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Economic Growth in the UK: Rolling with the Punches

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Economic Growth in the UK
Rolling with the Punches

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Abstract

Economic growth transformed the world. Its measurement via GDP has risen to prominence as the pre-eminent metric of economic prowess and political success. How better to tell its story than through the lens of the world's first growing economy?

Britain's experience with economic growth has been a rocky path of tremendous highs and despairing lows, but despite crises and shifts in industry, growth has rolled with the punches. Our work presents an analysis of growth and crisis in the UK, surveying key ideas from academic literature in an engaging and informative manner, accessible to readers with or without a background in Economics.

Our paper studies defining events in Britain's past relationship with growth, whilst engaging with pertinent contemporary debates surrounding its future. We explore the drivers of growth, the restructuring effects of crisis on productivity and employment, and the socioeconomic impacts of restricted access to the growing economy. We hope that our work provides context and depth to modern discussions, enabling readers to evaluate growth and crisis in a new light and to inform their perspectives on future growth.

Keywords: Introduction to economic growth; history of growth; crises and growth; UK growth.

JEL classification: O1.

Introduction

Economic growth signalled the end of a long, and largely stagnant existence, in which wars and monarchs came and went, but life was largely unchanging generation to generation. Before economic growth, the vast majority of the world population lived in extreme poverty. Diet was extremely limited (as such, nutrition was poor), living conditions were dire, disease was widespread and modern medicine did not exist. With economic growth came the dawn of modernity. Despite the millennia that humans have inhabited the planet, sustained economic growth has only been present since around 1650 – less than four centuries ago. Rapid sustained growth, such that average incomes increase on a generational basis, first occurred in Britain around 1760 with the Industrial Revolution. In the time since growth began, humankind has progressed from a limited subsistence agricultural existence to a world at our fingertips. Technology has become increasingly more capable of executing more complex tasks at a faster rate. The structure of society and our way of life has been crafted by the defiant advances of economic growth.

Throughout the UK's experience of growth, industry, employment and productivity have altered dramatically and the drivers of growth have continually changed. As industrialisation has spread internationally, and economies have become increasingly interconnected and globalised, crises have begun to spread rapidly and each crisis has left its mark. Despite economic restructuring, growth has bounced back and its trend has proved unyielding. However, access to growth has not yet reached everyone, as such, on a national and international scale, the world struggles with persistent inequitable distribution of opportunities, incomes and quality of life. Yet our world currently lives in the infant stages of the age of growth, a world that is drastically different from the conditions that existed for many millennia. With growth, standards of living have soared and poverty reduction has been dramatic. Continuing the trajectory of sustained growth, we can be on course to further eliminate poverty, to continue increasing standards of living and to improve economic versatility and adaptability to future challenges.

This paper covers a lot of ground. We have aimed to go deeper than the surface of British economic history, identifying how the pursuit of growth has woven the fabric of British society, delving into some of the policy decisions, conjured in times of temporary crisis, which left a legacy that persists to the modern day – we hope we have done it justice and that it sparks new lines of interest and en-

quiry for our readers. We have divided our paper into four parts. The 'Roadmap' below details the structure of each section, with a guide to what you will encounter as you progress through the paper.

Please note: the UK did not exist before 1801, the modern classification of the UK did not exist until 1922. As such, where the UK is mentioned in this paper, it refers to the definition of the United Kingdom when the event in discussion took place. 'Britain' is a collective term to denote the entity of Britain. It encompasses all nations classified as the UK or Britain during the period in question, and represents the political, military or geographical entity depending on the context.

Sources. At the end of each part, we provide the references, categorised to correspond with the headings in the text. All information to inform the survey is encompassed within the references listed. Links, embedded within the sources listed, were valid on 1st September 2021. All quotations within the text are contained within the referenced literature. Full citations for data sources and graphs are listed after the table of contents.

Roadmap

Part I: The Inception: Origins of Growth in the UK

In Part I we will investigate the remarkable rise of economic growth, a worldwide revolution that began in Britain with the Industrial Revolution in 1760. We go back to where it all began to understand the factors that forged the rise of economic growth. First, we will review the centuries of subsistence living, in which growth was negligible for many generations. Standard of living stagnated and each generation witnessed much the same existence as the last. Confined to the Malthusian Trap, per capita wealth was determined by population. We demonstrate that a series of institutional, demographic, structural and technological changes transformed the face of life and work in Britain, signalling the birth of economic growth.

