followed by Wales and the North East. Trade did not fall by as much during the third quarter given the gradual easing of lockdowns and returned to normality, again with West Midlands, Wales and Scotland as the most affected regions.

The West Midlands and the South-East experienced a significant downturn in exports to non-EU countries over the second quarter (52 per cent and 41.3 per cent decreases, respectively). In contrast, the North East saw a more pronounced fall in exports to the EU, with a 47.1 per cent fall between April and June, 2020. The machinery and transport industry concentrated these reductions of around 50 per cent, as well as the chemical industry, in the case of the South East of England.

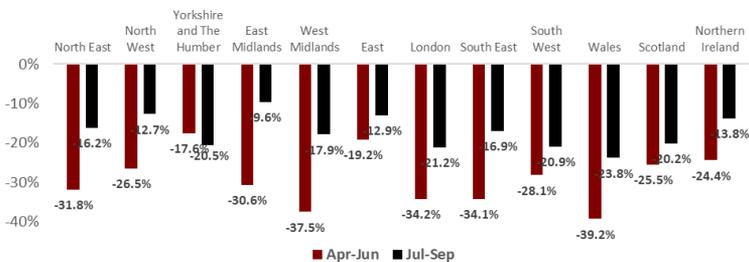
Figure 5.5 UK Quarterly Export Growth by Region (Q2 and Q3 2020 vs. 2019)



Source: HMRC and NIESR

UK imports fell at similar rates across most regions over the second quarter of 2020, as shown in Figure 5.6. The West Midlands saw the largest decrease compared to the same period in 2019, followed by London, the South-East, and the North-East. The fall in imports to the West Midlands was primarily due to a significant reduction of imports from the EU (44.4 per cent) in sectors such as manufactured goods and machinery and transport. As in the case of exports, Wales saw a large imports reduction over both the second and third quarters of 2020, with significant falls in industries such as mineral fuels and machinery and transport.

Figure 5.6 UK Quarterly Import Growth (Q2 and Q3 2020 vs. 2019)



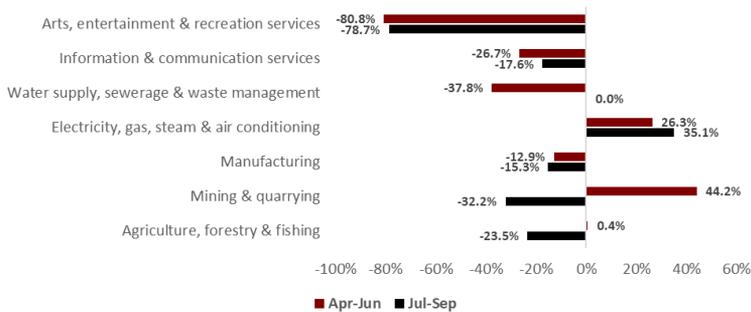
Source: HMRC

Figure 5.7 shows that UK exports increased between April and June 2020 in agriculture (0.4 per cent) and, especially, mining (44.2 per cent), relative to the same quarter of 2019. However, exports in those sectors fell again in the subsequent months, reflecting the volatility of industries that rely on international commodity prices. Agriculture and mining accounted for 0.6 per cent and 8.8 per cent of the total fall in exports in Q3 2020, respectively. On the other hand, manufacturing experienced sustained falls in exports over the second and third quarters of 2020, accounting for over 30 per cent of the fall.

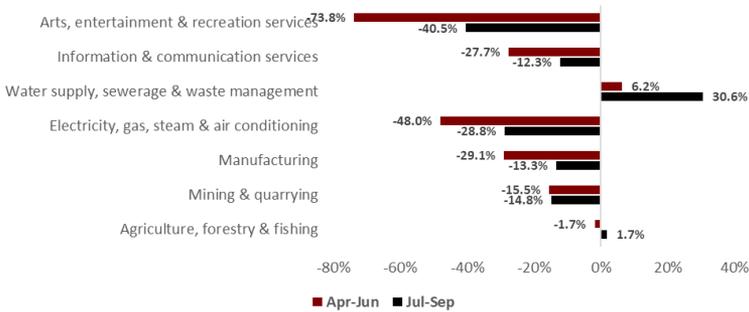
Exports of UK services deteriorated significantly over these two quarters. The arts, entertainment and recreation services industry saw the largest falls in exports (year-on-year). These account for around 6 per cent of total UK export reduction. Exports of information and communication services also deteriorated over the same period.

The most prominent decrease in UK imports over the second quarter of 2020 were in arts, entertainment and recreation services, electricity, gas steam and air conditioning and, to a lesser extent, manufacturing. These along with mining and quarrying also saw the largest reductions in the subsequent quarter.

Figure 5.7 UK Quarterly Export Growth by Sector (Q2 and Q3 2020 vs. 2019)



Source: ONS

Figure 5.8 UK Quarterly Import Growth by Sector (Q2 and Q3 2020 vs. 2019)

Source: ONS

The aggregate dynamics described earlier led to trade surplus in 2020 for the UK compared to a deficit recorded in 2019 (£4.3 billion vs. -£20.7 billion). Trade balances differ significantly across sectors. Several goods industries such as agriculture and manufacturing show ongoing deficits. The agricultural deficit increased in 2020 Q3 by 13.5 per cent. Conversely, there was a reduction in the manufacturing deficit of 63.2 per cent and 8.8 per cent in the second and third quarters of 2020, respectively. These figures reflect a larger fall in imports relative to exports. UK Services industries, on the other hand, such as arts, information and communication are usually in surplus. Arts, entertainment and recreation services are sectors that were heavily hit by the Covid-19 crisis. Indeed, the trade surplus in the arts industry fell by 84.3 per cent in 2020 Q2 and 90 per cent in 2020 Q3.

Foreign Direct Investment

While the trade literature provides rich evidence of a positive relationship between productivity and exporting outcomes, another strand of literature finds an even stronger link between productivity and Foreign Direct Investment (FDI). Helpman, Melitz and Yeaple (2004) categorise firms according to productivity levels, claiming that the most productive ones invest in foreign markets, followed in the ladder by firms that choose to export.

Engel and Procher (2012) test these predictions for French firms, finding that firms with a broader market-driven FDI strategy have higher productivity than firms that engage less in such activities. For Japanese firms, Ito (2007) finds that superior total factor productivity (TFP) outcomes largely explains the decision to start investing abroad in the service sector, but this is not the case for manufacturing firms. However, after initiating FDI, service firms improve their productivity faster than manufacturing firms. Also working with Japanese firms, Tomiura (2007) argues that firms engaged in FDI are clearly more productive than firms outsourcing abroad, which are as productive as exporters but also more productive than domestic firms.

Another area of the literature focuses on the aggregate effects of FDI on productivity, at the country or industry level, and the underlying mechanisms. Alfaro et al. (2009) find that countries benefit from FDI via TFP improvements through well-developed financial markets. Focusing on Chinese industries, Zhao and Zhang (2010) identify both a direct and indirect channel (via spillovers) whereby FDI may positively affect industrial productivity. They find that the FDI contribution to productivity is enhanced by the endowments of human capital, which reinforces the importance of a country's absorptive capability. Also for China, Zhou et al. (2002) focus on FDI spillover effects on domestic firms, Firms in regions attracting more FDI tend to have higher productivity, whereas the effect tends to be opposite for firms in industries attracting more FDI, due to competition effects.

Both inward and outward FDI flows in the UK decreased during 2020, in terms of new projects, employment and capital, amid Covid-19 and the transition to Brexit. The FDI literature provides us with some clues on how this downturn may affect productivity at the country, industry and/or regional level.

FDI Markets data provide us with details of projects that have been undertaken, by country and location, and provide approximate impacts on jobs and capital investment. These data provide flows of investment (labelled projects) but do not show total stocks of inward investment. FDI Markets is part of a suite of Insights offered by the Financial Times. FDI Markets is a comprehensive record of FDI transactions globally. It includes information on host and destination countries, areas and cities, it also collects details on the firm investing, which sector they belong to, the number of jobs created and the capital investment amount. Overall, and in line with the trade data discussed above, data from FDI Markets reveal

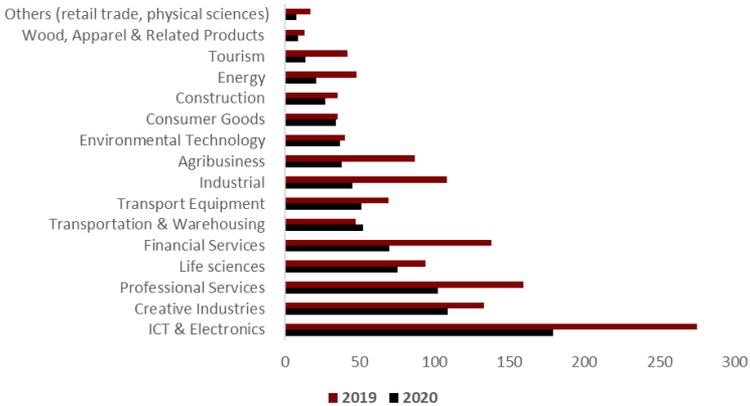
a downturn for the UK for both inward and, to a greater extent, outward foreign direct investment (FDI) in 2020, compared to 2019. Once again, we emphasise that it is not possible to determine the extent to which this was driven by the Covid-19 pandemic and/or the impact of Brexit on future trading relations. The aggregate picture on FDI provides us with a sense of what are the areas that have been mostly affected by the recent shocks. A more granular perspective can shed light areas of strength and weakness.

a. Inward FDI

The number of new FDI initiatives launched in the UK fell from 1,340 in 2019 to just 871 in 2020, implying a 35 per cent annual reduction compared to 2019 new investments. The number of new jobs created in these projects also decreased from 60,627 to 47,063 (-22. reduction per cent). Interestingly, the total capital investment (CAPEX) embedded in these projects increased from £41.4 billion in 2019 to £44.3 billion in 2020, meaning a 7 per cent annual rise. Data show that, despite the fall in absolute terms, the mean number of jobs created per inward project in the UK rose from 45 to 54 during 2020. Similarly, average CAPEX per inward project increased from £30.9 million in 2019 to £50.8 million in 2020.

Looking at the distribution of FDI projects across the range of economic activities, Figure 5.9 breaks down the number of new FDI projects that draws from the cluster classification available at FDI Markets tool data. The figure shows that the ICT and electronics industry accounted for the largest number of inward projects in the UK during 2020 (179). This sector was followed by projects in the creative industries and professional services. However, ICT and electronics saw one of the largest annual decreases (275 projects in 2019). Other industries with significant reductions in FDI were financial services, with nearly a 50 per cent fall, and agribusiness, and industrial, both of which saw their FDI projects dropping by over 50 per cent. Only transportation & warehousing had a slight increase in the number of projects.

ICT and electronics was also the most important sector in terms of job creation in 2020, as seen in Figure 5.10. This sector was followed by transportation and warehousing, and consumer goods. These findings do chime with the growing evidence that places digital skills at the heart of economic growth and recovery going forward (Schilirò, 2020). ICT and electronics, however, experienced a substantial fall in employment in 2020 (-31.2 per cent).

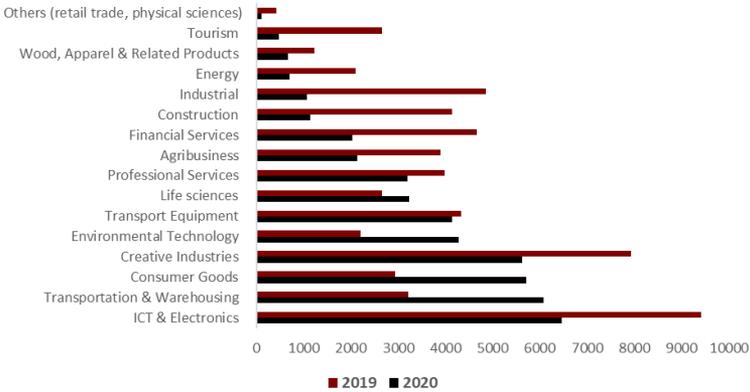
Figure 5.9 UK Inward FDI: Number of Projects 2019-2020

Source: fDi Markets

Conversely, transportation & warehousing saw a nearly 100 per cent increase in job creation in 2020. Similarly, jobs produced in consumer goods projects almost doubled in a year. These two industries, together with environmental technology, largely explain the rise in the average number of jobs per project, while most industries, like tourism, construction, and industrial, saw a sharp fall in new employment. It is interesting to note that creative industries were the second ranked industry at attracting inward FDI jobs in 2019 but fell to fourth place in 2020.

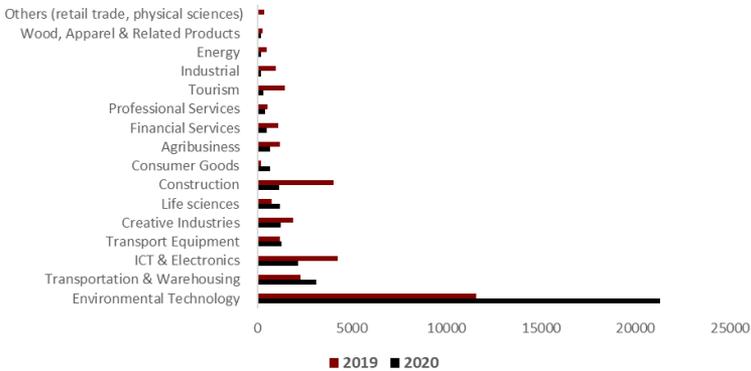
The 2020 rise in inward FDI capital investment (CAPEX) both in absolute and average terms, was driven largely by the large increase in investment in the environmental technology industry (almost doubling from £14.8 billion in 2019 to £27.4 billion; see Figure 5.11). Other industries like transportation and warehousing and transport equipment experienced increases in new inward CAPEX. In contrast, many sectors slowed down in terms of new capital investment by over 100 per cent. ICT and electronics, construction, and tourism were among the most affected.

Figure 5.10 UK Inward FDI: Number of Jobs Created 2019-2020



Source: fDi Markets

Figure 5.11 UK Inward FDI: Capital Investment 2019-2020 (US \$ Millions)



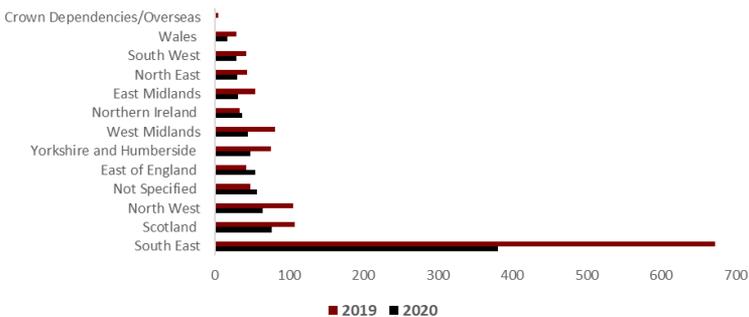
Source: fDi Markets

The fDi Markets data also shows that the South East region in England, (including London) is the area hosting the most significant number of FDI projects in the UK. The South East is followed by Scotland, with a long history of inward foreign direct investment,

and the North West of England. Figure 5.12 shows that these three regions, like most in the UK, saw the number of new projects diminish during 2020.

The South-East was home to 672 new projects in 2019, but in 2020 new FDI projects dropped by almost one half. FDI initiatives in Scotland and in the North-West also decreased significantly. Only Northern Ireland exhibited a slight rise in projects (34 vs. 37), which is interesting given Brexit considerations in and around the island of Ireland.

Figure 5.12 UK Inward FDI: Number of Projects by Region 2019-2020



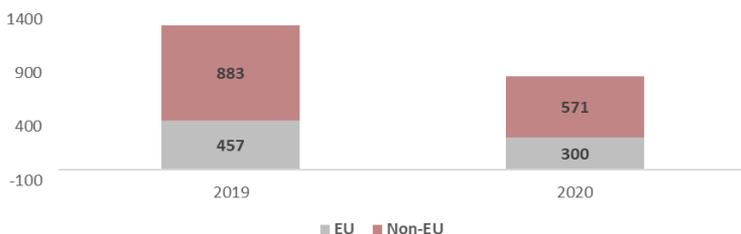
Source: fDi Markets

UK inward FDI projects from both EU and non-EU countries were fewer in 2020 relative to 2019, as illustrated by Figure 5.13. While EU projects dropped by 34.4 per cent, those originating from non-EU countries fell by 35.3 per cent. More disaggregated data reveals that new projects from the United States, the primary source of inward FDI, fell from 468 to 339. As for the main EU source countries, new investment projects from Germany fell from 96 to 63 in 2020, while France fell from 64 to 55.

Finally, monthly inward FDI data enable us to consider the changes in investment projects at a more detailed level as the pandemic unfolded. We see that the decrease in number of new FDI projects took place throughout 2020, but especially in March, April, September and October, as seen in Figure 5.14. April 2020, which was the beginning of the first lockdown, saw the largest year-on-year fall in the number of new projects from the world to the UK

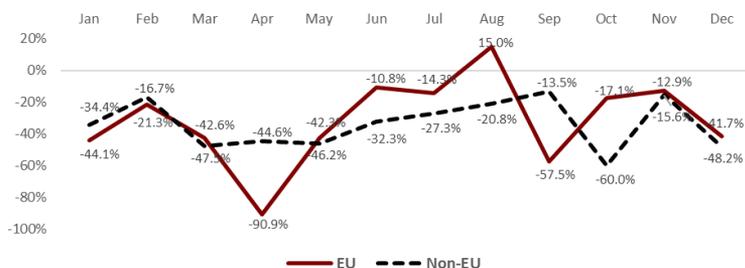
(60.2 per cent). This fall was most dramatic in the case of EU-sourced projects. In October, when the overall fall in FDI was 46.4 per cent, the burden was mostly borne by non-EU projects.