In the mid-18th century, Britain underwent a drastic change, as agriculture and traditional production methods began to mechanise, increasing productivity to exceed the limits of the land and human strength. For the first time, people witnessed increases in standard of living within a generation, as national wealth soared. As the 19th century dawned, Britain welcomed the steam age, an ignition of modernity, transforming travel, trade and production. We explore the

wider repercussions of Britain's economic dominance, highlighting the consequences of rapid urbanisation and assessing the implications of the era of Imperial strength.

The second half of Part I surveys the measurement of growth – a powerful and dominant aspect of economic policy, political dialogue and international comparisons. By meeting some of the most prominent, and some overlooked, economic dynamos of British history, we discover the origins and consolidation of National Accounting, a vital instrument in the development of GDP. To conclude, we explore the formidable rise of GDP, viewed by some as gold dust whilst for others it presents a topic of contention. From humble beginnings in textile factories in Great Britain, economic growth has developed from a by-product of competing industrialists to a worldwide craze of industry, becoming the emblematic, and often politically definitive, measure of 'progress'.

Part II: Down But Not Out: Growth's Battle with Crisis

In Part II we journey through the Second Phase of the Industrial Revolution and into the 20th century, establishing that economic growth is a two-sided coin. Introducing the pain to growth's pleasure: economic crises. First, we investigate how the trade policies of the 19th century spelled trouble on the eve of the world's first mechanised war. We learn how the British economy underwent radical reconfiguring during the height of the conflict, remodelling the role of the state – a lesson that would prove significant for the Second World War.

Exploring the interwar period, we identify the foundations for labour market tensions, social divides and productivity challenges that came to define later economic crises. We discover new industries, evolving drivers of growth and the formation of the corporate firm, along with the changing geography of British industry. We observe the beginnings of National Insurance but notice that the early throws of the welfare state pitched new employment challenges.

The second half of Part II dissects the permanent restructuring effects of three major economic crises with varying triggers, all of which altered the nature of employment and economic growth. We consider the impacts on productivity of the shifting international power dynamics following the Second World War. Next, we turn to the 1980-81 recession, a crisis entwined with social disquiet that the British cultural psyche has struggled to forget. We learn how domestic fiscal policy can compound past short-

comings and expose economic fragilities, and observe how the perception of wealth status can influence the political behaviour of a nation.

The third crisis, and the first of the 21st century, the 2008 Financial Crisis, laid bare the scarring from previous crises. Productivity puzzles and accentuated employment polarisation lingered following crisis recovery. We assess the role of economic policy and rebound growth as a key determinant of future economic prosperity. Finally, we conclude Part II with a brief excursion across the pond – we evaluate how the US orchestrated an experiment in exchange rate policy, webbing together world economies. It made for a Golden Age of growth in the post-war period, but ultimately fell from grace, revealing the underlying frailties in the structure of the British economy.

Part III: Bearing the Scars: Access to Growth and the Age of Knowledge

Part III approaches economic growth from a new perspective: access to growth's benefits. We investigate whether the allocation of increasing national wealth as a result of growth has facilitated an equitable distribution of standards of living and opportunity. In doing so we learn that economic inequality in the UK is a complex web of spatial and skills mismatches, irregular dispersions of poverty and pockets of disconnection, struggling to access the benefits of economic growth. We examine how city developments can mask areas of deprivation, and whether regeneration strategies on a national scale have proven successful at a local level. We explore the economic contribution of different areas of the UK to national growth and build on the socio-cultural restructuring effects of crisis to develop a more holistic picture of UK standard of living. We delve into some of the causes of regional disparities, uncovering an uneven economic landscape that laid down roots as early as the Industrial Revolution. We consider the societal and health impacts of these disparities, detailing the widening gaps in life expectancies, educational outcomes and employment prospects across the UK. Next, we welcome you to the knowledge economy – the current phase of economic development, where intangible goods and services drive a digital era of economic growth. We review the extent of transitions to new employment sectors, examine challenges that have arisen in modernising the measurement of growth to include intangible production. We investigate whether the era of knowledge is thus far alleviating or compounding accrued in-

equalities from previous periods of growth. To close, we explore wellbeing trends in the UK, displaying the toll on mental health that can accompany an economy viewed as healthy through GDP, where rising trends in underemployment and work-related stress span salaries and education levels. Further, we examine 'economic scarring', the lasting trauma embedded in the structure of the economy as a result of the growth contraction and economic fallout from crisis.

Part IV: Perspectives on the Future of Growth

For our final part, we voyage into the unknown: the future. In this section we present the predicted economic costs of climate change and survey the deficiencies in quantifying these costs. As we write, the deep recessionary effects of the Covid-19 pandemic are still at the forefront of the global economy. We assess the recovery of growth and consider areas of economic uncertainty as we exit the pandemic.

We also review the economic lessons from international comparisons of managing the impact of the virus on health, society and the economy. In our third restructuring event, we view the potential impacts on the labour market of automation – it may not prove to be the Armageddon that people fear, but it will require new avenues for education and skilling of the population to ensure labour market adaptability.

Throughout these discussions we highlight areas for progress in economic research and policy. As we look to the future, there are gaps in our understanding. We invite you to delve deeper into these lines of enquiry to push boundaries of crisis management and strategies for sustained future growth. For the paper's curtain call, we reflect on the themes of growth, crisis and inequality and turn to discussions on the future form of economic growth.

We emphasise that economic growth can provide us with the much-needed wealth to confront future challenges and improve standard of living in developing economies, provided growth is inclusive and sustainable. Lastly, we highlight discussions surrounding the suitability of GDP as a representative measure of an economy's health, presenting arguments from literature for emissions-adjusted GDP and happiness as a metric of an economy's wellbeing, concluding that a 'dashboard' of indicators may best represent economies that are diverse internationally and diverse within themselves.

Contents

Figures

Data sources for figures 1, 3-9, 11 and 13-14 produced by the authors.

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Figure 10. Office for National Statistics (2020) Labour Productivity, UK. Reproduced under Open Government Licence v3.0.

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Part I
Inception: Origins of Growth in the UK

1 Introduction

Economic growth represents the increasing output of an economy, hence growing national wealth, over time. In the modern day, it is quantified by GDP, a national accounting exercise to represent the market value of the production of goods and services that occurs in an economy in a given period. Economic growth is a phenomenon of relatively modern times, with sustained growth only emerging around 1650. For nations that have experienced economic growth, standard of living and average incomes have risen extraordinarily.

Part I will investigate how Britain led the way in breaking out of the Malthusian Trap – a futile cycle of population and progress governed by the produce of land. We will begin by exploring the persistence of subsistence living which was experienced by much of the population prior to industrialisation, before assessing the structural changes that enabled the conditions for economic growth to occur. This will include the significance of institutions to enable growth, the role of technological change and demographic shifts towards urbanisation.

We then cover the dominance of industrial might as the Industrial Revolution made Britain the world's first industrial nation. We uncover force and slavery as facilitators of growth and investigate how Empire trade connections created networks across the world to facilitate British economic growth. In the second stage of this part, we study measurement of growth as a pivotal metric of economic progress and development, and the invention of GDP, a linchpin of international comparisons and economic policy, which has attracted supporters and critics alike. Figure 1 is the United Kingdom's GDP per capita over time which depicts these different periods of growth.