Figure 5.13 UK Inward FDI: Number of Projects per source 2019-2020



Source: fDi Markets

Figure 5.14 UK Inward FDI: Number of Projects 2020 (year-on-year growth)



Source: fDi Markets

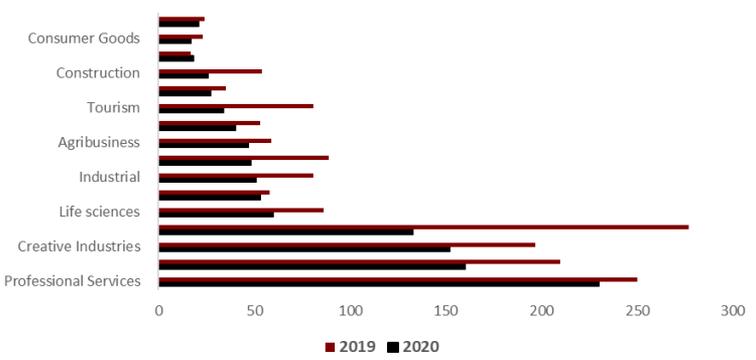
b. Outward FDI

The number of outward FDI projects launched by UK firms decreased from 1,547 in 2019 to 1,117 in 2020, a 30 per cent fall. This downturn accompanied a reduction in the number of new jobs created, which decreased from 145,228 in 2019 to 92,992 (36 per cent annual decrease) and a fall in capital investment (CAPEX) from £59 billion to £42.7 billion (28 per cent negative growth). fDi Markets statistics also show that the average number of new jobs created

per UK-outward project fell from 91 to 83 in 2020. However, the average CAPEX per project increased slightly from £37 million to £38.2 million.

Figure 5.15 shows the changes in the outward FDI across sectors from 2019 to 2020 in terms of the number of projects. While in 2019, financial services was the leading UK industry undertaking new FDI projects abroad, it fell to fourth place during 2020. There was a sharp over-50 per cent fall in new project numbers from 277 to just 133. Professional services, which ranked second in 2019, became the largest source of new UK outward FDI projects in 2020, even though the total number of newly established projects fell slightly relative to 2019. All sectors have experienced a reduction in the number of projects, with tourism and construction seeing dramatic decreases of over 50 per cent in a year.

Figure 5.15 UK Outward FDI: Number of Projects 2019-2020



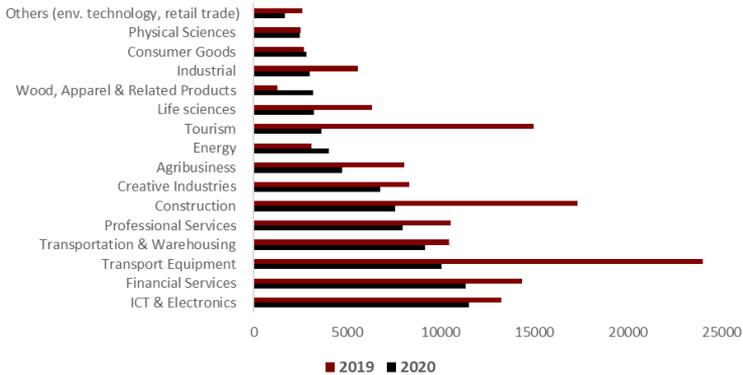
Source: fDi Markets

Regarding FDI-related employment, Figure 5.16 shows important changes in the annual ranking across sectors. Transport equipment, construction, and tourism were the most important job-creating industries from UK outward FDI projects in 2019.

These three industries saw severe reductions in the number of new jobs created in 2020. Transport equipment and construction experienced over-50 per cent annual drops in new FDI-related jobs. In relative terms, tourism was the most affected industry, where new

jobs fell dramatically by 76 per cent in 2020. Only a few industries, like energy, consumer goods, and wood, apparel and related products, saw slight rises in FDI-related employment last year.

Figure 5.16 UK Outward FDI: Number of Jobs Created 2019-2020

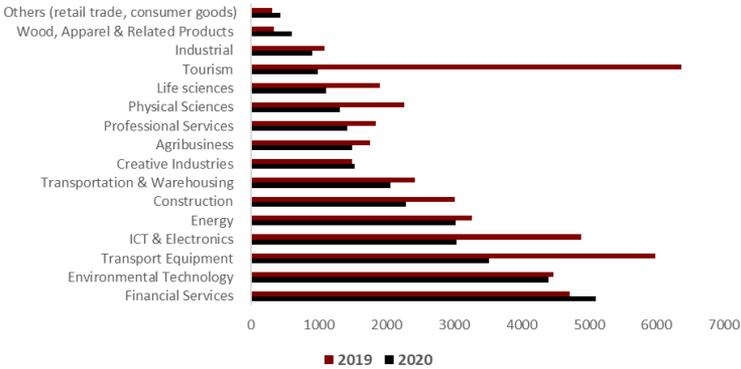


Source: fDi Markets

The slight rise in the average capital investment is attributable to the increase in financial services (Figure 5.17), where total CAPEX rose by 10 per cent in 2020. Other industries saw smaller increases, such as creative industries, retail trade, consumer goods and wood, and apparel and related products. Once again, tourism, which was the largest UK outward FDI industry in terms of capital investment before the breakout of Covid-19, was the most seriously affected activity, with CAPEX falling from £8.1 billion in 2019 to just £1.3 billion in 2020.

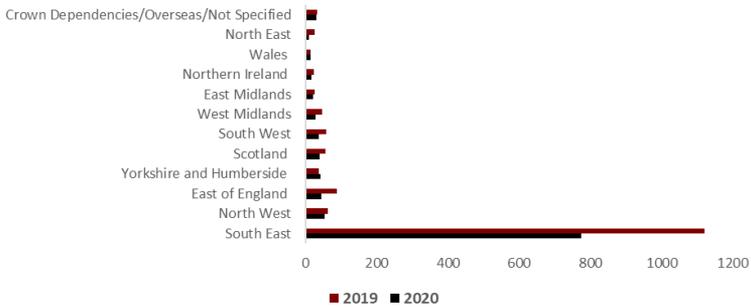
Similar to inward FDI, the South-East region of England, which includes London, is the primary source of UK outward FDI projects. The total number of projects decreased by 31 per cent in a year. Figure 5.18 shows that all UK regions, except Wales, saw a decrease in FDI activity during 2020.

Figure 5.17 UK Outward FDI: Capital Investment 2019-2020 (US \$ Millions)



Source: fDi Markets

Figure 5.18 UK Outward FDI: Number of Projects by Region 2019-2020

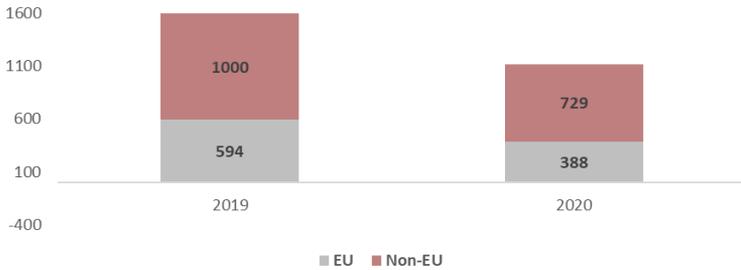


Source: fDi Markets

UK outward FDI projects were fewer in 2020 to both the European Union and the rest of the world, as seen in Figure 5.19. Projects established in the EU decreased by 27 per cent in a year, while those implemented outside the EU fell by 35 per cent. The United States continues to be the leading destination for UK projects, but that number of projects dropped from 307 to 289 in 2020. Germany, the second most important destination, received fewer projects from the UK in 2020, moving from 124 to 79 projects. France and

Spain were among the top destinations of UK outward investment in 2019. However, they have been replaced in the ranking as hosts for UK investment by Australia and the United Arab Emirates.

Figure 5.19 UK Outward FDI: Number of Projects per Destination 2019-2020



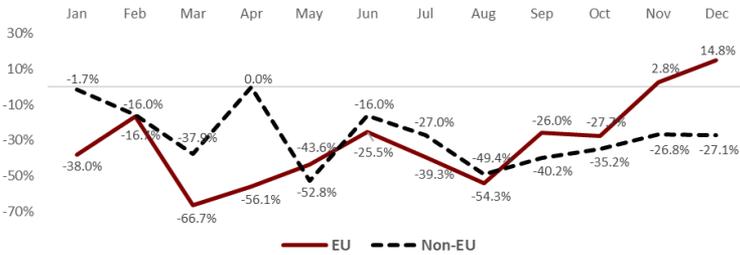
Source: fDi Markets

Monthly FDI data show that outward FDI projects were fewer throughout 2020, but March, May and August, with drops around 50 per cent, were the months with the most significant year-over-year reductions in the number of new projects from the UK. Figure 5.20 shows that projects in the EU fell more dramatically than projects in the rest of the world between January and August, but from September, figures saw a reverse in the trend, with non-EU projects falling by more. Investment in EU projects saw a significant increase in November and December, probably in anticipation of the Brexit transition period.

Conclusion

Recent literature sheds light into the productivity benefits of engaging in international trade activities and possibly to a greater extent, of those associated with foreign direct investment (FDI) activity. Investigating changes to trade and FDI flows over pandemic can help illustrate longer-term changes to production structures and consumption and potential implications to productivity. In the midst of Covid-19 and Brexit, the 33 per cent global reduction of trade for the UK is consistent with what we have seen in other countries.

Figure 5.20 UK Outward FDI: Number of Projects 2020 (year-over-year growth)



Source: fDi Markets

The large economic downturn observed over the second and third quarters of 2020 was mostly caused by the supply chain disruption, as a result of the first Covid-19 lockdowns. In the UK these lockdowns seriously affected industries like arts, entertainment and recreation services, and regions like the West Midlands and the North-East were among the worst hit. Trade recovered in the last two months of 2020, particularly trade with the EU, followed by a decrease in January 2021, which can be attributed to firms' anticipation of the new trade rules between the UK and EU under Brexit. The positive growth rates in trade registered between February and June 2021 require however a more careful interpretation, as we are comparing with the first months of the Covid-19 crisis which is when trade collapsed. The rapid economic recovery of trading partners like China can help us understand the resuming of trade globally.

The sectoral findings highlight the importance of the ICT and electronics sectors which appear to have attracted the lion's share of foreign investment before Covid-19. Since then, the investment in the environmental (green) technology sector has risen in importance. These developments give some early indications of changes in the economy as we go through several waves and variants of Covid-19 and move into post-Brexit trading arrangements.

Project-based analysis of FDI flows over the short run shows their volatility. Investment trends can look lumpy, and by focussing on year-on-year trends we might get a more nuanced picture. Future work might want to explore how the UK has fared compared to other EU nations, as not all countries were not equally affected to the same degree and time by the Covid-19 pandemic.

If 2020 was characterised by the unprecedented arrival of the Covid-19 pandemic and national lockdowns the world over, 2021 saw the tentative emergence of economies as vaccines began to take effect, high energy prices and disrupted supply chains. All of which will have an unpredictable effect on global trade and investment flows.

The regional analysis of both inward and outward direct investment flows suggests that the more affluent regions continue to be the ones that reap the investment returns and job creation, although they also have experienced declines following the Covid-19 pandemic. Data suggest that these regions will likely maintain their advantages and further policy measures will be needed to address UK regional inequalities.

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Digital Divide and Technology Adoption in Covid Times

Gabriele Ballicu, Ana Rincon Aznar, Catherine Robinson and Manuel Tong

Introduction

In this chapter, we review existing evidence for the UK and other countries of the extent to which the Covid-19 crisis may have accelerated the rise of the digital economy, and whether it could be creating a tipping point that could lead to a revival in productivity. Although the pandemic may have recently stalled the globalisation process, digitalisation has been central to the mitigation of damages to the economy (Schiliro, 2020). Evidence from around the world suggests that digitalisation is playing a key role in the recovery from Covid-19. We explore how the UK performs in terms of adoption of digitalisation, with respect to large European countries, and discuss implications in relation to the digital divide across UK regions.

The process of digitalisation has been defined as the adoption and use of digital technologies such as big data, cloud computing, Artificial Intelligence, E-commerce, internet of things, 3D printing and robotics (ECB, 2018), and are regarded by many as the key pillar of the fourth wave of industrial revolution (Schwab, 2017; Brynjolfsson and McAfee, 2014; Fleming, 2015; Goldfarb et al., 2015; Agrawal et al., 2019). These technologies rely intensively on computing power, fast and reliable internet connectivity, and are quickly being considered as modern general-purpose technologies due to their profound transformational properties in society. The rise of the digital economy is playing a significant role in accelerating global economic development and opening opportunities for consumers and businesses in accessing new markets and industries, creating significant gains in terms of cost savings, productivity, flexibility, quality, and innovation (Albertin and Moura, 2004).

However, at a time of rapid technological change, productivity growth has been weak across most developed economies. Over the last decade, there has been a slowdown in the rate of diffusion of ICT technologies as well as slow progress in adopting complementary technologies and investments. This is one likely factor helping to explain the global productivity slowdown, which peaked in the years leading up to the financial crisis of 2008-2009.

Digital technologies allow firms to improve product design and production processes, to access wider markets and automate routine tasks, to perform certain tasks remotely, and to facilitate relations with suppliers and clients. There seems to be a consensus that greater diffusion of existing technologies (e.g. broadband internet, cloud computing and online platforms) should have positive productivity benefits. However, while the theory of productivity benefits of adopting digital technologies has found some empirical support in the literature, the evidence is still scant. Moreover, uncovering an empirical link between digitalisation and productivity is often complex, as the business benefits take time to show.

For instance, Gal et al. (2019) estimate that a 10 per cent increase in a country's share of firms using high-speed broadband internet is associated with an increase of 1.4 per cent in total factor productivity, which measures efficiency gains in the economy, after just one year. This rises to 6 per cent after five years. In the case of cloud computing, the estimated productivity increase is of 1 per cent after one year, and 3.5 per cent after five years. Calvino et al (2018) find that countries that concentrate larger share of GDP in digital sectors are more productive.

Brynjolfsson et al. (2021) identify the existence of a productivity J-curve in the advent of general-purpose technologies (GPT), which leads to productivity being underestimated in the early stages of a new GPT. They argue that a key role is played by complementary investments in intangible assets with the benefits materialising in later stages, as productivity rises becoming more significant. These findings resonate with the earlier evidence showing that using Information and Communication Technologies (ICT) becomes more beneficial for businesses when complemented with intangible capital (Corrado et al., 2017).

There are other factors to consider when explaining the relatively small contribution from ICTs to output and productivity growth observed in recent years in the UK and other major economies. A

chief explanation is the problematic measurement value of ICT services. While not likely to be the whole story, uncertainty around productivity measurement has increased with a growing awareness of the importance of intangible assets in production and the difficulty to measure the value of digital and free goods. The OECD stresses that productivity gains across economies have been disappointing due to shortfalls mainly due to insufficient complementary investments and inadequate policies, which have slowed the diffusion of digital technologies and reduced the potential productivity benefits (OECD, 2019). These include firms' capabilities in terms of technical and managerial skills, organisational capital, innovation and financing.

There are several ways in which digital connectivity has been critical to societal resilience and business continuity since the outbreak of the Covid-19 pandemic. Digitalisation has helped resume operations when physical contact has been limited by the various lockdowns and has been a catalyst for new opportunities to diversify into new products and new markets, fostering a new wave of adaptation and innovation in the digital space. It is also recognised that it can help build up resilience to supply/demand shocks as well as other operational risks. Moreover, even during the rise of the pandemic, there was a shift among companies towards the use of technologies such as robotics, making the automation and digitalisation industries one of the few winners of this crisis (Financial Times, 2020).

Businesses and citizens have adapted to changing terms of consumption, working and socialisation habits (Tosheva, 2020) and new opportunities have arisen. For instance, for telemedicine, food delivery and logistics, online and contactless payments, remote learning and entertainment, new on-line business models as well as in the delivery of public goods and services, etc. In this landscape, new opportunities have arisen for homeworking too, and a considerable proportion of employees in the UK (40 per cent) have worked from home exclusively at the outset of the pandemic (ONS, 2020). The percentage of people purchasing on the internet in the UK increase from a level of 87 per cent pre-pandemic (2019) to 90 per cent in 2020; this is considerably higher than the European Union average (Eurostat, 2021).

As the global economy recovers from pandemic (and adapts to life with it), a key research question is the extent to which emergency solutions implemented at a time of crisis and uncertainty will turn into 'better' ways of doing things in the long-run which with a potential to increase productivity. There is ample evidence of

dynamic changes among firms including an accelerated digitisation, investment in new technologies, and reorganisation practices. However, according to a Mackinsey report, covering the US and six large European economies,¹ these have been largely concentrated in certain sectors and in large and 'superstar' firms (McKinsey, 2021). The report estimates that these advances have the potential to foster annual productivity growth by one per centage point in the new few years. However, productivity growth could also remain low unless advances are sustained and spread and are in large-enough sectors in the economy. If the observed trend persist, we could observe a widening divide in which at best only a minority of firms, regions and households enjoy productivity and income growth.

The OECD (2019) discusses specific ways in which digitalisation can support productivity. An example is the development of online platforms which sustain important productivity gains (Bailin et al., 2019). These platforms act as intermediaries between service providers and consumers in industries such as food and accommodation, retail trade, finance, personal services or entertainment. They can reduce information asymmetries between consumers and service (often low-tech) providers, intensifying competitiveness and incentivising suppliers to provide better value for money in products and services. Online platforms can also bring important efficiency gains to firms by making the real-time availability of services more visible, improving capacity utilisation (such as in hotel and restaurant or taxi bookings), or making the system of payments quicker and more efficient. This has been particularly noticeable among SMEs who previously found contactless payment mechanisms too expensive to support.

Brynjolfsson et al. (2021) find that the use of technologies such as predictive analytics boost firm productivity, if combined with factors like accumulation of IT capital, educated workers or workplaces designed for highly efficient production.

According to a new global survey of executives by McKinsey,² companies have accelerated the digitisation of customer interactions by three to four years. Moreover, there has been a seven-year increase, on average, in the rate at which companies are developing digital or digitally-enhanced products and services. The findings of this survey highlight a significant increase in remote working, identifying changes in customer needs in response to new health

1 France ,UK, Spain, Sweden, France, Germany and Italy.

2 McKinsey Global Survey of executives (2020)

and hygiene considerations, as well as more intensified remote interactions between businesses and their customers and suppliers. The latter has required significant investments in data security and a more rapid migration to the cloud. Companies have permanently removed some of the main bottlenecks and constraints to virtual interactions, and operations and technology-related changes, along with remote work and customer interactions, are expected to be long-lasting. In the concrete case of the UK, a survey by Make UK found that 46 per cent of surveyed firms agree that investments in digital technologies made in the past have helped them survive the Covid-19 crisis. Moreover, 71 per cent consider increasing such investment over the next two years, despite whatever happens regarding Covid-19 (Policy Link, 2020).

As a result, companies have needed to modernise their IT equipment, investing in more flexible digital solutions, which better match demand and lower fixed costs. Even though UK investment in information and communication technologies (ICT) and other machinery equipment sharply fell by 39 per cent in the second quarter of 2019 relative to 2018, this type of investment has since recovered, thus contributing to the overall rise in business investment in subsequent periods (ONS, 2021). Going forwards there will be less need to maintain expensive IT departments in-house with large overheads. There is an expectation that this can yield benefits in the form of improvements to productivity. Cloud computing gives firms access to flexible data storage and improves processing capacities and operational agility. These changes potentially reduce the scale advantages held by more established incumbent firms. DeStefano et al. (2020) investigate the adoption of cloud services by UK firms, analysing those firms' performance and find that adoption of cloud technologies leads to significant increases in firm scale, especially for younger firms, and enhance worker mobility.

Adopting digital solutions thus emerges as one of the strategic areas that businesses can focus on to achieve a solid recovery; but compared to the earlier vintages of ICT in the workplace, this latest wave will also involve broader rethinking of their organisations, and establishing the skills and roles needed to sustain new organization models (McKinsey, 2020).

There are other trends, like the intensification of home-working and/or hybrid-working patterns that appear to be consolidating. While it has been shown not to be detrimental for business productivity and have the potential to increase efficiency, they will require of

continuous and significant investments in digital infrastructures and skills. A key aspect of the acceleration in the digital transformation is the realisation that digital skills are now more essential than ever and require a degree of interconnectivity not previously observed.

In a survey commissioned by the Department for Digital, Culture, Media and Sport (DCMS, 2021), almost half of UK businesses surveyed (46 per cent) reported problems to recruit for roles requiring data intensive skills, such as machine learning (28 per cent), programming (24 per cent), emerging technologies and solutions (24 per cent), advanced statistics (24 per cent), among others. Additionally, 18 per cent of firms state that graduates are lacking basic IT skills. Likewise, an EU investment survey (EIB, 2021) finds that in 2020 37 per cent of EU firms had not adopted any advanced digital technology, compared to 28 per cent of US firms.

Almeida et al. (2020) argue that the digital economy can only succeed if it is accompanied by a public and private strategy for the digitalisation of education and training, both at the level of transversal knowledge of the whole population in information and communication technologies, as well as in the training of highly specialised people in the fields of computer science. As such, a strong commitment to digitalisation does not necessarily lead to a disinvestment in human capital. Indeed, complementary investment in skills are required to broaden to a number of areas, not only in terms technology but other, creative and softer skills, which should help respond to social challenges.

Pre-Covid empirical studies have shown that digital technologies may have contributed to the increasing levels of dispersion in productivity performance across firms especially between highly digitalised firms at the frontier and those lagging behind the technological frontier. Gal et al. (2019) find that a simultaneous increase in five of the most important digital technologies (defined as high-speed broadband, enterprise resource planning, customer relationship management (CRM) systems, simple cloud computing, and complex cloud computing) can explain about half of the annual observed divergence in firm productivity between the bottom and the top quartiles of the productivity distribution, over the period 2010-2015.

The Covid-19 pandemic has likely exacerbated the regional asymmetries in the digitalisation process, as companies and households differ in resources and maturity that allow them to face

the challenges of digital transformation. Large groups of workers have been required to work from home since the advent of the pandemic and this transition has been easier for high-income workers and those with jobs in service sectors such as finance, insurance, or professional services, more likely to be located in places that are already better off (Nguyen, 2020). Many areas most directly affected by the health crisis will also be hard hit by the longer-term economic crisis (Aitken and Overman, 2020).

In a post-Covid-19 world, technology could contribute to develop areas that are currently excluded and economically disadvantaged, contributing to reduce regional disparities. But significant investment in data networks and digital infrastructure is required. As the Internet is a key enabler of digital technologies, access to high-speed internet, which is critical to the use of recent data-intensive technologies, is especially problematic in rural and remote areas of the UK. For instance, while three quarters of premises in London have access to ultra-fast broadband, in Wales only one out of three have it (Aitken et al., 2019). Moreover, these inequalities are likely to have long term effects as detrimental education impacts have also been more acutely felt by children from poorer backgrounds with lower digital resources and access (The Children's Society, 2020) and persist over time. Along the same lines, Van Ark (2021) advocates for better access to broadband and digital devices, which provide technical means for greater productivity, but this should be joined by an improvement in people's digital skills, involving schools, colleges, government and businesses.

While the use of digital technologies and analytics has accelerated in larger organisations, the pandemic has been a reality check for many businesses, especially SMEs. Businesses face a number of challenges, and while the crisis caused by Covid-19 has generated a learning effect in many organisations, it has become evident that many businesses are not yet fully prepared to face the challenges of the digital transformation. Many businesses had been reluctant to undertake digital transformation but were forced to start doing so in a relatively short period of time. Digitalisation does not simply involve the purchasing of technology but implies the reformulation of business processes. Restructuring of processes requires dynamism, agility and investment in more organic structures, the reinforcement of standardisation and automation in order to optimise the responses

to customers' needs, and the search for new ways of working that allow for increased efficiency without reducing levels of social interaction within organisations.

There is evidence suggesting that the productivity effects of intensifying certain digital activities (e.g. through e-commerce) could bring larger benefits to small companies compared to medium-sized and larger firms, and therefore should be supported and incentivised. Smaller and younger firms for instance may benefit more from adopting cloud computing than larger firms, as it allows them to scale-up more easily. While smaller and younger firms are pioneers in adoption of cloud computing, at least in the US (Bloom and Pierri, 2018), this is not the case in terms of adoption of other technologies, such as personal computers and e-commerce.

Consumer behaviour and demand patterns have changed, and businesses need to adapt to prosper. Social media tools can be used to improve the exchange of information between businesses and customers, promoting knowledge sharing and enhancing innovation in the production process. Smaller businesses can focus on improving tools such as e-commerce platforms to improve their visibility, or CRM modelling to improve customer relationships.

The pandemic has also led to a differential adoption in digital technology across sectors. Mackinsey (2021) argues that those sectors where investment in new technologies have the greatest potential (where annual productivity growth could increase by 2 per centage points) include: healthcare (with the increase of telemedicine), construction (through the accelerated adoption of digital and industrialised methods), ICT (with an increased demand for services) and retail (notably through the increase in e-commerce).

There is evidence that firms in services industries may experience larger benefits in certain ICT uses, such as participation in e-commerce activities, relative to manufacturing firms (Falk and Hagsten, 2015). This may reflect higher levels of organisational flexibility by services firms, and higher opportunities to deliver services online. Digitisation enables organisations to establish their operations anywhere in the world, which will be even more relevant in the post-Covid times. Hagsten (2016), however, shows that overall labour productivity gains from increases in the share of broadband internet-enabled employees are larger for manufacturing companies, although this positive association occurs more often in services firms across the countries studied.

Building on the literature on the nexus between international trade and Covid-19, Hayakawa et al. (2021) explore whether e-commerce has been able to mitigate the negative effects of Covid-19 on international trade, as online shopping is not limited to domestic transactions. The study uses a gravity-model for a number of countries and exploits data on E-commerce from UNCTAD, proxying for business e-commerce readiness. The findings indicate that e-commerce development in importing countries (where B-2-C business plays a key role) has contributed to mitigating the negative effect of Covid-19 on trade. In contrast, in exporting countries this is not observed. This may be because cross-border B-2-B business is still in its infancy, compared to the B-2-C online experiences.

The UK has lagged other nations in the adoption of industrial digitalisation technologies. The Policy Links Institute (2020) mentioned examples of industrial digitalisation policy responses amid Covid-19 by countries like Germany, Japan, Singapore, South Korea and China, which the UK could take as a reference.³ This publication identified the key drivers of industrial digitalisation before and after Covid-19, highlighting the emerging priorities for the UK to take forward. These include emphasizing the key role of: a) digital workflows, which involve remote working and physical-virtual mapping solutions to accommodate a reduced physical workforce, and which present opportunities to boost productivity; b) intelligent supply chain forecasting, based on data-driven demand forecasting which is needed to ensure better transparency across the value chain; c) automation and reshoring; and d) green recovery and circular production, which support more sustainable forms of production. A future UK Industrial Strategy could contribute to the development of long-term structures that can spur digital technology adoption and innovation across the whole of the country.

Innovation is considered key pillar guiding the processes of digitalisation, and this is likely to have been disrupted by the Covid-19 crisis. Bloom et al. (2021) have analysed survey data from the Decision Maker Panel (DMP), a large and representative monthly panel survey of around 3,000 UK firms. They show that Covid-19 has

3 For instance, Germany has reinforced “Go Digital”, a programme of digitalisation measures, as well as a Digital Policy Agenda for the Environment. Likewise, Germany has released a €2 billion fund for start-up ecosystem and a €130 billion stimulus package, along with a new “Digital Now” funding programme.

led to a large reduction in R&D expenditure by firms. Overall, they estimate TFP could be around 1 per cent lower over the medium term, with additional longer run negative effects on productivity from diminished innovation and intangible investment by firms. This could affect the efficacy of R&D because of the difficulty of carrying out research under lockdown when scientists and engineers are not able to physically access equipment. However, these findings should be taken with caution, since the effect described might have just been temporary, with companies resuming to invest in large new R&D projects.

Technologies of the 4th Industrial Revolution (4IR), such as the Internet of things, robotics, big data, artificial intelligence and virtual reality, which play a key role in digital transformation by helping businesses to manage better their operations, are likely to become increasingly important in the post-Covid world. At a very early stage, at the end of the 90s, the UK was the European leader in terms of 4IR patent applications with more than 50 applications per year. Over the last twenty years, however, the UK has fallen behind Germany and France (European Patent Office, 2017). In relation to AI specifically while the US and China have the largest number of patents in this field, the proportion of AI applications is growing at a similar rate to that in the US (IPO, 2019).

The 4IR technologies create a range of opportunities for data-driven decision making, changing the way in which companies operate, as well as the relationship between suppliers, customers, and other agents. In order to excel, companies need to expand their digitalisation channels by, for instance, using advanced analytics to combine new sources of data, such as satellite imaging to make better and faster decisions and strengthen their links to customers (McKinsey, 2020). In the manufacturing sector, these technologies can also help to track resource and energy efficiency.

Despite the enormous transformational properties of digitalisation, the productivity gains associated with use of 4IR are not yet observed in full scale, and do not show in the aggregate economic statistics (Van Ark, 2016). There is for instance uncertainty surrounding the impact of artificial intelligence on the speed of technological change, on job creation and its potential to transform the economies and benefit all. Dolado et al. (2021) discuss important societal challenges associated with the rapid process of digitalisation, robotics and artificial intelligence (AI) and the platform economy, especially in interaction with the effects of the pandemic. The pandemic

outbreak has taken place in times of profound demographic changes that see significant reductions in working-age populations around the world. Some have argued that job reallocation spurred by recent technological changes will be intensified and extended by the economic consequences of the Covid-19 crisis, as job losses have been disproportionately large among the youth (Barrero et al., 2021). Job losses and increasing inequality resulting from AI and related forms of automation technologies were already of concern to many, especially in developing countries and emerging market economies. Dolado et al. (2021) argue that the ageing of the population coupled with technological changes, such as robotics and AI, may have long-term negative consequences for productivity growth, through the deceleration in innovation. This is because of the aggregate constraints on resources that will be available for investment, as well as the direct implication of an increasingly older working-age population on the success rate of innovation.

Narayanamurthy and Tortorella (2021) explore how the outbreak of Covid-19 could affect employee's performance and the moderating role performed by 4IR technologies. Focusing on the service sector, they find that home office work environment enhances output quality and delivery performance of employees. The findings also reveal that service organisations that are adopting 4IR technologies are underutilizing their capacity, and therefore underestimating the perception of their benefits to individual performance. This was particularly observed during the Covid-19 pandemic, which has entailed several changes to the way organizations work. However, the advent of 4IR technologies has other less favourable considerations. For instance, by facilitating home working, it may limit the sharing of knowledge via face-to-face contact, which is particularly relevant for younger workers. It can also be detrimental for the development of social capital and innovation in the workplace. In addition, promotion prospects could be more limited for women and other minorities working remotely, due to that lack of social contact.

To enable meaningful cross-country comparisons of digital adoption and readiness, a number of indicators can be used to illustrate the degree of digitalisation in the UK compared to other economies where comparable data exist. In Figure 6.1 we illustrate 5 dimensions of digitalisation in relation to a handful of countries (Germany, France, Germany, Sweden and Denmark). Overall, the results show

that the UK does better in terms of digitalisation than the major EU economies. However, it underperforms compared with several of Nordic and Northern European countries.

Before the pandemic, 87 per cent of individuals in the UK were making regular purchases over the internet (in 2019). This was the highest share in the EU. This compared to 60 per cent in the EU-27 (which excludes UK). In France this was 70 per cent, in Germany 79 per cent, and in the Netherlands 81 per cent. By 2020, this has gone up to 90 per cent in the UK and to 64 per cent in the EU-27 as a whole. During 2020, the majority of purchases in the UK were mainly of clothes, shoes and accessories (0 per cent of individuals), followed by restaurant deliveries (36 per cent of individuals), printed books (31 per cent) and furniture, gardening or home accessories (30 per cent). In 2020, the percentage of UK population undertaking e-banking activities reached 80 per cent (Eurostat, 2021). This was significantly higher than many of the EU countries and the EU average (57 per cent). It was however lower than in countries such as Denmark (94 per cent), and Netherlands (89 per cent), Finland (92 per cent) and Sweden (85 per cent).

Additionally, it was recently found that UK adults spent on average 3 hours and 37 minutes online each day in 2020, nine minutes more than in 2019 (Ofcom, 2021). This average lapse is longer than those of EU countries like Spain (3 h., 3 min.), France (2 h., 20 min.) and Germany (2 h., 6 min.).

Under 30 per cent of UK firms⁴ reported e-commerce sales in 2020, lying above the EU-27 percentage (21 per cent) and large countries like France (17 per cent) and Germany (20 per cent). Nevertheless, e-commerce incidence among UK firms lies below countries like Denmark (38 per cent), Sweden (35 per cent), Czech Republic and Croatia (31 per cent). Among the EU members with the lowest shares of firms reporting e-commerce sales, we have Italy, Latvia, Poland and Cyprus (all 16 per cent). E-commerce sales represent 20 per cent of total turnover of UK firms, in line with the EU average. It is however lower than in some countries such as Ireland (44 per cent), Belgium (31 per cent), Denmark (29 per cent) and France (23 per cent).

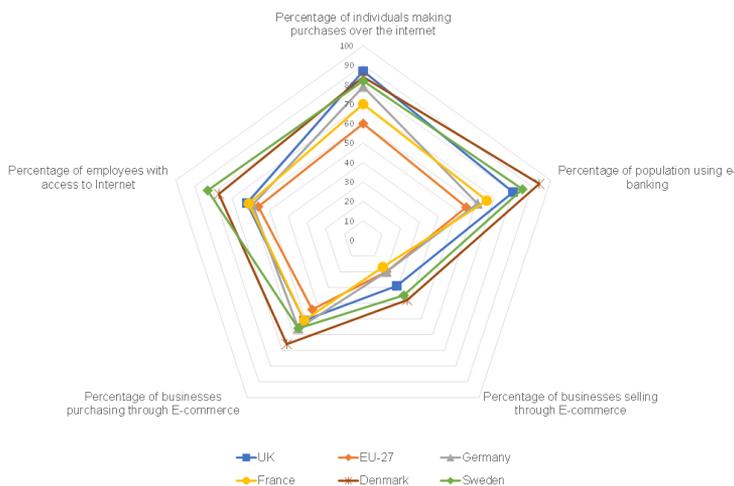
4 Exc. Financial sector and those of less than 10 employees.

The per centage of UK firms making online purchases was just over 50 per cent (this was measured in 2017). This is again higher than in many EU countries, but lower than in countries such as Austria (63 per cent), Netherlands (57 per cent), Denmark (66 per cent) and Sweden (78 per cent).

The per centage of UK employees with access to Internet was 62 per cent in 2020. This is higher than the EU average (56 per cent) and slightly higher than in some large EU economies such as France (61 per cent), Germany (59 per cent), Spain (56 per cent), and Italy (53 per cent). It is however lower than in other countries, such as Denmark (77 per cent), Netherlands (72 per cent), Finland (80 per cent) and Sweden (83 per cent).

Prior to the pandemic (2018), the per centage of UK employees that worked form home at least once a week was 16 per cent (Eurostat, 2021). This was above the EU average (9 per cent) and, most EU countries, and only lower than in the Netherlands (20 per cent). During 2020, the proportion of UK employees working from home exclusively reached almost 40 per cent in the first quarter of 2020 and decreased to about 25-30 per cent towards the end of 2020 (ONS, 2020).

Figure 6.1 Measures of digitalisation in the UK and major EU economies



Source: Eurostat and NIESR.

Thus, the UK appears to be at the frontier in terms of consumer purchases and amongst the leading nations with regards to banking and selling online, but domestic internet access lags behind the Nordic nations and business-to-business online purchases appear less established. This suggests that a cultural change may be required within businesses as well as improvements in broadband and overall digital infrastructure.