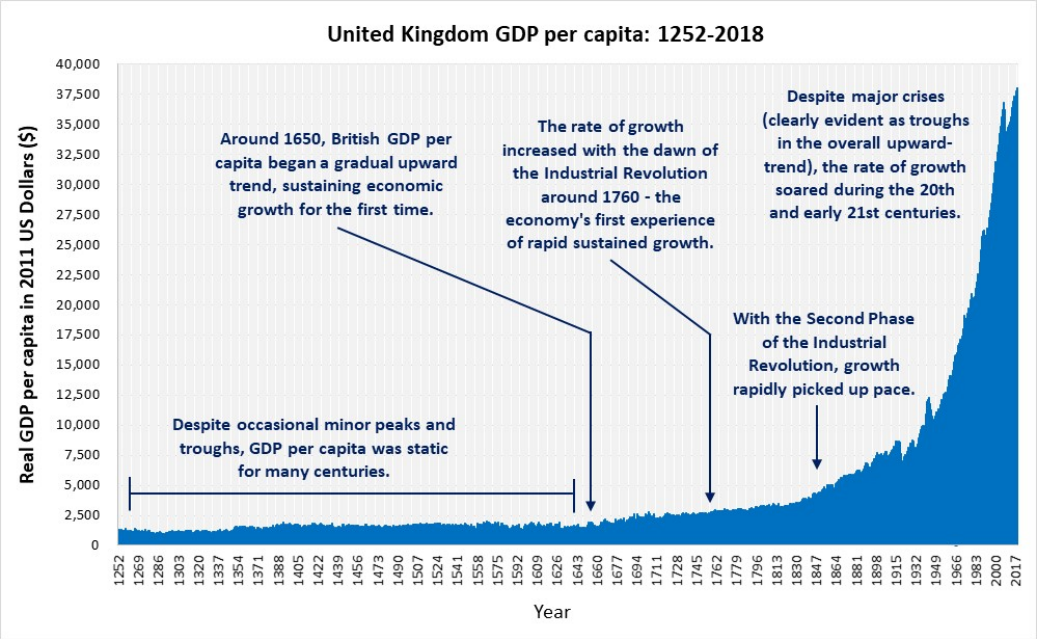

Figure 1: United Kingdom GDP per capita over time, displaying sustained economic growth since around 1650, and rapid sustained growth through the Industrial Revolution to the present.
(Source: Broadberry, S. N., Campbell, B., Klein, A., Overton M. and van Leeuwen, B. (2015) via Maddison Project Database, version 2020 by J. Bolt and J. L. van Zanden, licensed under a Creative Commons Attribution 4.0 International License. Note: Data for England to 1700, the UK 1700-2018.)

2 The Long Wait

As we have seen in the introduction, sustained economic growth did not emerge in Britain until about 1650. Not until the dawn of the Industrial Revolution (around 1760) did rapid growth enable improvements in standards of living within people's lifetimes. This is quite a puzzle. During the Neolithic period, humans settled down, beginning practices of organised agriculture, domesticating livestock and for the first time, storing resources. Yet, growth did not follow – the main goal was to be self-sustained to avoid starvation and death.

2.1 Caught in a Trap

Before the emergence of sustained economic growth, Britain saw little alteration in agricultural productivity throughout the latter half of the Middle Ages and the beginnings of

the Early Modern Era. Productivity, hence output per worker, was limited by human capacity. Thus, income per capita was essentially determined by the size of the population. As a result, population growth presented the only opportunity to increase output.

Yet this posed a dilemma. On the one hand, there were limits to arable land availability for agricultural expansion, hence an increasing population meant less food to go around, reducing standards of living. On the other hand, a decline in population, such as the almost halving of the British population in the Black Death (1348-1350) meant standards of living, in terms of income per capita, increased. Over time however, if the population was not replenished, output production would decrease due to reduced manpower until again, there would only be sufficient food for the size of population at that time. It was a futile cycle with little progress.

The pre-industrial period witnessed transient periods of growth, increasing agricultural output. However, as a greater food supply can support a larger population, population size increased. Increases in productivity saw increases in population but not an increase in standards of living, as the agricultural output per head remained unchanged. Britain was confined by the 'Malthusian Trap'. The nation could not sustain the output growth necessary to further increase the population without decreasing standards of living.

Gregory Clark's 'The Long March of History: Farm Wages, Population and Economic Growth, England 1209-1869' demonstrates that a substantially civilised society, along with an organised market economy, fostering employment and wages, does not by itself create an environment for economic growth. Even with the emergence of paid employment as early as 1209, which allowed specialisation and removed the need to grow one's own food, growth did not occur.

One can speculate that laws to regulate markets prevented growth through inhibiting free trade. But already in Medieval Britain, the most significant British market, the one for grain, was according to Gregory Clark, 'both extensive and efficient as early as 1209' and 'England had an elaborate market economy at least 500 years before it had sustained economic growth.' Until advancements in agricultural technology, British output was trapped by a period of 'technological stasis'. To achieve growth, a population must move beyond manpower and land as the sole determinants of output.