Digital readiness has proved a crucial factor in allowing some economies to successfully contain the spread of the virus and maintain some normality during the Covid-19 pandemic. Companies need not only to develop digital solutions to adapt their organizations to new operating models, but to integrate businesses' processes, incorporate data-driven decision making, and implement change management. Building digital skills and education are all critical for successful digital transformation (ADB, 2020). Firms need to hire and manage the talent of the most qualified and suitable people for the new challenges of the digital economy. Government action could be crucial in supporting firms to build resilience by facilitating digital technology adoption and other types of investment. This is particularly important since evidence so far has shown that innovation and other advances have been concentrated in leading firms and geographies. Changes will need to be more broad-based in order to transform the crisis into a real opportunity for tangible and sizeable productivity gains. Policy can incentivise innovation across the economy in a number of ways, for instance offering tax credits or subsidies and revising platform and competition rules. Policy also has a number of tools to ensure that investment is directed to the right places, including infrastructure and skill building. An example of support schemes is the Help to Grow digital support currently being offered; an alternative would be a more hands-on approach by sponsoring masterclasses on digital integration and innovation and investment. We need to recognise that the complementary skills and assets are also required to fully reap the rewards from the significant uplift in digital investment as a result of the pandemic in order to transform the crisis into an opportunity for productivity gains.

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Firm Creation, Geography and Productivity

Barry Naisbitt ¹

Introduction

The pandemic has severely disrupted to economic activity, with effects on output, employment and productivity as discussed in sections 2, 3 and 4. This section examines evidence on the establishment of new firms during the pandemic, which have an important economic role in a dynamic context, and productivity trends across regions.

New Firms Across Regions and Industries

The Covid-19 pandemic and associated lockdowns have been accompanied by a boom in firm creation in the UK with an increase in new firms also reported in the US.² Firm creation is an important determinant of productivity, accounting for one side of the creative destruction process in industry, the other side being firm exit. One simple hypothesis is that more productive new firms enter the economy and less productive incumbents exit the market, so firm entry enhances overall productivity. However, there are other considerations as entrants have a greater incentive to innovate than incumbents, which aids productivity, but increased entry diminishes incumbents' profits which reduces their ability to finance innovation and decreases productivity.

Normally, the former positive effect of entry on productivity wins out over time – influential studies by Foster et al. (2001) and Brandt et al. (2012) find that entry and exit account for a significant portion of manufacturing productivity growth in the US and China

1 Thanks are due to Jagjit Chadha, Paul Mortimer-Lee and Bart van Ark for comments and Anthony Savager and Yannis Galanakis of the University of Kent for providing updated data on new business registrations and for helpful comments and discussions.

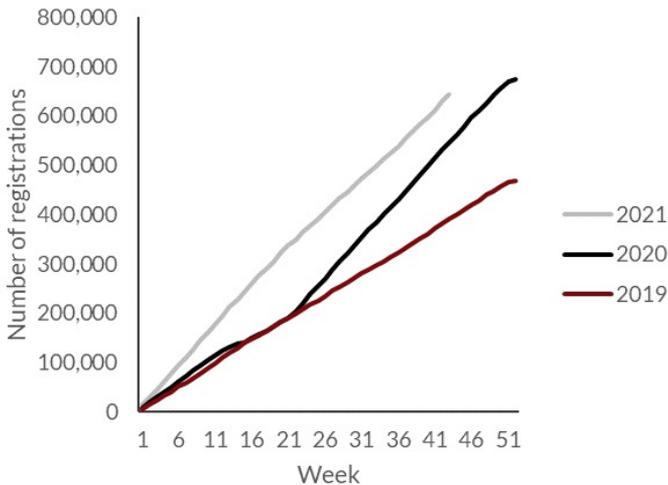
2 Duncan et al. (2021) for the UK and Haltiwanger (2021) for the US.

(respectively 25 per cent of US manufacturing productivity growth and 72 per cent of Chinese manufacturing productivity growth in the periods studied).³

Entrants are also an important engine for competition. Greater entry reduces the price-setting ability of incumbent firms, which means lower markups. In turn, lower markups increase productivity if they cause incumbents to utilize excess capacity which occurs with imperfect competition.⁴

NIESR has published research on firm creation in the UK during the pandemic.⁵ The research on recent firm births in the UK by Duncan et al. (2020a; 2021) shows that in 2020 the number of new business registrations was 44 per cent higher than in 2019. The high level of new business registrations continued into 2021, with year to October new registrations 18 per cent above the equivalent period in 2020.

Figure 7.1 Cumulative number of registrations by week



Source: Data supplied by www.ukfirmcreation.com to update Duncan et al. (2021), Figure D1.

3 Quoted in Asturias et al. (2021, p.3).

4 See Savagar and Dixon (2020).

5 Duncan et al. (2020a) and Duncan et al. (2021).

For 2021, much of this increase relative to 2020 occurred in the first half of 2021 and since May, weekly new registrations have been running at slightly lower levels than in the same period in 2020. Figure 7.1. shows cumulative weekly new business registrations figures, with new registrations increasing further this year.

There are clear differences across industrial sectors in new business registrations, with wholesale and retail trade new business registrations in 2020 running at twice the level of the same period a year earlier and expanding further, by almost 30 per cent in 2021.⁶ Manufacturing industry saw an increase in new registrations of over 50 per cent in 2020 but the pace of increase has slowed to around 10 per cent so far this year. Other sectors noted in Table 7.1 also saw increases in registrations of around 20 – 30 per cent in 2020.⁷ While their registrations have continued to increase in 2021, the rate of increase has been slower than in 2020 in all the sectors noted in the table, as has the increase for all identified industries.

Table 7.1 Per centage change in new business registrations by industry (year to October compared to a year earlier)

	2020 relative to 2019	2021 relative to 2020
Accommodation & food services	31	23
Construction	31	19
Manufacturing	62	9
Real estate	35	20
Transportation & storage	43	29
Wholesale & retail trade	108	27
Information & communication	20	16
All identified industries	40	18

Source: Data supplied by www.ukfirmcreation.com to update Duncan et al. (2021).

⁶ These comparisons are for the year to October.

⁷ It is possible that some registrations may have been made to take advantage, possibly fraudulently, of government schemes such as the Bounce Back Loan Scheme and the Furlough Scheme.

Although firm entry and exit have been shown to be major sources of productivity growth, there is not detailed data on the productivity levels of individual new firms and exiting firms in the UK that would enable a detailed real-time analysis of the contribution of these firms to the overall level of productivity and its growth. It is, however, possible to focus on whether firms are being created in sectors that have high or low productivity. This assists in assessing whether booming firm creation during Covid-19, when the sectoral pattern of new business is considered, could cause an allocation of inputs that may have positive long-run implications. One possible hypothesis is that the relatively high rate of firm creation during the Covid-19 pandemic means firms are not necessarily setting-up in highly productive sectors, instead firms might be being created in sectors than can best operate in a Covid-19-compliant manner, but which may not yield strong long-run positive productivity effects.

The evidence for the UK is that in 2020, new firms have tended to register in lower productivity sectors. However, comparing the growth in new registrations in the year to the final quarter of 2020, there is a positive relationship between the growth in the number of firms in an industry and the level of productivity in an industry. The extent to which these patterns are directly due to the nature of new business opportunities in the pandemic and whether they will prove to be transitory or permanent is not yet known.

The recent increase in new firm registrations and the positive relationship between firm creation and productivity growth found in the research literature suggests the possible existence of a positive reallocation effect on productivity from the Covid-19 pandemic. OECD research has identified job reallocation towards high-productivity sectors during the pandemic, with real-time accounting data on small businesses in UK, New Zealand and Australia showing job reallocation towards high-productivity firms, particularly those using digital technologies, although overall job reallocation was mitigated due to furlough policies.⁸ Bloom et al. (2020) also found a positive 'between-firm' effect in a productivity decomposition.

However, the reallocation channel is only one component of aggregate productivity growth. The within-firm response to economic shocks must be considered. Bloom et al. (2020) decompose

8 Andrews et al. (2021).

aggregate changes in UK productivity into within-firm and between-firm productivity effects and find that within-firm productivity had declined because intermediate costs increased in response to Covid-19. In effect, firms redirected existing inputs away from producing output and towards mitigating the effects of Covid-19, leading to productivity falling. The research attributes a small increase in productivity to between-firm productivity effects, which occurs because business is reallocated to more productive sectors or firms, or because less productive firms suffer disproportionately.

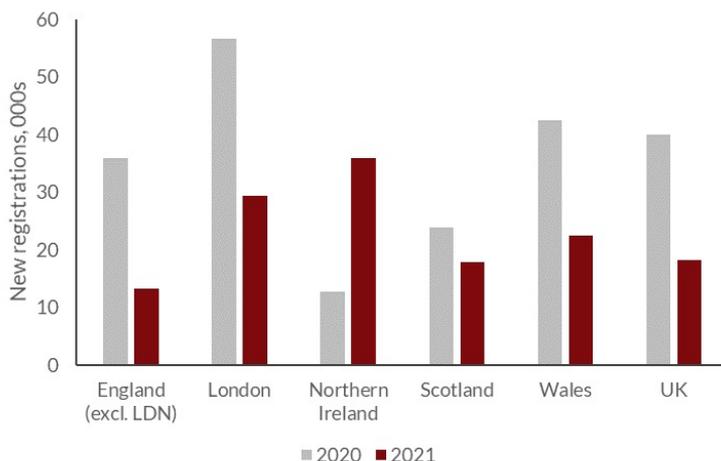
The sectoral analysis of new firm registrations supports the evidence for this channel, with firm entry growth having been greatest in high productivity sectors such as the manufacture of basic pharmaceuticals. Despite this positive effect, Bloom et al. (2020) show that overall the pandemic had strong negative effects on productivity in the UK because it decreased the productivity of existing firms, thus stressing the importance of within-firm changes.⁹ One potential area for future research might be to examine the hypothesis that these within-firm changes might be just temporary, as a reaction to the immediate effects of the pandemic, and that as the threats from Covid-19 reduce and economic growth is re-established the drop in productivity may reverse.

Duncan et al. (2020a; 2021) extended the analysis of new firm creation to countries and regions within the UK, as shown in Figure 7.2.¹⁰ Company registrations grew most rapidly in the London region in the year to October 2020 (by around 57 per cent), but growth in Wales and England (excluding London) was also strong at around 40 per cent. For the year to date in 2021, growth compared to the same period in 2020 has been weaker than in 2020 for the UK (18 per cent compared to 40 per cent) and has been strongest in Northern Ireland at 36 per cent, with London again showing strong growth. The growth rates in Scotland and Wales were positive and similar, at around 20 per cent, and stronger than in England (excluding London) which recorded growth of around 13 per cent. In absolute terms, the increase in the number of new business registrations in England (excluding London) and London is far greater than the number in any of the other nations shown in Figure 7.2.

9 See also De Vries et al. (2021).

10 See also Savager and Galanakis (2021).

Figure 7.2 Annual change in new registrations by country (per cent, year to October)



Source: Data supplied by www.ukfirmcreation.com to update Duncan et al. (2021), Figure D1.

The increase in new firm creation in the UK¹¹ in the pandemic is not just a UK phenomenon. In the US a literature describes a decrease in business dynamism and entrepreneurship in the years after the global financial crisis.¹² However, the recent pandemic (and associated recession) has seen somewhat of a boom in new firm creation and the narrative is now one of increasing business dynamism.¹³ The recent increase in firm creation is unusual in that in a 'typical' recession firm creation might be expected to fall. However, during the Covid-19 recession the economy has had to restructure towards industries that are able to operate in a manner consistent with lockdown and other restrictions and are also able to respond to the challenges posed by both Covid-19 and the need to find ways to combat Covid-19. Hence in the UK there has been booming firm creation in sectors such as online retail and household goods.

11 Duncan et al. (2021). The information and analysis for the UK on real-time firm creation data acquired from the Companies House register of company incorporations is available at <https://www.ukfirmcreation.com/reports/monthly>

12 Decker et al. (2016) and Hathaway and Litan (2014).

13 Djankov and Zhang (2021), Dinlersoz et al. (2021) and Buffington et al. (2021).

It is still too early a stage, especially with the pandemic continuing, for studies to examine in detail both the differing reasons for this return of business dynamism and whether it will be sustained. However, the evidence from the UK and US suggests that it is possible that a change may have occurred in terms of the willingness to start new firms and the role of creative destruction may have been boosted. The job creation and productivity implications of this, in both the short- and long-term, will be important for future economic growth. One area of particular importance here may concern trends in self-employment (non-employer businesses in the US). Increases in UK self-employment in and immediately following the global financial crisis were frequently documented as being heavily influenced by a perceived lack of employment opportunities, as opposed to an increase in entrepreneurship. The different level of financial support for employment and self-employment in the UK during the pandemic may have contributed to lower rates of new self-employment activity in the pandemic than in the global financial crisis.

Firms, Job Creation and Productivity

A major focus of the analysis of the importance of new firms in economies in the research literature has been on their contribution to job creation.¹⁴ This research concludes that new firms are very important for job creation and the formal policy importance of job creation has been boosted in the US recently by the change in monetary policy operation by the US Federal Reserve which stressed the idea of maximum employment as a goal of economic policy.¹⁵

Criscuolo et al. (2021, p.1) report that “young firms (five years or younger) are the primary source of job creation in all 18 countries [examined] over most of the 2000s. This is driven to a large extent by the entry of new start-ups as well as higher growth rates of young firms that survive”.¹⁶ This importance of new firms in job creation is well-documented for the US. Haltiwanger et al. (2017, p.11) comment that “business start-ups and high growth young firms disproportionately contribute to job creation in the United States. In a typical year, start-ups account for about 10 per cent of firms

14 Birch (1979) and Davis et al. (1996). A recent UK example in the context of the pandemic is Duncan et al. (2020b).

15 Powell (2021).

16 Criscuolo et al. (2014, p.1).

and more than 20 per cent of firm-level gross new jobs creation [...] less is known about the nature of their contribution to output and productivity growth due primarily to data limitations.”¹⁷

The focus on job creation has, in part due to data issues, dominated the examination of the effect of start-ups on productivity. A further, but important, complicating factor is the high death rate of new firms. Bank of England research showed that the probability of firm death was at its highest in the first three years (at around 12 per cent a year) in the UK.¹⁸ The Kauffman Foundation estimates that only 78 per cent of US new firms are currently surviving beyond one year and recent US research notes that “most new employer businesses fail within the first five years after entry”.¹⁹ In the UK, the five-year survival rate for businesses born in 2014 was 42.5 per cent.²⁰ From this perspective, there is also a need to focus on the business exits and in particular their employment and productivity characteristics. There will be no net gain to productivity in the economy if new firm numbers are high but are matched by high exit numbers and if new firms do not have higher productivity than exiting firms.

If new firm creation spurs productivity growth in the longer-term, possibly because new firms are being set up in faster growing and higher average productivity and productivity growth industries, then this will be an important feature to monitor.²¹ In the short-term, however, evidence suggests that new firms have initially below average productivity levels, in part because start-up and development costs may be higher than for established firms or such firms may not yet have reached points at which increasing returns to scale exist.²² It is also the case that, historically, smaller firms (of 1 to 9 employees) have lower gross value added (GVA) per worker than larger (50+ employees) firms and that younger firms (2 years or less) have lower GVA per worker than other age bands (see Table 7.2). Evidence from the Office for National Statistics shows that the

17 Haltiwanger et al. (2017, p. 11). Start-ups are largely defined here as new firms, typically in their first year of operation.

18 Melolinna and Schneider (2019).

19 Kauffman Indicators of Entrepreneurship at www.kauffman.org and Haltiwanger (2021, p. 21).

20 Office for National Statistics (2020b).

21 Van Stel and Storey (2004).

22 Office for National Statistics (2017).

median GVA per worker of a firm that was aged 2 years or younger in 2018 was over 10 per cent lower than a firm aged between 3 and 5 years.²³

Table 7.2 GVA per worker in 2018 (£000)

GVA per worker (£000)		
Age band of firm	Mean GVA per worker	Median GVA per worker
2 years or younger	41	24.5
3 to 5 years	50	28
6 to 10 years	49.5	25.5
11 to 20 years	52	29.5
21 years or older	49	31.5

Source: Office for National Statistics (2020a).

However, there is evidence that if new firms survive the early years and develop into high growth firms, they have a positive effect on overall productivity growth.²⁴ So the dynamics of firms' survival is an especially important factor for an economy. Such research suggests that the combination of monitoring the growth of new businesses and their productivity characteristics across industries and regions will give insights into prospective trends in productivity.

The analysis outlined here represents only part of what is a complex interaction of factors that contributes to an analysis of trends in productivity and productivity growth and, developing from there, gives insights into policies and approaches that would help to increase productivity both nationally and locally as well as to assist the levelling-up agenda.²⁵ A deeper understanding of the reasons for the growth of new firms, their locational choices and their initial and continuing levels of productivity will be required to understand more fully how they contribute to productivity growth in the short- and medium-term. In addition, a deeper understanding of the reasons behind firms closing (and in particular their productivity characteristics), is important at both sectoral and regional levels for the analysis of the dynamics of productivity.

²³ Office for National Statistics (2020a).

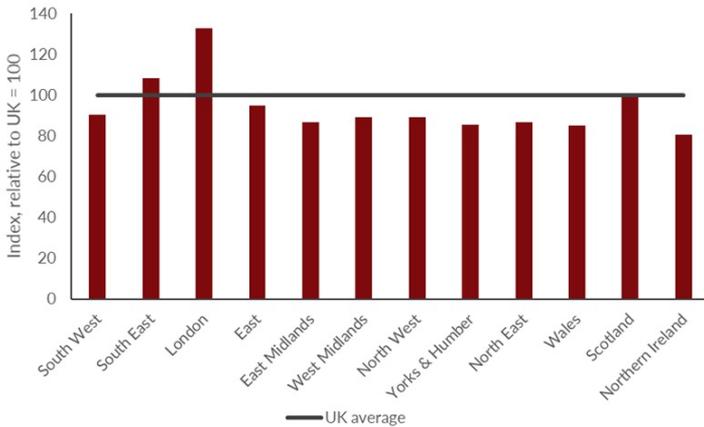
²⁴ Du and Temouri (2015).

²⁵ Centre for Cities (2017) and Ramuni (2019).

Productivity Across Regions and Industries

The boom in new business creation during the pandemic has the potential to raise productivity growth. In the context of the current economic and social policy priority of the levelling up agenda, it is important to consider evidence on productivity across places. For many economies, official regions form a standard definition of place, to some degree because of the availability of economic data and also due to political and cultural considerations.

Figure 7.3 Regional Labour Productivity in 2019 (index relative to UK = 100)



Source: Gross value added per hour in 2019 from Office for National Statistics (2021).

Evidence across geographies shows an uneven pattern of the level of labour productivity across UK regions and nations as shown in Figure 7.3.²⁶ The pattern of spatial differences in labour productivity has been a persistent feature of the UK economy over at least the past two decades. The overall impression from the figure is that many regions have similar productivity levels and only London and Northern Ireland substantially differ from the UK average.²⁷ London stands out as having the highest level of labour productivity per

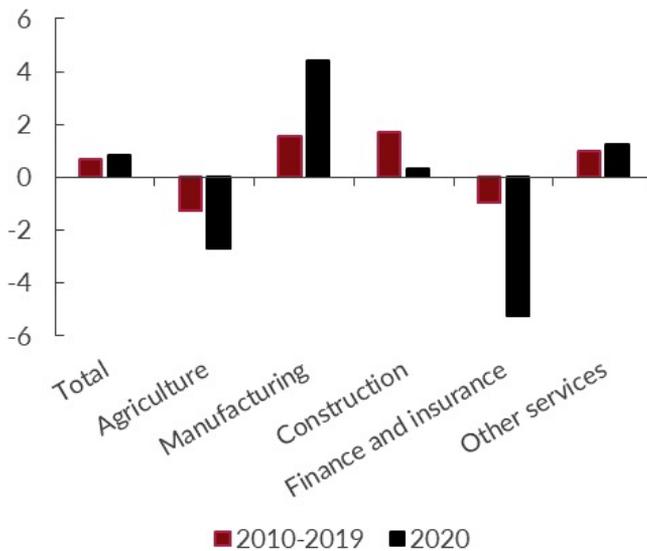
²⁶ Office for National Statistics (2021).

²⁷ This issue of broad similarity across several regions is also discussed in Office for National Statistics (2019).

hour, 33 per cent above the UK average. At the other end of the distribution, Northern Ireland is estimated to have a productivity per hour level that is around 20 per cent below the UK average.²⁸ The recent past shows little change in regional productivity relativities. However, the policy agenda of levelling up would be consistent with levels of productivity across regions becoming less unequal.

To assist in understanding and projecting industrial and regional trends, NIESR has undertaken research to link the National Institute's macroeconomic model (NiGEM) with a new UK sectoral economic model (NiSEM) and a UK regional economic model (NiReMS). One objective of this work is to examine the effects of changes in macroeconomic activity, industrial activity or productivity on regional productivity growth and relative productivity levels across regions.²⁹

Figure 7.4 Annual Growth in Labour Productivity in Selected Sectors (per cent)



Source: National Institute UK Economic Outlook, Summer 2021, updated Figure 1.17.

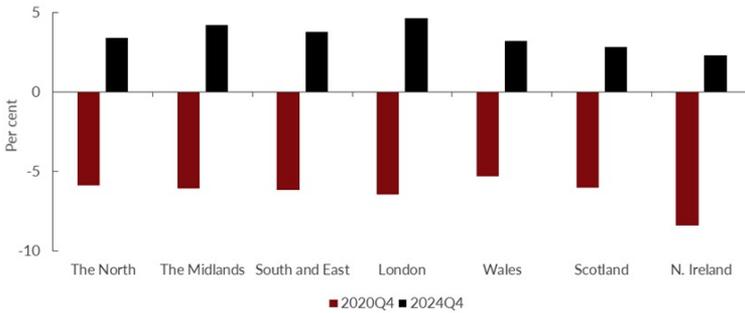
²⁸ Figure 7.3 shows estimated regional levels but there are also differences at local levels within regions.

²⁹ Lenoël and Young (2021b) and Bhattacharjee and Lisauskaite (2021b) provide details of the modelling in NiSEM and NiReMS respectively.

The modelling approach links industrial and regional data and projections to consider regional productivity growth. Figure 7.4 shows that labour productivity growth, in terms of output per hour, has been particularly badly affected in the finance and insurance sector during the pandemic, while annual productivity growth in manufacturing industry has been stronger than in the 2010 to 2019 period. Lockdowns (including social distancing) and furlough provisions, as discussed in Section 3, will have affected output, employment and productivity in many industries in both 2020 and 2021, so that the sharp changes in productivity in 2020 reflect a temporary response to the challenging business operating conditions rather than a sustained change in productivity growth.

The National Institute's Autumn UK Economic Outlook combines the UK macroeconomic outlook with industrial activity projections from NiSEM and the regional economic model (NiReMS) to project regional labour productivity trends. Figure 7.5 shows the projected medium-term labour productivity level outlook relative the estimated level in the final quarter of 2019. All regions are forecast to show a higher level of labour productivity by the final quarter of 2024 than before the onset of the pandemic, with similar sized increases across regions. Perhaps the key point is that after the estimated falls in 2020 the level of labour productivity is forecast to increase in all regional geographies. London and Northern Ireland are estimated to have had greater falls in productivity in 2020 than the other regions and by the final quarter of 2024 all of that larger fall should be recovered, with the two regions showing similar growth over the whole period to other regions. London is projected to show a very slightly larger increase in productivity relative to the final quarter of 2019 than the other regions, but the differences across regions in growth are not substantial. The short-term effects of the pandemic in 2020 dominate the initial fall in productivity, in part because of the scale of the shock to output (with the fall in GDP in 2020 being the largest for at least half a century) and also because of the effect of the lockdown restrictions, particularly in sectors where social distancing regulations made normal business operations impossible.

Figure 7.5 Labour Productivity relative to 2019Q4 (real GVA per hour worked, 2019 prices)



Source: National Institute UK Economic Outlook, Autumn 2021 (from Table 2.1).

The scope for enhanced regional policy that focusses on better evidence-based alignment of jobs to skills, levelling-up of transport connectivity and infrastructure, and green initiatives to achieve the climate change targets, together with the wider economic recovery from the collapse in output in 2020, suggests that there is considerable uncertainty about how regional productivity differentials will evolve. With substantial inter-industry differences in productivity levels and growth rates, the approach that NIESR has developed of linking macroeconomic, industrial and regional models opens the possibility of examining scenario analyses of potential patterns of regional productivity following macroeconomic changes.

Implications and Research Potential

The effects of the pandemic on health, well-being and economic activity are still being felt. The boost in the formation of new businesses in 2020 and 2021 and the evidence on the productivity characteristics of firms as they develop implies that it will be important to track the fortunes of these new companies in terms of their survival rates and productivity profiles to determine the extent to which aggregate productivity will benefit. In addition, it will be important to ascertain whether the increase in start-ups was a temporary response to the pandemic shock or part of a sustainable new trend in business entrepreneurship.

Evidence on the effect of the boom in new firms will need to follow the dynamics of these firms because new firms have relatively high failure rates, and it appears that the most significant enduring contributions to increased aggregate productivity and productivity growth come from high-growth firms that have survived a number of years. In addition, to the extent that new firms may have been started during the period in order to take advantage of the particular economic changes associated with the Covid-19 pandemic period such as the increase in online purchasing, the progress of these firms when, hopefully, Covid-19 has diminished significantly will be important.

The potential research agenda in this area is substantial, encompassing both sectoral and regional productivity issues. Currently observed differences in productivity levels across sectors and regions can only present part of the information. Differences in productivity levels within industrial sectors nationally and within sectors across regions add another level of complexity.

Perhaps more important for the outlook for productivity and productivity growth will be the investigation of the factors that contribute to the differences in productivity levels and growth rates of firms within sectors and regions, such as innovation, foreign ownership, whether firms are producing for domestic or international markets, competition structure, and locational factors such as agglomeration benefits.³⁰ At the same time, the research already underway at NIESR that looks to integrate UK macroeconomic, sectoral and regional modelling and economic forecasting is aimed at providing insights from scenario analysis into potential future productivity trends to help to inform policy decisions.

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30 See (e.g.) Haldane (2017).

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The Impact of Covid-19 on Early Years and Beyond

Claudine Bowyer-Crane

Disruption to Education

The Covid-19 pandemic has caused massive disruption to education from Early Years settings all the way to post-16 education. In the academic years 2019/20 and 2020/21, partial closure of schools and colleges meant that learning and teaching were carried out online for the majority of children and older students. The closure of early years settings meant that many young children did not receive the high-quality input that has been shown to have a significant impact on later educational outcomes. Families with young children often had to juggle childcare and home learning with working from home, and young people at college had to cope with online classes and uncertainty over assessment arrangements. It is still too early to measure the full impact of this disruption, but it is likely that it will reverberate throughout the education system and beyond.

This section draws together current evidence of the impact of Covid-19 for social and educational outcomes and for social mobility. There is a particular focus on the Early Years sector given the importance of early years education to children's outcomes but also to women's employment opportunities. However, the impact of Covid-19 on schools and FE colleges is also discussed. What is clear is that Covid-19 appears to have already widened the disadvantage gap in terms of educational outcomes and has significant implications for social mobility. Schools and early years settings have experienced lockdowns, reduced attendance and staff absences due to furlough, redundancy and self-isolation.

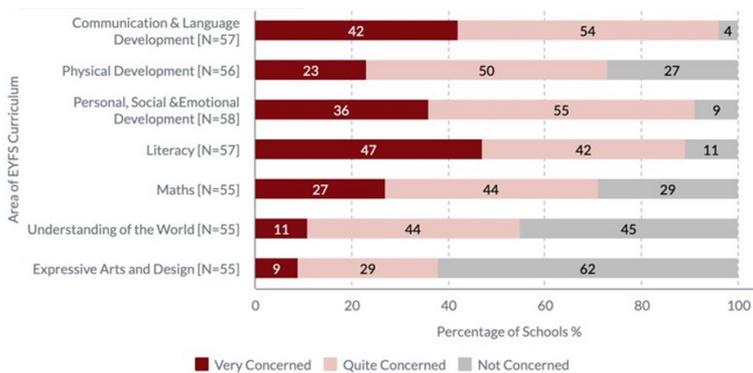
In terms of impacts on productivity, we can think about this in terms of both short-run and longer-term impact. For example, parents who usually rely on educational settings in order to work reported feeling less productive during lockdown (Chung, Birkett, Forbes & Heo, 2020). In the longer term, children and teenagers have missed

out on learning, with remote schooling shown to have resulted in far less coverage of the curriculum, particularly at primary school (ONS, 2021). The long-term effects of this missed learning has the potential to lead to an under-skilled workforce which would have a significant effect on the country’s productivity. Much will depend on the plans put in place to help children and families recover from this crisis.

Early Years Education

There is emerging evidence that children and young people have been adversely affected by the pandemic in terms of social and educational outcomes. In Early Years education, research suggests that children’s socioemotional wellbeing and language and communication have been particularly negatively impacted (see Fox et al, 2021 for a review). For example, in our own research with just under 60 schools, we asked teachers and parents what areas of the Early Years curriculum children were struggling with when they started school in September 2020. Personal, social and emotional development, and language and communication were both areas of concern for teachers (see Figure 8.1), and socioemotional development was a clear concern for parents. This could be attributed to a lack of social interaction as a result of being in lockdown (Bowyer-Crane et al, 2021).

Figure 8.1 Areas of the EYFSP teachers were concerned about before school started in September 2020



Source: <https://www.niesr.ac.uk/publications/impact-covid19-school-starters-interim-briefing-1-parent-and-school-concerns-about>

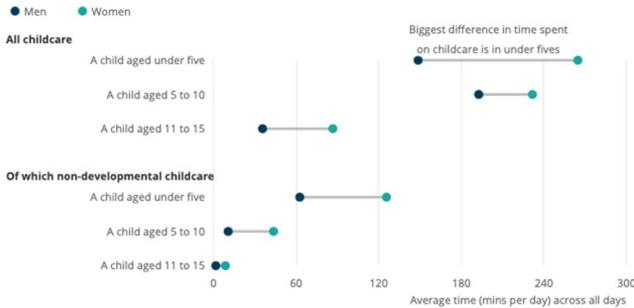
Fox et al. also found physical development was a cause for concern, particularly for families from disadvantaged backgrounds who had less access to green space, were living in cramped conditions and struggling to provide regular meals for their children. Teachers reported that children were struggling with basic skills and with meeting many of their developmental goals on the Early Years Foundation Stage Profile. Given the importance of the early years to future educational and even employment outcomes these findings are of particular concern. A recent report from the Nuffield Foundation summarises research that shows the positive impacts of attending preschool on outcomes at primary school, and even into secondary school and adulthood (Oppenheim & Archer, 2021). Moreover, analysis by the Institute for Fiscal Studies found that attendance at preschool compared to no preschool positively predicted future lifetime gross earnings and had significant benefits to the Exchequer (Sylva et al, 2014).

In addition to the impact on children, the disruption to early years provision has had a significant impact on the labour market. Approximately 97 per cent of the Early Years workforce are female, so a flourishing early years sector provides job opportunities for women. In addition, early years settings provide women with the opportunity actively to participate in the workforce while their children are being cared for. However, Cohen (2021a) suggests that “affordability of childcare drives the gap” (p.3). Working mothers of children under two are more likely to work part-time than fathers. Having a family is the main reason why women are unable to work – and with UK childcare costs reportedly exceeding some families mortgage and rent payments it is easy to see why. Covid-19 restrictions meant that a majority of children were not attending settings during the first lockdown, and even now attendance has not risen to pre-pandemic levels. Reports suggest that this had a significant impact on women’s ability to work (ONS 2020). Women took on most of the home schooling and childcare responsibilities during lockdown, particularly for children under five years of age (see Figure 8.2).

Figure 8.2 Average minutes of childcare per day by gender of parent and age of child

Women spent much more time on childcare than men when the child was aged under five

Average minutes per day spent on activity spread across all days, Great Britain, 2020



Source: Office for National Statistics – Parenting in Lockdown

Source: Office for National Statistics – Parenting in Lockdown.

Women felt less productive and had lower job satisfaction than men during the Covid-19 pandemic despite there being no difference between men and women pre-Covid based on a study by Feng and Savani (2020). Some positive aspects of working from home were identified (Chung et al, 2021), e.g. spending more time with children and partners, being able to do more housework. In contrast, increased childcare and housework were cited by the majority of women as negative aspects of working from home. Only 15 per cent of women could draw clear boundaries between work and home. While 39 per cent of female non-parents reported increased productivity while working from home, only 26 per cent of mothers (of children of all ages) reported the same, and similar findings were reported for fathers compared to male non-parents (27 per cent vs 36 per cent). In addition, reductions in contracted working hours and actual working hours were higher for parents than non-parents, and highest for mothers (Chung et al, 2021).

More women were furloughed than men, while 31.7 per cent of women cited home-schooling responsibilities as the reason Covid-19 had affected their work, compared to 24.5 per cent of men (ONS, 2020). In families with a child under 5, women did 78 per cent

more childcare than men (ONS, 2020) and 46 per cent of mothers who had been made redundant during lockdown attributed to this a lack of adequate childcare (Women's Budget Group, 2021). The Women's Budget Group (2021) prebudget briefing also reported that 70 per cent of women who requested furlough due to childcare responsibilities were denied their request and 48 per cent are now concerned about negative treatment from employers due to childcare responsibilities.

These findings emphasise the importance of the Early Years Sector to post-pandemic recovery, particularly for women. Without high quality, well-funded and affordable early years settings, many women will be excluded from the workforce, or only be able to work in part-time employment, and have their career options and earning potential reduced. Availability of childcare has been demonstrated to have a causal relationship with women's participation in the workforce (Chevalier & Vitonen, 2002). However, demand for childcare does not always influence supply (Chevalier & Vitonen, 2002), and this is likely to be down to the fact that the early years sector in the UK has typically been underfunded.

However, Covid-19 has only served to exacerbate this issue, increasing the vulnerability of the sector. In *The Forgotten Sector* (June 2020), a report by the Early Years Alliance, it was reported that while schools received additional funding for costs associated with Covid-19 e.g. PPE, cleaning costs, early years settings did not. The funding associated with the Coronavirus Job Retention Scheme (CJRS), or furlough scheme, was only available to subsidise private income which led to redundancies in settings reliant on high levels of government funding. Business rate relief and local authority discretionary grants were not accessible to many settings, while many childminders could not access SEISS because applications were based on profit, not income, and profits are typically low for such occupations.

In addition, early years settings were excluded from promises of "catch up funding". Reports from the National Day Nurseries Association (NDNA) and Education Policy Institute (EPI) showed that early in the pandemic, approximately 7 per cent of staff left their jobs for alternative employment or starting new education courses. Staff with the lowest level of qualification were more likely to be furloughed or made redundant and 15 per cent had their hours reduced. Employment did grow as settings reopened but there was a great deal of variation. Between November 2020 and February

2021, 72 per cent of settings that were being surveyed closed due to insufficient demand or staff and children self-isolating. Some staff were still on furlough, and some were still on reduced hours (Cottel, Bonetti, Broadbury & Ziolowski, 2020a; 2020b; 2021).

However, attendance has not reached pre-pandemic levels – on September 21st 2021, DfE figures show attendance levels are at 76 per cent of pre-pandemic daily level. This means settings are not receiving the income they would typically receive, and this has been the case throughout the pandemic, even though settings remained open in the last national lockdown. Government statistics show that the number of childcare providers fell by 4,055 in the year from July 2020 to July 2021. This means that access to childcare places has reduced, and prices are likely to rise, which will particularly affect women and children in areas of disadvantage. In fact, the Childcare Survey 2021 (Jarvie, Shorto, & Parlett, 2021) showed that childcare costs have already increased above the rate of inflation since 2020. The question now is how the sector will recover to mitigate against this increasing inequality. In the October 2021 budget speech the Chancellor announced an investment of approximately £500m over the period from 2022/23 to 2024/25, increasing the core funding for early years places. In addition, £150m has been allocated to training for early years staff. This investment is a step in the right direction but it is unlikely this will be enough to support the sector in the short term, particularly since early years providers have been excluded from the 50 per cent business rates relief offered to retail and hospitality over the next year.