2.2 Feudal Frustration

The trappings of feudalism restricted innovation needed for developments in efficiency. Under feudalism, a lord's land was divided into sections, which were cultivated by peasant farmers ('serfs'). Serfs were obliged to relinquish a portion of their crop ('dues') to the lord, retaining the produce net of dues for their own

consumption. They were not waged workers and under the legal structure of the time, could not establish agricultural production to their own schedules, or own the land. As such, they could not break free from forced labour so had no power to increase their productivity through innovation.

There were other reasons too for the lack of any technological, labour-saving progress. Farmers doubled as military protection. Any lord who adopted a new technology would reduce the number of peasants and become vulnerable to a rival lord who would seize his land before he could benefit from the fruits of more efficient production. In this sense, lords were 'playing chicken' with each other – the first lord to move loses.

There are conflicting conclusions about the efficiency of the manorial agricultural system and the situation preceding the watershed moment of adopting new technologies. However, neoclassical institutional economists, and theorists with alternative perspectives, concur that establishment of property rights provided the necessary conditions for the adoption of productive technologies, giving rise to the dawn of the revolution in agriculture. The emergence of property rights brought forth the development of institutional control of agricultural production. It gave both worker and lord assurance that neither would act to the detriment of the other as this would void the social contracts imposed by the rights established by the institution.

Lords took complete ownership of the crop that their land produced, gaining revenue from its sale, incentivising lords to maximise the profitability of their land, hence invest in more productive technologies. Peasants became employed by the lord and earnt a wage. The short-sighted 'cat and mouse' rivalries between lords were replaced by a new perception of earnings potential over time. Before, the short-term impact of another lord's military might outweighed the future earnings of investing in new technology. The transition to a landowner-paid-employment relationship between peasant and lord, along with enforceable ownership rights, shifted the lords' preferences to favour increased future earnings. The breakdown of feudalism made way for the adoption of new technologies, increasing productivity of British agriculture, instigating growth. In the process, it brought about 'the worker', instead of the peasant bound by necessity, a concept vital to the transition to urban centres of industrial production.

3 Emergence of Growth

'There is just one truly important event in the economic history of the world, the onset of economic growth. This is the one transformation that changed everything.' (Max Roser)

In the mid-17th century, Britain began to experience steady growth of income. By the mid-18th century, economic growth was skyrocketing. But where did growth come from? How did Britain transform from the agrarian Malthusian Trap to the world's first industrial nation?

3.1 Early Growth

We have already seen that restricted innovation as a result of feudalism had stagnated growth potential for many generations. However, feudalism's stranglehold on growth was in decline before its official end in 1660. Following the Great Famine (1315-1317) and the Black Death (1348-1350) a severe decline in the population diminished the control that lords could wield over peasants – there were too few peasants for the amount of land. As control became increasingly centralised around monarchy, the localised landowner-peasant relationship became less prevalent. Once agricultural practice was freed from manorial agriculture, technology could prevail. As such, it is not the case that Britain's economy was trapped in stagnation up until the dawn of the Industrial Revolution.

In the pre-industrial period, Britain's economy experienced an upturn in sustained growth for the first time around 1650, albeit at a slow rate of increase. Recent analysis of probate records, wills and apprenticeship records by Patrick Wallis, Justin Colson and David Chilosi suggests that England displayed an upturn in productivity in all the three sectors of the economy (agriculture, industry and services) from the 1630s to the turn of the 18th century. Employment migration out of agriculture, although not necessarily into cities, was evident from the first half of the 17th century. Wallis et al. accredit this pre-Industrial Revolution period of growth in part to the foundations of the British economy: productive and organised agriculture, along with commercialisation, processing of foods for transportation around the country (such as cheese and bread) and rural-based proto-industry. Crucially, the transition into secondary employment (out of agriculture) – a demographic transition common to all nations who have since undergone industrialisation and experienced economic growth – had already begun. Britain's economy had begun to show embryonic signs of growth even under the technological limitations of the time.