Schools and Colleges

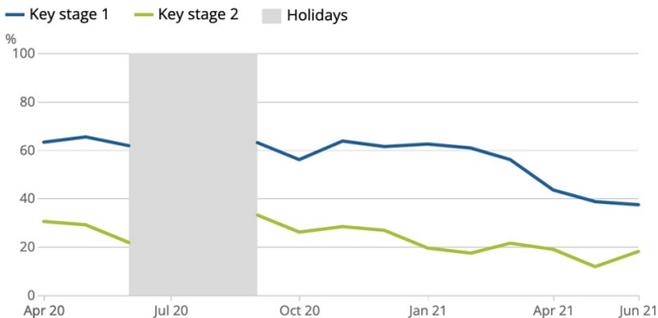
Schools and colleges partially closed from March to June 2020, with only children of key workers and children classed as vulnerable able to attend. While settings reopened for some cohorts from June 2020, they did not fully reopen until September 2020. Even then, schools and colleges were struggling with social distancing, and Covid-19 related absences, and then further lockdowns from January 2021 to March 2021. With these closures, came a switch to online learning for the majority of pupils. However, online learning was not equally accessible to all, with the digital divide resulting in less access to educational input for children in less advantaged areas than those with access to technical resources. Educational outcomes have been affected, particularly for young children. A review published by the EPPI Centre Evidence for Policy and Practice (Moss et al, 2021)

identified four key harms to learning and attainment resulting from school closures: a reduction in time spent learning, a reduction in the quality of work, a lack of access to technology, and impacts on attainment when schools reopened.

Their review found that while all children spent less time learning during school closures, and that this decreased from the first to the second lockdown, younger children were likely to spend less time learning than older pupils. The review also found evidence that the quality of children's work and level of engagement with schools had reduced based on teacher reports, particularly in areas of social disadvantage. Similarly, data from the ONS (2021) suggest that pupils who learnt remotely covered proportionately less material than those who studied in class. This was particularly true of primary school children, and partially dependent on the input received by parents (see Figure 3). Linked to this, Moss et al. (2021) found evidence of the digital divide, meaning that children from areas of disadvantage had less access to the technology needed to engage with remote learning; a problem reported early in the pandemic by the Institute of Fiscal Studies (Andrew et al, 2020).

Figure 8.3 Key Stage 1 pupils' learning is more dependent on parental involvement than older pupils

The proportion of learning received dependent on the input of parents for remote learners in primary schools, April 2020 to June 2021, split by pupil Key Stage

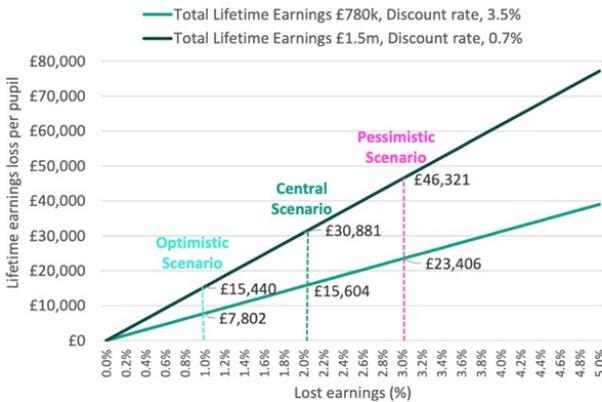


Source: Office for National Statistics - Remote schooling through the pandemic, England, April 2020 to Jun 2021

In terms of attainment, a number of studies were identified by Moss et al. (2021) which had attempted to identify learning losses. A report published by the DfE looked at learning loss in reading and maths for children in years 3 to 9 (8 to 14 years of age). They found that all year groups had suffered some learning loss, up to approximately 2 months for reading and 3 months for maths. Analysis of regional differences and differences related to free school meals showed that learning losses were greater in the North than in the South and for children from areas of disadvantage.

Similar findings were reported by NFER in a report which showed children in Year one made approximately 3 months less progress in reading and maths compared to a 2019 comparison group, while children in Year two made three months less progress in reading and two months less progress in maths. Alarmingly, the disadvantage gap is estimated to be between 7 and 8 months. In a study of around 450 Year one children, progress on EYFSP key curriculum areas between the Spring term and Autumn term 2020 was analysed. Data was provided by teachers on key early learning goals both concurrently when the children were in Year one and retrospectively when the children were in Reception. Results revealed 16 per cent of children made no progress, 45 per cent made only some progress, and this was particularly true for children with SEND and those from areas of disadvantage (Nash et al, 2021). A report from the Education Policy Institute (EPI) published in October 2021 showed that learning loss for pupils in primary school in the first half of the Autumn term 2021/22 was higher for maths than reading, and higher for children from areas of disadvantage. In maths the learning loss for children in disadvantaged areas was 4.3 months compared to 3.4 months for their more advantaged peers. In reading, the learning loss was 2.2 months compared to 1.7 months. In the second half of the Autumn term there was some evidence of recovery, but again this was partly dependent on level of disadvantage. In reading, children from areas of disadvantage recovered approximately 0.4 months of learning compared to 0.6 months for their more advantaged peers. In maths, both groups recovered around one month's worth of learning. Importantly, the EPI suggests that, depending on the particular scenario assumed, these learning losses could equate to lifetime earning losses of between £8,000 and £46,000 per pupil (see Figure 8.4) (Andrews, Archer, Crenna-Jennings, Perera & Sibieta, 2021).

Figure 8.4 Possible lifetime earnings under different scenarios



Notes and sources: see Appendix A https://epi.org.uk/wp-content/uploads/2021/05/Education-Recovery_EPI.pdf

Source: Education recovery and resilience in England; Phase two report available at Education recovery and resilience in England - Education Policy Institute (epi.org.uk)

Turning to older pupils, there was much talk about grade inflation when GCSE results were published. However, Ofqual's report (Lee, 2021) suggests a widening gap between children in receipt of free school meals and their peers, which is also reflected in the A-level results. Atherton and Mazhari (2020) found that the highest proportion of students starting HE courses in 2020 with at least one E grade came from low SES and BAME cohorts. They also suggest that over 5,000 fewer students from London would pursue university education in 2021/22 compared to pre-Covid expected numbers.

In addition, students undertaking vocational courses have been disproportionately adversely impacted. Spours et al. (2021) reported that while pass rates appeared to increase in academic subjects, they fell by 5 per cent in vocational courses. In terms of apprenticeships, a drop of 46 per cent in apprenticeship starts was seen between 2019 and 2020, and many young people already on apprenticeships were unable to continue them. All of these factors imply that the "Covid generation" may have lower skill levels and less earning potential, particularly from areas of social disadvantage.

In terms of labour force issues, similar issues arose for women of school age children as for mothers of early years children, i.e., having to juggle home learning. However, schools reopening could be expected to alleviate that issue somewhat as mothers are able to work during the school day. However, given the instability of the childcare sector, access to childcare outside of school hours may still mean that mothers are not able to take full time positions. In addition, parents are still having to cope with the ongoing uncertainty surrounding the pandemic and children being sent home from school as a result of Covid-19.

There are also potential issues with the teaching profession. Teacher wellbeing has been significantly negatively impacted with teachers reporting feeling undervalued as a profession (e.g. Kim & Asbury, 2020). A report commissioned by the Gatsby foundation (Fullard & Zucollo, 2021) reported that the teaching profession was in crisis with recruitment and retention rates falling over several years. Surprisingly, Covid-19 saw a surge in retention and recruitment to teaching. However, Fullard and Zucollo (2021) suggest that this may be a result of a lack of other available career options, and we may once again see a fall in recruitment and retention as the labour market recovers from the pandemic. Finally, we must be mindful that the pandemic is still ongoing. Attendance is high (around 89.3 per cent) and Covid-19 related absences are low for students (approximately 2.6 per cent) and staff (2 per cent). However, attendance rates are falling and Covid-19 related absences are rising as the pandemic continues (DfE, 2021).

Conclusion

Taken together these results suggest that the pandemic has had a negative impact on children's educational outcomes from Early Years to Post 16 education. More importantly there appears to be a widening of the disadvantage gap which may well have knock on effects for social mobility and future productivity of the workforce. Government initiatives such as the creation of the National Tutoring Programme (NTP) and the rolling out of the Nuffield Early Language Intervention (NELI) nationally may help to alleviate some of the impacts of the pandemic. Unfortunately, it is still too early to know whether these will have a positive impact and we await the results of the NFER evaluation of NTP, and the Education Endowment Foundation (EEF) evaluation of NELI to gain more insight into the success of these initiatives. However, a report from the Royal Society

Delve Initiative (2020) makes for sobering reading, suggesting that it will take until 2080 for the workforce to recover from the potential loss of skills and therefore improve earning potential and productivity.

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Institutions and the Policies of Productivity in the Pandemic

Adrian Pabst and Andy Westwood¹

Introduction

The Covid-19 shock has neither changed the UK's governance system fundamentally nor so far significantly altered the institutional framework in relation to productivity. However, it both reminds us of something well known and reveals something new. It reminds us that the UK's system of political and economic governance is highly centralised, with state power and private finance heavily concentrated in London and the South-East (Collier and Tuckett, 2020), and that productivity growth in other regions and sectors is weak (Haldane, 2021b; McCann and Ortega-Argilés, 2021). During the past 18-24 months of the pandemic, London experienced at once the sharpest contraction in productivity and the largest expansion, while most other regions now lag behind London and the metropolitan parts of the South-East as much or more than before the pandemic struck (Bhattacharjee et al., 2021a and 2021b).

During the coronavirus crisis, productivity disparities between and within regions widened, while asset and income inequality increased. In response to the coronavirus crisis, the UK's governance system fused state centralisation with market concentration – new central powers in many areas of public policy (health, education, and policing powers), combined with support for large corporations in key sectors such as medical supplies, pharmaceuticals and tech platforms.

But Covid-19 also reveals that place- and space-specific knowledge is key to limiting the economic and social damage wrought by Covid-19 (e.g. test and trace) and that both local and regional government have a vital role to play in supporting the recovery and delivering regional regeneration, as evinced by the actions of Metro and city mayors and the devolved administrations in Scotland, Wales

1 We would like to thank Bart van Ark, Jagjit Chadha and Tony Venables for helpful comments and suggestions. All remaining errors remain ours.

and Northern Ireland (Warner et al., 2021). We now also know that a more activist state in relation to industry, manufacturing and the labour market can support the economy and boost productivity growth, as with the vaccine taskforce and publicly funded support schemes such as loans to businesses.

Thus, the pandemic shines a light on governance, institutions and policies that either help or hinder productivity growth: more 'political' institutions that are specific to the UK's productivity performance, including structural weaknesses in national, regional and local government, but also the flaws of more 'economic institutions' such as finance, R&D dissemination or purposeful firms, as well as an insufficiently robust social and civic infrastructure such as universities, training colleges, professional associations or trade unions.

The UK's poor productivity performance before, during and after (the worst of) the pandemic has to be analysed at the interface of both political and economic factors (Besley, 2021a and 2021b) and their shared roots in deep-seated structural features of the British economy and politics (Pabst and Westwood, 2021). Adopting a political economy approach, this section will focus on how governance, institutions and policies influenced productivity faced with the Covid-19 shock. Our argument is the UK's highly centralised political system and its highly concentrated financial system has contributed to deep disparities in productivity between London and the metropolitan parts of the South-East and the rest of the country, but also exacerbated productivity differentials within regions.

The onset of Covid-19, after a decade of fiscal consolidation and the Brexit shock, has put the task of reducing regional inequalities ('levelling up') at the top of the political agenda, which is beginning to change both the politics and policies of productivity (Westwood et al., 2021). The success of the government's 'levelling up' efforts will depend on whether central institutions can be reformed (e.g. the operation of the Treasury or BEIS) and whether local and regional institutions can be strengthened (e.g. more powers and funding for Local Authorities, city regions and mayoralities, which will have to be more accountable to their citizens and communities).

Institutions and Productivity Pre-Pandemic

The UK has one of the poorest productivity performances and highest spatial inequalities among the OECD's 38 advanced economies. It also has one of the most centralised political and financial systems (Pabst, 2021). The set-up and the functioning of UK institutions contributes to policy design and decision-making that are too centralised in spatial, geographic terms and simultaneously too fragmented in functional, sectoral terms. Underinvestment in physical, digital and human capital (especially skills), disjointed decision-making and policy churn are to a significant extent the outcome of a top-down, hierarchical governance system that leaves local and regional government too dependent on an overbearing centre in Westminster and Whitehall (Pabst and Westwood, 2021).

Many arguments and drivers for reforming the nature and role of the state predate the Covid-19 pandemic. Divergence of policy approaches in Scotland, Wales and Northern Ireland is at least partly being driven by a lack of faith and trust in UK institutions and the Whitehall and Westminster model of centralised, 'hoarded power'.

Britain's decade-long record of flat-lining productivity, stagnant living standards as well as growing disparities of wealth and power requires a radical rethink if the country is to tackle the task of economic recovery after Brexit and Covid-19, combined with the ecological transition and profound transformations in demography, technology and trade.

There are four structural factors at work that characterise the relationship between institutions and productivity (Pabst and Westwood, 2021). First of all, over-centralisation: the pyramidal shape of the UK state suggests that it is both hyper- centralised and top-down, which means that the centre fails to learn from regions and localities, while the latter depend on the centre for power and resources. So far city- regions and the new mayoralities have not significantly decentralised the economy. Second, weak, ineffective institutions and policy churn: a poor financial infrastructure fails to support investment and innovation across regions and sectors for small, medium and even large businesses, which is combined with an insufficiently developed diffusion infrastructure that helps to promulgate ideas and technologies and recycle expertise and know-how.

Third, institutional and policy silos: both in terms of funding and reach, Britain's institutional ecology seems too weak and ineffective to boost the country's productivity growth beyond London and the South-East. Regional policy has been chopped and changed for decades with few positive effects on reducing long-standing inequalities. Fourth, short-termism and poor policy co-ordination: in UK politics, both institutional design and policy-making have been short-term insofar as they tend to follow the electoral cycle rather than the economic cycle. Balancing short-term decisions with a medium-term horizon is key to promoting sustained investment in physical, organisational and human capital to support more sustained productivity growth and more robust, resilient and inclusive economic growth. Connected with this are stronger institutions at local, regional and national levels, which – combined with more joined up and coordinated decision making over the longer term – are necessary for higher and sustained productivity growth.

Productivity, Institutions and the Covid-19 Response

The dominant response to the Covid-19 shock by the UK government was a further centralisation of power combined with fragmented and disjointed implementation of decisions, which had an adverse effect on productivity. While some of the measures taken were deemed to be necessary to protect lives, including new policing and other powers to enforce national and local lockdowns, others failed in their primary purpose. One such example is the UK's health system, which illustrates the fusion of centralised governance and decision-making with fragmented implementation and delivery, leading to worst outcomes in terms of both lives and livelihoods as well as productivity (Coyle et al., 2021).

When the pandemic broke out, Public Health England (PHE) had responsibility for tracking the spread of the coronavirus, but there were a mere 290 staff to do so. PHE was not alone in being understaffed and under-funded, which applied also to Directors of Public Health (DPH) who with their teams were moved back into local government just as the post-2010 cuts hit, reducing by 20 per cent in the five years after 2014 and resulting in the loss of up a third of staff. In response to the limited capacity of both PHE and DPH, the UK government created NHS Test and Trace (NHST&T), a wholly centralised system answerable to Westminster and Whitehall alone.

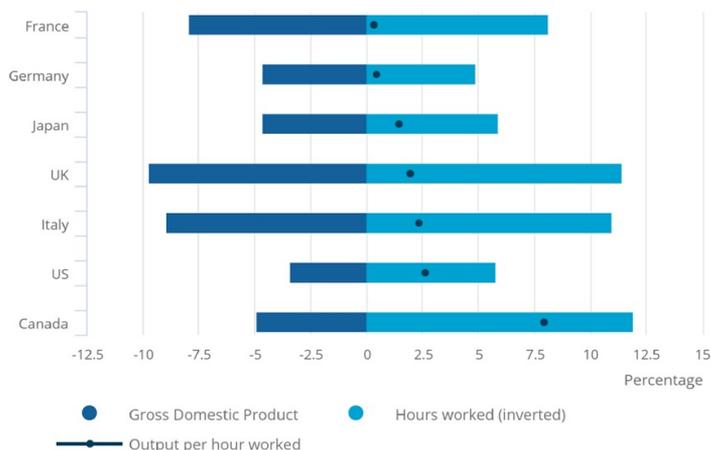
By contrast, countries such as Germany and South Korea, which are considered to have responded more successfully to Covid-19 in terms of both health and economic outcomes than the UK, have public health systems that are better funded by the centre and can better deliver locally by being embedded in local government. In Germany, for example, the federal government provided extra funding, but the Covid-19 response was driven by 375 local authorities in the country's sixteen regions. For example, in the Charlottenburg-Wilmersdorf district of Berlin, the number of staff responsible for tracking and tracing infections increased from approximately 10 to 130 at the beginning of March 2020 for a population of around 325,000.

In Britain, the pandemic saw a shift of some competencies from NHS England to the Health Secretary whose 'powers of direction' were expanded, including oversight of NHST&T. But the performance of this test and trace system is questionable: of the £22 billion allocated for the financial year 2020-21, £13.5 billion were spent (including expensive contracts for management consultancies) but the system did not help avoid further national lockdowns (in November 2020 and January – April 2021). Those lockdowns saved lives but they also contributed to the sharp productivity contraction in the UK, especially in the hospitality and culture sectors (de Vries et al., 2021).