The early transition out of primary employment did not lead to urbanisation in large city areas. Re-

call that the early signs of British economic growth originated from a network of proto-industry and early commercialisation. An unusual occurrence. Britain had a peculiar early urban landscape, characterised by pockets of industry in many smaller urban areas formed from rural communities. How could this have occurred? By both avoiding rule of law and being protected by it, the 1500s-1600s enabled countryside industry and domestic trade links to develop throughout England to enable the economy to establish the roots necessary for the early throws of sustained economic growth. In the Tudor period, laws were implemented in an attempt to monopolise the economy under the monarch's control. But laws only covered existing industries.

To avoid legislation, people were motivated to diversify into new, unchartered industrial sectors. Why not form new sectors within existing towns? Some economic historians have suggested that the guilds who governed and enforced the rule of law were limited to towns. Moving into the countryside allowed early industrialists to 'fly under the radar' and escape the rule of law. Further, rural peacekeepers and law enforcers were unpaid so had limited incentive to enforce the law. In addition, Clark suggests that the rise in small industrialised hubs could be accredited to unusually 'safe' rural areas. In the Middle Ages and pre-Industrial period, England's countryside was largely protected from organised violence, removing the requirement for 'cottage industries' to join into large urban conglomerates for protection.

3.2 Rules of the Game

We have established that Britain's economic markets were extensive for many centuries before the onset of growth. However, to transition from simple trading markets to a growing economy, a nation requires a missing piece of the jigsaw: institutions. It has been identified that to establish growth, a pre-industrial economy needs solid institutions and access to robust financial systems. Sheilagh Ogilvie and A. W. Carus state that 'Historical evidence suggests strongly that although markets are required for economies to grow, public-order institutions are necessary for markets to function.'

Despite perspectives in economic history, and amongst some economic theorists, that economic growth is purely the product of competing private interests vying for profit in a crowded market, historical records do not evidence a purely private role in the emergence, nor the maintenance of growth. Ogilvie and Carus argue that private-order institutions cannot alone forge economic growth. The essence of their discussion is that private and public institutions are not substitutes for one another, but by operating as complementary entities, they can enable the conditions for sustained economic growth. In the

latter half of the 1600s, the role of the state in Britain significantly altered.

The breakdown of feudalism culminated in the 1660 Tenures Abolition Act, accredited as the end of the Feudal Era. Less than thirty years later, Britain experienced the Glorious Revolution in 1688. In 1689, Parliament replaced the monarch as the ruling authority. Parliamentary sovereignty was established, usurping the principle of monarchical rule that sovereignty originated from birth. The landowner had been separated from the peasant worker, and national control had been separated from monarchy, disbanding monopolistic control over land, workers and society.

Many analyses of economic history have determined that the establishment of British institutional power, particularly the expansion of parliamentary powers in Britain after 1688, founded the necessary institutional makeup to enable the progress of the Industrial Revolution and rapid sustained economic growth. Following 1689, British economic institutions emerged to underpin security of property rights, during a period described as the English Financial Revolution. As we have discussed, establishment of property rights contributed to the breakdown of feudalism.

The Financial Revolution created structures with which to secure property rights, which once enforceable, well-defined and inclusive of all stakeholders, provided the guarantee required to push the time-focus of British investors further into the future. Prior to secure property rights, the fear of property loss in the short-term deterred investments that could be beneficial in the long-term. Institutions for securing property rights increased certainty in the short-term. With reduced fear that property, wealth and material goods would be lost in the short-term, capital markets could adopt the long-term dimension necessary for the investment in productive technologies.

Douglass C. North comments that the formation of The Bank of England in 1694, and development of new financial instruments, significantly reduced transaction costs, further incentivising landowners to invest. The synergy between private investments in innovative technology, and the security provided by institutional authority created a market where investments necessary to instigate rapid sustained economic growth were mutually beneficial – the nation could gain wealth and stability, improving international power and prominence, whilst private investors could ensure profit in the long-term.

4 Soaring to New Heights

By the latter half of the 17th century, Britain had established well-functioning markets, financial institutions and new property rights, along with the formation of urban pockets of specialised small industry. The foundations necessary to spark rapid economic growth were established. However, by the early 18th century, according to Wallis et al., 'diminishing returns had set in'. The largely agricultural and small proto-industry model had mostly reached its limit in producing productivity gains necessary for an increase in the rate of growth. Growth originates from a shift to more productive factor inputs of production.

We saw in the 'Long Wait' (Section 2) that Britain had experienced brief periods of sporadic growth prior to mechanisation, due to increases in population – the factor inputs (human workers) had become more productive by multiplying in number. However, to instigate continued growth, total factor productivity (the quantity of output gained from the production inputs) must constantly improve. Inefficiencies must be systematically ironed out, and technology must adapt to advance the output capacity of a worker. Simply increasing the number of workers cannot provide the efficiency gains and the ability to surpass human capability over a long time period.

Around the mid-1600s, productivity increases in agriculture were gathering pace. Developments in mechanisation had begun to transform the structure of work and life in Britain. Production was no longer restricted to the limited productivity of manpower – complementing human with machine revolutionised the output potential of workers. Mechanisation extended into traditional manufacturing, primarily textiles, and so cottage industry production was replaced by mass manufacturing.

Industry continued to gain efficiency throughout the pre-industrial and the Industrial Revolution period, accompanied by a mass transition from primary employment (agriculture) into secondary employment (manufacturing), and a demographic transition to urbanisation, as advancements in technology created redundant workers in rural areas. Employment migration into large urban areas coincided with major advances in manufacturing equipment and technology.

Agricultural mechanisation continued, whilst the scale of industrial production increased in newly-formed city-orientated urban hubs. Through labour specialisation and the production line, the productivity of an individual worker in the collective is increased, increasing capacity for economic growth.

Due to rapid innovations in technology and employment migration

necessary to provide a labour supply for city-based factories, Britain became the first nation to undergo industrialisation, with the Industrial Revolution beginning around 1760. The increasing use of mechanisation signalled the dawn of sustained rapid growth. As productivity per worker grew, population growth detached from output and standard of living. Britain was successfully escaping the Malthusian Trap.

4.1 Energy

Before efficient conversion of energy (kinetic or heat) into mechanical energy, plant matter and the energy it contained was the source of livestock growth, human survival and the effort humans exerted to sustain minor industry and agriculture. During the Industrial Revolution, developments in technology enabled humans to break free from the production limitations imposed by photosynthesis.

The productivity gains in textiles from the Spinning Jenny increased with the water-wheel powered 'water frame' and later the Spinning Mule. Deriving useful energy processes from the rotation of a wheel was an old invention. Think of the principles of a windmill used to operate a millstone grinding wheat into flour. The water wheel was established before the dawn of the Industrial Revolution.

The match made in heaven was the use of the water wheel to operate equipment for mass manufacturing and industrial processes, such as chopping wood. Supplementing human energy from plant matter with the mechanical energy provided to production machinery by the water wheel markedly increased the productivity of workers. With greater productivity came faster economic growth. But in the 19th century, steam was a game changer for manufacturing and transport.

Releasing energy from fossil fuels was not a new idea. Coal gained traction in England in the 14th century, with usage becoming widespread during the Tudor times, mainly to heat homes. However, it was not until burning coal to heat water to create steam that people enabled conversion of historical photosynthesis (i.e., the trapped plant energy in fossil fuels) into mechanical energy for industrial processes.

The steam engine eclipsed the dominance of the water wheel and economic growth continued its steep ascent. The steam engine could be located anywhere, was operable in any conditions and had substantial wide-ranging uses, creating a sudden acceleration in speed and efficiency across industry and society. The 1840s brought 'Railway Mania', as travel and distribution brought the far reaches of Britain closer to the cities through fast-paced transportation. For many, the rise of steam is the image synonymous with the power of British industry.

Adam Smith had previously dismissed the concept of sustained economic growth through production

as a realistic occurrence, accrediting limits in agricultural land available and the trade-off between tradeable production (i.e., production of goods for sale), and the ability to produce sufficient foodstuffs for the British population to survive. Within the limits of technology at the time, this was an apt observation – Smith had understood that natural limits will impede human progress.

Akin to Smith's rumination, by viewing fossil fuels as historical photosynthesis processes, the advent of steam power also spelled the beginnings of a process towards coal and fossil fuel depletion and of releasing sunk carbon. Smith's assertion that nature's limits will prevent humans forging growth in production at a point is not far removed from what is true in a long-run perspective.