NHST&T also fell well short of various targets, including total laboratory testing capacity (which remained under 65 per cent in November and December 2020) and the failure to turn around all tests in face-to-face setting in 24 hours despite spare capacity. Crucially, low utilisation rates stretching into autumn 2021 and setbacks in rolling out rapid testing in schools and universities in September 2021 further limited the system's usefulness in containing the virus and supporting both lives and livelihoods. In countries where contact tracing worked much better and was much cheaper (as in Germany, South Korea, Japan and Taiwan [Lewis, 2020]), lockdowns were either imposed earlier than in the UK or were less draconian – though the test and trace system was more intrusive in relation to personal data.

The contraction in productivity in countries such as Germany was less severe than in the UK (Figure 9.1).

Figure 9.1 Gross domestic product growth, hours worked growth, output per hour worked growth, 2020 relative to 2019



Source: OECD data, ONS calculations (ONS, 2022, p. 14)

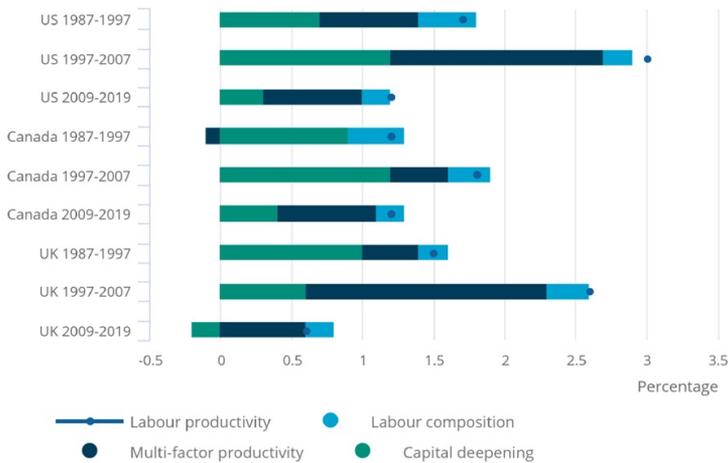
The UK's sharper Covid-19-related contraction exacerbated an already worse productivity performance in the years 2009-2019 when the output per hour growth was the second slowest across G7 advanced economies. Compared with other G7 countries, the contribution of capital deepening to the UK's labour productivity growth has been particularly weak (Figure 9.2), suggesting gaps in capital markets and capital provision.

A key difference in the institutional response to Covid-19 in the UK compared to other countries was reliance on a centralised system that cost far more than in Germany or South Korea where local-area knowledge was harnessed to trace infections: up until April 2021, the total costs of NHST&T was about £13.5 billion compared with around £2 billion spent by the German government on tracking and tracing.

One key reason was the fragmentation of implementing policy, which was insufficiently joined up between the centre, on the one hand, and regional and local government, on the other hand. For example, the minister of state for care shares responsibility with local authorities for the care homes in which many thousands

of people died during the first wave of the pandemic. Figure 9.3 depicts the complex organisation of the UK health and social care service with dependence on central funding streams, fragmented decision-making and a lack of accountability to citizens – all of which contributed to the poor productivity performance during the pandemic (Coyle et al., 2021).

Figure 9.2 Contributions of capital deepening, labour composition and MFP to market sector output per hour worked growth, UK, US and Canada, 1987 to 2019



Source: ONS, Bureau of Labor Statistic and Statistics Canada (ONS, 2022, p. 12)

The problems with the UK's centralised model extend to other aspects of the health system and its poor productivity performance during the pandemic. First, the development of an online contact-tracing application. A number of apps were developed, including one by Tim Spector of King's College London and another by Zoe, a health start-up. But neither was supported by government which preferred to develop its own, delaying the process. Further delays occurred when the government initially preferred the NHS to hold data rather than using the technology based on Apple's and Google's protocols under which data is decentralised.

Figure 9.3 The organisation of the UK's health and social care system

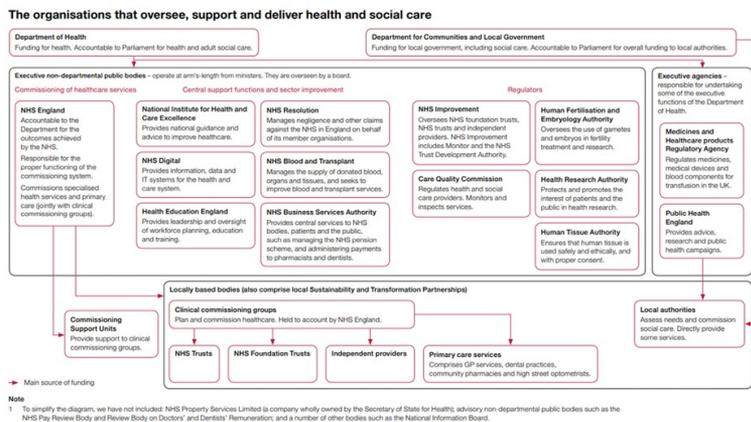


Figure 3. (Colour online) Organisation of NHS England
Source: NAO <https://www.nao.org.uk/wp-content/uploads/2017/09/2017-Short-Guide-to-the-Department-of-Health-and-NHS-England.pdf>

Source: Coyle et al. (2021), p. 97.

The second example relates to the development of testing capacity. PHE, under instruction from the Department of Health, ignored new Covid-19 test developed by companies such as MicrosensaDX, which delayed mass testing capacity by 6-8 weeks in the critical period of mid-March to the end of May 2020. Connected with this centralising logic is the difficulty for local government to access data from NHST&T. That, in turn, exacerbated local outbreaks in places such as Leicester where a city-wide lockdown was belatedly declared, but even then the data that was shared was of limited use as it only identified cases at a postcode level without specific addresses, workplaces or ethnicity. The centre cited concerns with data protection, but those do not apply to centrally taken decisions.

The Covid-19 shock also shone a light on other institutional deficiencies that had a negative effect on productivity and often predate the advent of the pandemic. As a result of deindustrialisation and the outsourcing of production, it became apparent in the early weeks of the coronavirus crisis that Britain lacked the capacity to produce personal protective equipment and other critical medical supplies to deal with a pandemic, including face masks or ventilators.

Besides more than a billion given to companies with links to government ministers for emergency imports, nearly £500 billion was spent on consultants to bypass the civil service.

None of these central measures addressed the lack of manufacturing and industrial strategy. Instead, the Industrial Strategy Council (ISC), which had been set up in 2017 under the aegis of the Business, Energy and Industrial Strategy department (HM Government, 2017), was abolished by the Johnson government in March 2021 and replaced with a Treasury-led 'Plan for Growth' (HMT, 2021a; cf. Haldane, 2021a; Jones, 2021). The top-down character of successive government industrial intervention and the lack of substantive consultation with business (especially SMEs), regions and local communities undermine the prospects of an effective policy to improve productivity (see Myrodiadis, section 10).

The notable exception was also the single greatest success in the government's response to the pandemic – the procurement and roll-out of Covid-19 vaccines thanks to the Vaccine Task Force led by Kate Bingham who reflecting on her experience of discovering and delivering Covid-19 vaccines highlighted the key role of government in adopting an activist approach to manufacturing and industrial strategy:

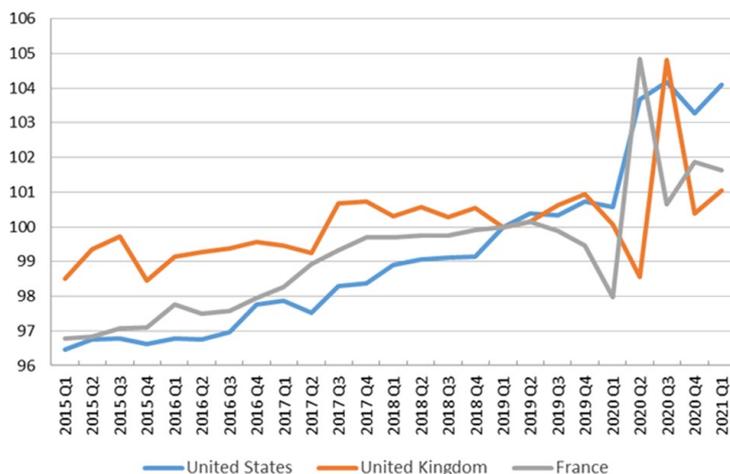
The machinery of government is dominated by process, rather than outcome, causing delay and inertia. There is an obsessive fear of personal error and criticism, a culture of groupthink and risk aversion that stifles initiative and encourages foot-dragging. Government must be braver. It needs to adopt an entrepreneurial mindset in which people are rewarded for flair and results. [...] The government must do better. It needs to take a positive, proactive approach to the life sciences industry. The government lacks the knowledge, and interest to detect the differences between money-grabbing opportunism and valuable corporate behaviour. This leads to some damaging decisions (Bingham, 2021).

Once the UK's vulnerabilities were exposed by Covid-19, there is now a concerted effort to "ensure the UK's supply chains are resilient" and that "the UK has sufficient access to the essential medicines, PPE, testing equipment, vaccines and treatments it needs, even during times of global shortage" (cf. Westwood, 2020). The proportion of PPE supplies manufactured in the UK has increased from 1 per cent

at the start of the pandemic to 70 per cent today. The UK's Vaccine Taskforce constituted early in the pandemic has been a case study in – re-shoring manufacturing capacity identifying likely vaccines while still in their early stages and procuring supplies, securing domestic manufacturing agreements along the way (in places including Oxford, Stoke, Wrexham, Livingston and Teesside).

However, other Covid-19 emergency responses such as the Coronavirus Job Retention Scheme (CJRS), or furlough, did not help support productivity as it failed to make any distinction between low-productivity, low-wage sectors and high-productivity, high-wage sectors. Even if there was a strong economic and social rationale to support workers' incomes, businesses and firm-specific skills during an unprecedented shutdown of the economy (Mortimer-Lee, 2021), the UK government failed to adopt more activist labour market policies in order to stimulate the reallocation of work away from less productive sectors. Policies that should be considered include addressing the acute labour shortages the country has experienced since the end of the third lockdown (Jan.- April 2021) and helping both start-ups and established businesses with strong growth prospects.

Figure 9.4 Real GDP per hour worked index (2019Q1 = 100), US, UK and France



Source: de Vries et al. (2021)

While causation is hard to establish, there is little doubt that governance, institutions and policies play a role in a country's productivity growth, especially when comparing the UK's poor performance before and during the pandemic to countries where productivity did not contract by as much and recovered more quickly and has returned to higher growth rates, such as the US and France – besides Germany and South Korea (Figure 9.4).

After Covid-19: How Institutions and Policies Could and Should Shape UK Productivity

The Covid-19 pandemic disrupted so many plans and assumptions, not least those of Government in the period almost immediately after the 2019 General Election. It is having a deep impact on the way we think about and understand society and the economy, recasting our view of the size, shape, role and reach of the state (Pabst, 2021; Pabst and Westwood, 2021; Wilkes, 2021). Yet until now the overriding response has been one of crisis management rather than strategic statecraft – even after the first lockdown or, more recently, the successful roll-out of vaccines. Policies and policy priorities have certainly changed, but no institution-building of any significance has so far been outlined.

The shift away from the ISC to the 'Plan for Growth' is important insofar as it cements the central dominance of HM Treasury that has 'taken back control' from attempts by some to establish the pre-eminence of No 10 over economic policy. And the assertion of the centre's levers of power was in evidence after the first wave of the coronavirus crisis when the Westminster government not only imposed local lockdowns against the judgement of local leaders (moving places such as Greater Manchester into tier three) but also decided unilaterally on funding formulas for different city regions and mayoralties – besides the allocation of money from the Towns Funds for struggling towns across England to support growth and productivity, which has been criticised for privileging Conservative-held parliamentary constituencies (Shearer and Shepley, 2021).

In the course of 2021, the contours of the government's strategy for boosting economic growth and productivity have become clearer. A commitment to 'build back better' (HMT, 2021a) and 'levelling up' underpins the UK Government's narrative for a series of post-Covid plans – though the Levelling Up White Paper is yet to be published. The government's ambition is to set out a policy agenda that delivers on a popular mandate for change 'won' at the 2016 Referendum as

well as in the 2019 General Election. This encompasses a range of institutional and governance reforms that will define the broader framework for the plans about 'levelling up'.

Although many plans have been inevitably delayed by Covid-19, we are now beginning to see the shape of early reforms. White Papers on energy – 'Powering Our Net Zero Future' (BEIS, 2020) and skills – 'Skills for Jobs' (DfE, 2021) – were published in late 2020 and early 2021. Later in 2021, the government also outlined its 'Net Zero Strategy' (BEIS, 2021) and elements of the digital services strategy (GDS, 2021). And in early 2022, we can expect, amongst other things, more detailed innovation and 'levelling up' plans as well as a full response to the Augar Review (DfE, 2019). All will form critical components of this Government's approach to productivity over its lifetime.

What we do already know are the government's medium- to long-term investment plans for all key areas including commitments to infrastructure spending, R&D, education and other budgets as set out in the Autumn Budget and the 2021 Spending Review (HMT 2021b). Neither individual expenditure commitments nor the overall spending envelope are sufficient or sufficiently targeted to boost growth and productivity through a combination of public and private sector investment. Our analysis of the implications for productivity is as follows (NIESR, 2021):

1. Investment in frontier sectors

The budget contains funds totalling £1.4 billion for the Global Britain Investment Fund to support investment in the UK's life sciences, offshore wind and automotive manufacturing sectors. These measures are in line with the Plan for Growth of March 2021, which recognises that the UK has strengths in manufacturing industries such as aerospace, electric and autonomous vehicles, and in emerging industries such as AI and fintech. There is an intention to promote the development of key industries where the UK has a comparative strength on the international stage. These policies however should be embedded into a more strategic vision of sectoral policies that consider the diversity of the industrial landscape and other 'sector-orientated' schemes, for instance training schemes to address skill needs.

Productivity weakness is pervasive across sectors of the economy, and some sectors are critical due to its size and connections across the UK economy. While announcements aim to support industries such as automotive and life sciences, the incentives for entrepreneurs to resume investment in a wider range of high-tech and creative industries are less ambitious. The bulk of decrease in FDI since Brexit and the pandemic affects a diversity of manufacturing and services industries including financial services, professional services, creative and recreation industries, ICT and electronics in particular.

We continue to see FDI being concentrated in few regions including London, the North-West and Scotland. A comprehensive strategy to level up the country would expect a wider range of initiatives to attract foreign investment across the country, which would contribute to create jobs address regional imbalances. Schemes for helping firms entering overseas markets and investing abroad do not seem to be a key priority in the plans.

2. R&D spending

The government is increasing public R&D investment to £20 billion by 2024-25. The goal is to spend £22 billion on R&D by 2026-27 towards the economy-wide target to invest 2.4 per cent of GDP in R&D in 2027. The government is also reforming R&D tax reliefs to refocus government support towards innovation in the UK. Investing in R&D is critical to the innovation process and for increasing productivity. It creates high-value added industries and well-paid jobs. Given earlier announcements, the expectation was that government would prioritise investment in innovation and R&D. The gaps in total R&D spending relative to world technology leaders will likely widen. Pushing back innovation plans does not resonate well with the key aims of HMT's Plan for Growth, notably investing in R&D and innovation to help drive economic growth and lead a high-tech recovery and thereby to increase international competitiveness.

In addition to delays in increases to total R&D spending, the decisions on how to allocate funding are absent from today's announcement. The Build Back Better Plan for Growth published by HMT in March 2021 had set out the importance of innovation to UK prosperity, highlighting also the importance of achieving a regional balance of R&D and innovation activity. R&D spending remains largely concentrated in certain areas of the UK (London and the South-East) and in larger firms, and addressing this is critical element to reducing regional quality and making progress on levelling-up.

Funding for the scale-up for innovative and R&D-intensive businesses in the Budget are welcome. However, a true inclusive process means to consider firms and areas that are not at the technology frontier. Research has shown that there is large potential for the realisation of knowledge spill-overs from publicly funded R&D. More consideration should be given to who participates in innovation and who benefits from public resources in order to maximise the return of public R&D.

Enhancing the mechanisms for public-private cooperation and public support to R&D should also be essential and in line with the levelling-up ambitions. The strengthening of the research collaborations with European partners is welcome, but overall, there is a need to see much more detail on how regional imbalances of government spending in R&D are being addressed with place-based considerations, and adopting a wider set of criteria in the rationale for the government to support R&D in businesses.

3. Infrastructure investment

The Budget announces a plan to invest in the quality of local transport with an 'unprecedented package of £5.7 billion in eight English city regions to transport local transport networks', along with investment in cycling and bus services across England. The plan also considers a 5-year £24 billion investment in quality upgrading strategic roads, £35 billion in rail infrastructure for the period of the Spending Review, among other measures. While these announcements should help improve the connectivity of the country, as well as to facilitate the functioning of supply chain, digital connectivity is of growing importance in the aim of building a stronger and more competitive economy and should have a more prominent role.

The government's main approach to improve digital connectivity is tackling rural isolation, continuing the support of the Project Gigabit (£5 billion), which seeks to provide broadband in remote areas of the UK, and by expanding investment in the Shared Rural Network (£180 million over the next three years) to provide 4G mobile coverage to most of the UK territory. This lacuna was already highlighted in NIESR's review of the March 2020 Budget (NIESR, 2020) and its ongoing omission raises questions about the government's determination to raise productivity growth. Investing in 5G technology is essential to improve digital infrastructure if the UK is aiming to become a global leader in terms of innovation and technology.

The Chancellor announced a Multiply programme to invest in improving adults' numeracy skills. Despite the importance of numeracy skills for human capital development, the development of digital skills of our adult population should be considered equally important. A more digitally-skilled workforce is a potential source of economic competitiveness, and the Budget should contemplate more specific initiatives to tackle digital skills gaps. This could complement any additional investment in digital infrastructure, which would make the proposed infrastructural revolution much more convincing.

4. Skills spending

The government has announced a £3.8bn increase in skills spending by 2024-25 to boost growth and productivity by increasing the provision of post-16 education and creating opportunities for people wishing to acquire technical qualifications. This increased spending is to be welcomed and includes an extra £1.6bn for 16-19 year olds' education in England, and provides for up to 100,000 Technical or T level students by 2024-25. There is also increased funding for adult training including more access to level 3 courses in areas such as engineering and digital skills and a scaling up of 'Skills Bootcamps'. Also to be welcomed is £560m for the Multiply programme to develop adult numeracy skills.

However, it needs to be recognised that the increase in skills spending does not make up for a large fall in skills spending since 2010; to a large extent the budget is seeking to reverse the austerity of the Conservative-Liberal Democrat coalition government (2010-15). While this is welcome for people who want to pursue vocational or technical training, the funding is far too little to address the skills mismatch, which both Brexit and Covid-19 have exacerbated.

There are long-term structural shortages in many key areas such as health and social care, not to mention shortages in transport. It will also be essential for the government to properly evaluate new skills programmes and modify them as required. Nor does the Budget say anything about creating more synergies between HE and FE.

There are concerns about longer-term unemployment for particular groups of people who may find it harder to find re-employment, for example those aged 50, those without a degree, and other vulnerable groups with weaker labour market links. The government introduced the Kickstart scheme in September 2020 to help support youth

employment, but this scheme is scheduled to end in December 2021. The government should undertake a robust evaluation of the Kickstart scheme, but it seems likely that there is a need to extend the scheme beyond December with an enhanced focus on targeting young people who are most disconnected from the labour market.

The pandemic has served to entrench significant differences in education and labour market outcomes among young people that already existed prior to the pandemic (see also Section 8). There also needs to be support for young people to progress after a Kickstart placement to ensure a route into other training such as apprenticeships.

The UK has a poor record of maintaining effective active labour market policies, with frequent changes to schemes, often failing to undertake proper evaluation, or scrapping schemes in the face of evidence that they are working. There is a need for a switch from sanctions-based ALMPs to support-based schemes that are well-targeted and focused on job quality not just quantity. What is also required is in-work support to improve pay and progression.

5. The government's wider strategy

Beyond the detail of the implications of the Spending Review for productivity, it is worth saying that all major decisions about spending priorities and institutional reforms are ultimately political. That is why a political economy perspective is required to analyse the politics as well as the economics of productivity – an important aspect of institutional policy and governance but also vital to the subsequent policy decisions in all areas and at all levels. This applies as much to the Budget and the Spending Review as it does to the forthcoming White Paper on Levelling Up. What we already know is that the overall fiscal framework has been put in place, including the spending envelope, with no new money on offer to reduce regional disparities and spread opportunity more equally.

Therefore, the task is to analyse not so much the size as the shape of the state in the economy, and its role and reach in relation to reducing the regional disparities that characterise the UK's productivity performance (McCann, 2016 and 2020) and hold back higher productivity growth compared with countries that are more decentralised politically and economically (Carrascal-Incera et al., 2020). Indeed, sustained regional regeneration requires three fundamental institutional and policy actions to address the three

gaps the UK faces: a gap in regional and local capital markets, a gap in regional and local labour skills, and a gap in regional and local government (Pabst, 2021).

In relation to productivity, one objective of public policy must be to limit 'scarring' and long-term falls in labour productivity as people lose skills, health and hope – productivity is hard to create in the first place, just as it hard to get it back when it is lost. This is not just about spending levels overall, but also about the 'quality of spend', which means that it should target at removing obstacles to growth and improving productivity through long-term commitments to research, education, health and the social infrastructure (Kelsey and Kenny, 2021).

Having abandoned fiscal consolidation and increased spending significantly during the pandemic, the government seems now to be caught between two rival visions in pursuit of the stated aim of creating a high-wage, high-growth and high-productivity economy: one vision is of a more interventionist state with an activist industrial policy, decentralisation and the creation of new institutions to starve off a further 'revenge of the places that don't matter' (Rodríguez-Pose, 2017) – areas abandoned for decades that voted for Brexit in 2016 and for the Conservatives in 2019.

However, the Chancellor Rishi Sunak has also signalled his intention of beginning to 'balance the books' in the medium term with the freezing of various personal tax allowances and the announced 6 per cent increase in Corporation Tax in 2023, besides the tax increases in relation to funding of the NHS and adult social care. He seems intent on further tax cuts in the run-up to the next election, appealing to the alternative vision of a small-state, low-tax, limited-spending model that relies on free enterprise and free global trade deals to 'build back better' and 'level up'. The Levelling Up White Paper and its implementation (or otherwise) will provide a sense of which vision the government intends to embrace. But the existing policy mix is already shaped by a framework that makes fiscal policy too tight and monetary policy too loose (Chadha et al., 2021). It will take a fundamental rethink if government is to begin to address the UK's poor productivity performance.

Conclusion

As we can see in the UK's exit from the EU and the recovery from Covid-19, there are significant opportunities for domestic reform and changes in governance and the institutions – new and old – that will help shape and deliver policy. It will further test the UK's political and economic arrangements and likely create new ones and reshape others – possibly further devolution to city regions and mayoralities across England, or even an independent Scotland or a reunited Ireland.

Much will depend on whether 'levelling up' or regional regeneration occurs in a way that responds to the interests and needs of local people in the places that have not experienced economic growth and higher living standards over the past decades. In the Levelling Up White Paper published on 2 February, the government has set out four broad goals: (1) to shift power to local leaders and communities; (2) to support the private sector to grow and to raise living standards; (3) to spread opportunity and improve public services; (4) to restore local pride and civic cohesion (DLUHC, 2022).

Both goals (1) and (4) explicitly involve changes to the institutional and governance system, while goals (2) and (3) require new policies and potentially new institutions too. And insofar as higher productivity growth is this government's states ambition, the role of governance, institutions and policies will remain at the forefront of both research and public policymaking on productivity.

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Industrial Policy in the Era of Covid-19

Konstantinos Myrodiadis¹

Introduction

The outbreak of the Covid-19 pandemic and the government policies to contain the spread of the virus across the world triggered new debates about the crisis response and the prospects of economic recovery. Productivity has been at the centre of academic and policy attention worldwide, and particularly in the United Kingdom, where the productivity performance has been in decline for more than a decade. The current pandemic and post-Brexit economic challenges, together with the chronic structural weaknesses, particularly the productivity variation across cities and regions, income inequality, and socio-economic conditions, have caused the UK to face a new reality.

Britain has not been unique in dealing with recent emergencies. Most advanced economies have been through multi-level crises such as the current public health emergency, economic disparities, growing digital competition, and climate degradation. To deal with these challenges, most countries have shown a renewed interest in industrial policy, e.g., the EU's Industrial Strategy in 2017, the European Green Deal in 2019, USICA in the United States in 2021, and Germany's Industrial Strategy 2030.

The focus of this section is on the political economy aspects of the formation of current industrial policy in the UK and its effectiveness in regard to improving productivity during and after the Covid-19 shock. The productivity slowdown has often been attributed to structural issues in the British economy, while the political economy dimensions have received less attention in the literature. This

¹ The author is grateful to Adrian Pabst for his invaluable comments.

section shows that concentration of power, policy discontinuities, and implementation inconsistencies in policymaking impede the design of effective policies to improve productivity in the UK.

The Rebirth of Industrial Policy: from ‘why’ to ‘how’

Industrial and structural change policy has emerged as one of the most contested ideas in academic research and policymaking, and it has given rise to heated discussions in economics in the last decades (Chang, 2011). These disagreements have mirrored the ongoing debate over state v. market in the discipline (Aiginger and Rodrik, 2020; Chang, 2011). For the proponents of industrial policy, governments should identify ‘market failures’ and intervene to promote efficiency and productivity growth. Industrial policy should address market inefficiencies such as imperfect information, monopolies, and negative externalities, which often lead to uneven development, financial crises, and social conflicts (Chang, 2011). Governments should identify misallocations and inefficiencies across production and promote policies to ensure productivity growth and higher output. They should support sectors that capital markets refuse to finance and offer training to workers, facilitating higher labour mobility and the re-allocation of resources to more productive sectors. The government policies to support high-productivity economic activities lead to positive externalities for innovation, environment, and society.

The focus on ‘why’ industrial policy is needed to ‘correct’ market failures has allowed less attention to be focused on the ‘politics’ behind government policies. The failure of industrial policies in several countries and more recent research show that vested interests and lobbying have compromised government efforts to pursue structural change and increase productivity (Aiginger and Rodrik, 2020; Chang and Andreoni, 2020). The politicisation of industrial policy brought new evidence for those have been sceptical over government’s effective role in ‘fixing’ markets.

Based on these theoretical foundations, the emerging literature on industrial policy has reshaped the traditional state v. market debate in more interesting ways. The debate has moved forward from the necessity of industrial policy to ‘how’ the government should design and implement effective strategies for productivity (Aiginger and Rodrik, 2020; Chang and Andreoni, 2020). The focus is now on the political economy and how industrial policy can be emancipated by political calculus and not ‘captured’ by vested interests and lobbies.

Institutions play a key role in ensuring that government policies are transparent and effective. A new agenda in terms of industrial policy's rationale, design, coordination, and implementation that has barely been studied in the past is now at the centre of academic interest (e.g. Noman and Stiglitz, 2016; Crafts, 2018; Aiginger and Rodrik, 2020; Chang and Andreoni, 2020; Cherif and Hasanov, 2019).

Despite the significant variation in the literature, there is an emerging consensus that deconstructs the traditional 'top-down' and 'picking winners' policy that supports a few pre-selected industries, sectors, and firms (Aiginger and Rodrik, 2020). Modern industrial policy is formulated through a 'bottom-up' process, utilizes various policy tools that extend beyond subsidies, and is an ongoing learning process based on regular policy evaluation (Cherif and Hasanov, 2019; Coyle and Muhtar, 2021). Industrial policy should be co-shaped and designed in consultation with the academic community, businesses, unions, co-operations, regional actors, and local communities if it is to be long-lasting, effective, and successful.

The orientation of industrial policy beyond the 'traditional' metrics of success (e.g., GDP growth, exports) towards new societal objectives, especially quality jobs, the environment, and wellbeing, is important to mobilise social groups and build social and political alliances in favour of structural change (Aiginger and Rodrik, 2020). Finally, the regular review of industrial policy based on transparent performance criteria ensures credibility and prevents social divisions and conflicts (Chang and Andreoni, 2020). Overall, the formation, design, and implementation are important aspects to ensure that industrial policy is effective in improving productivity and living standards in the post-Covid-19 era. Does the new industrial policy framework in the UK embrace such policy principles?

The Emergence of a new Industrial Policy in the UK

For decades, successive British governments have invested limited resources in designing and pursuing industrial policies. The political parties across the political spectrum have discouraged -under the influence of the predominant laissez-faire economic ideas and the disappointing experience of industrial policies in the 1960-1970s- industrial planning in public policy since the 1980s. However, the emergence of a new era in the world economy and in British politics has opened up the path for a shift in policymaking in the last decade.

The global financial crisis in 2008 offered lessons on how regulation and effective governance can prevent market failures. It shone a light on the limits of the 'invisible hand of the market' to ensure financial stability and long-term prosperity (Stiglitz, 2010). Despite its complex consequences across the British economy, Brexit also prepared the ground for policies that would not be realistic under the EU's rules and restrictions.² The recent Covid-19 disruption in global supply chains led to aspirations for autonomy in critical supplies, bringing the need for more dynamic manufacturing back to the policy agenda. The multi-layered crises have triggered questions about Britain's capacity to deal with the recent and chronic challenges: the productivity slowdown, uneven development and regional disparities, the problematic diffusion of innovation, the import dependence for medical equipment, the fragility of supply chains, and the current climate crisis (Mazzucato, 2018; Haldane, 2021). All the above have laid the foundations -as major crises often do- to rethink the dominant policy-making paradigm in the UK.

From the 2017 Industrial Strategy to the new 'Plan for Growth'

The signs of the shift in thinking over industrial policy first appeared after the 2008 financial crash. The speech of the former Secretary of State for Business, Innovation, and Skills, Peter Mandelson, on 'market-driven industrial activism' (Mandelson, 2009) and the publication of a White Paper on 'New Industry, New Jobs' in 2009 set an initial agenda for an industrial strategy (BERR, 2009).

The shift in policymaking became visible with the Conservative government's decision, led by the former Prime Minister Theresa May, to set as its cornerstone policy a new 'Industrial Strategy' to guide Britain through the challenges ahead: 'artificial intelligence', 'the future of mobility', 'clean growth', and 'ageing' (BEIS, 2017). However, the 'Industrial Strategy' and the Industrial Strategy Council (ISC) -designed to monitor and evaluate the Industrial Strategy's progress- were abolished by the new government of Boris Johnson. After the first year of the Covid-19 crisis, the government announced

2 The EU is governed by a rigid framework of 'state aid' rules that prevents vertical and selective policies to support sectors and firms. Based on a strict competition policy, the European Commission approves or declines -in accordance with the European Court of Justice- 'state aid' policies in member states to prevent unfair policies that distort competition and trade across the European Single Market.

in its March 2021 budget that it would replace the BEIS-based Industrial Strategy with a new Treasury-led 'Plan for Growth' to address the challenges in the British economy (HM Treasury, 2021). Although the current thinking shift may open up the way for more active government policies, the persistence of a 'top-down', short-term, and contradictory approach in policymaking undermines the prospects of an effective industrial policy to improve productivity in the post-Covid-19 era.

Over-Centralism

The 'Plan for Growth' maintains some of the institutional and operational deficiencies of the previous 2017 Industrial Strategy. It entrenches the government's centralised role in designing 'top-down' policies to address the challenges, as those were identified by the officials in the Treasury. Policy decisions are taken in a highly centralised way that lacks cross-ministry consultation and co-ordination. The Treasury maintains the key role in decision-making, while the Department for Business, Energy, and Industrial Strategy (BEIS) is charged with secondary research-related decisions and other ministries have significantly less powers, especially the Ministry of Defence, the Department for Health and Social Care, and UK Export Finance (Coyle and Muhtar, 2021). The concentration of power with the Treasury also undervalues the engagement with external stakeholders, such as small firms, regional authorities, and local communities in designing and implementing the industrial policy.

Furthermore, the 'Plan for Growth' goes further by undervaluing the "co-creation" process -introduced by the previous 2017 Industrial Strategy- which opened up the way for businesses and local actors to co-shape priorities and projects. Initiatives such as the Local Industrial Strategies, where local areas (e.g., local enterprise partnerships and mayoral combined authorities) develop their own projects in partnership with the central government, seem to have been left behind.

Moreover, spending decisions remain highly centralised and largely controlled by Westminster. The Treasury's problematic appraisal methods may weaken -as Coyle and Sensier (2019) showed- the efforts to improve the regional disparities across the UK. The government's 'priority funding' allocation to 'level-up' regions and towns has opened the door to preferential treatment towards various constituencies (Financial Times, 2021).

The disapproval of these ‘top-down’ policies by local communities and the politicisation of industrial policy are likely to undermine the prospects of success, fail to reduce uneven development, or even trigger a social backlash against the current regional policies for growth.

Short-Termism

The current government’s decision to abolish the recently approved Industrial Strategy along with the Industrial Strategy Council announcing a new ‘Plan for Growth’ amid the pandemic left important questions unanswered:³ Was the Industrial Strategy effective? What is the evidence of its success or failure? Why does the UK need a new plan for growth? How will it avoid the limitations of previous approaches and how can we measure its effects?

The decision lacked the evidence on what worked and what did not in the previous Strategy and why, and a clear reasoning of how the new ‘Plan for Growth’ will prevent relevant omissions and failures in the future. The government failed to explain why 25 per cent of the 2017 Industrial Strategy’s 142 policy recommendations were delayed, while 15 per cent of them were outstanding at the moment that the ‘Plan for Growth’ was announced (ISC, 2021). No substantial assessment of the 2017 Industrial Strategy’s successes and failures has taken place so far. Policy initiatives such as the ‘sector deals’, which involved partnerships between the government and business in co-shaping plans for specific industries and led to profound successes such as the development of the Oxford/AstraZeneca vaccine during the pandemic, have been undermined in the new ‘Plan for Growth’ (Balawejder et. al, 2021).

Moreover, the absence of a long-term financing mechanism to provide targeted finance for firms and projects in regional and local levels will slow down the effectiveness of industrial policy. The Green Investment Bank that was launched to accelerate Green ‘transition’ was abolished and privatised in 2017. New initiatives such as the launch of the British Business Bank and the UK Infrastructure Bank seem to lack the coordination to finance targeted activities that would accelerate structural change.

3 The government decision was criticised by researchers and policymakers (i.e. Haldane, 2021; Mazzucato et al., 2021; Pickard and Thomas, 2021).

The absence of long-term and well-designed institutions opens up the way for party interests and personal ambitions and leads to short-sighted policies and political opportunism, which in turn compromise the prospect of successful industrial policies (Wade, 2014; Norris and Adam, 2017; Coyle and Muhtar, 2021). The abolition of the previous industrial strategy seems more like an action driven by political calculus than strategic rethinking about industrial policy after the Covid-19 pandemic.

The weak institutional framework of industrial policy compromises long-term thinking and planning and leads to short-term decisions and short-lived 'plans'. International experience shows that long-term independent institutions in industrialised economies (e.g., Korean Development Institute, the Productivity Commission in Australia) play a substantial role in effective industrial policies. Industrial policy requires an institutional framework based on expertise, central-local interaction, and institutional memory, which ensures transparency, consistency, and long-term success.

Conclusion

The current multi-level crises in the global economy have provoked a need to rethink the predominant economic ideas and led to a growing interest in industrial policy. The latter has been one of the most contested issues in Economics and policymaking for decades. The recent literature on industrial policy has moved forward from the unproductive debate over the necessity of industrial policies to how governments should design effective policies to increase productivity and achieve long-term societal objectives. Britain has embraced the current paradigm change and has an indispensable opportunity to design a new industrial policy to improve productivity in the post-Covid-19 era. However, the government efforts replicate the chronic policymaking deficiencies rather than pursuing a transformation in British politics. The 'top-downism', short-termism, and over-centralism of the recent 'Plan for Growth' mirror the institutional weaknesses of British policymaking and shrink the prospect of collaborative policies to successfully improve productivity and living standards across the UK in the new era after the pandemic.

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