4.2 A Will to Grow?

It was Adam Smith in his 'Wealth of Nations' that viewed increases in national wealth as a result of the natural human instinct for material betterment. He believed that when left unregulated, the market would enable wealth of all people to grow to the extent that they could fully choose how to invest. He considered that choice would enable all individuals to fulfil their unending desire to increase their material status, and that this system would benefit all players in the economy, from rich to poor.

The idea that unregulated free markets act as the most efficient and mutually beneficial economic system has persisted as a staunch underpinning for many political economic perspectives on the organisation for an economy. However, although the theme of instinctive human will, even to the extent of a biological gravitation, for material wealth continued to permeate economic thought, it is no longer attributed to being the source of growth.

Although it is not unfounded that people want better for themselves, these ideas neglect the value people place on activities other than consumption, such as dedicating their time to others and volunteering, leisure time, hobbies and interests, and enjoying the company of friends and family.

Further, it is now widely acknowledged that even with personal drive for increased material wealth, the road to economic growth cannot begin without increases in productivity. A series of minor efficiency and technological improvements, interspersed with radical new inventions mean production methods leap forward. For many centuries, people would have possessed an innate 'will to grow', however the British economy did not grow until advancements in productivity.

5 The Industrial Revolution

For many readers, the imagery associated with the Industrial Revolution will likely form a cultural depiction of the origins of British economic growth. It constituted a sustained period of continued evolution of technologies, improving efficiency of industrial and mechanical processes and changing the face of agriculture, manufacturing and working life. It was a major turning point in Britain's economic story and paved the way for other nations to undergo industrialisation.

Increasing productivity and rapid industrialisation created unprecedented rates of economic growth. Not only did output per capita increase spectacularly, having broken away from the Malthusian Trap, productivity increases through technology enabled the economy to sustain dramatic rates of growth. As a result, standards of living (the average material welfare per head of population) climbed dramatically.

The era is attributed as the first time that people could witness significant changes in living conditions and wealth within a generation. Tony Wrigley observes that 'Each generation came to have a confident expectation that they would be substantially better off than their parents or grandparents.' When compared to the many centuries when human life depended on survival, the Industrial Revolution was a remarkable new dawn for human civilisation, transforming societal and economic structures, creating progress towards our modernity.

5.1 What Happened?

The Industrial Revolution was defined by two phases. In the First Phase (1760 – c. 1830), industrialisation centred around urbanisation and manufacture of textiles. Many workers still resided in rural areas, agriculture still maintained a level of prominence and work in factories was still evolving into specialised mass production. Innovation during the First Phase mostly improved upon older techniques to increase productivity through gaining efficiency with new technologies.

In the Second Phase, growth soared to record-breaking heights. Whilst there is some debate surrounding the precise dates of the Second Phase, it was characterised by resurgence of high-paced growth after a brief mid-19th century productivity slowdown. The foundations for major industrial dominance had been crystallised in the First Phase and Britain's innovative capacity exceeded all previous expectations. The Second Phase witnessed a wealth of revolutionary innovations, in which entirely new breakthroughs in technology emerged or usage of a particular technology transformed industry

and way of life. Specifically, this was the era of steel, chemicals and electricity.

Research, and the consolidation of scientific ideas with technical inventions, played pivotal roles in promoting marginal efficiency gains to increase productivity. Steam was the symbol of the Second Phase. The steam train and engineering, such as railways, bridges and tunnels, along with billowing mills, became archetypical images of 'industrial Britain.' It was in the Second Phase that industrialisation began to spread to other nations, such as the US and Germany, with innovations throughout the world, such as usage of electricity for practical purposes, invention of the telephone, the first automobiles, and in the early 20th century, the aeroplane.

By the turn of of the 20th century, Britain was no longer unique in experiencing rapid sustained growth of productivity per worker, hence economic growth. The Second Phase of the Industrial Revolution took Britain through to the First World War, but many of its trademarks persisted as pivotal aspects of British industry until the mid-20th century. On a global scale, the end of the Second Phase can be defined as the mid-20th century, or later, encompassing the perfection of the assembly line and increasingly automated production lines during the latter half of the 20th century.

Industrialisation of textile manufacture was a key driving force of the first wave of the Industrial revolution (around 1760-1830) due to mechanised spinning. Between 1760 and 1830, the population of Manchester had grown from 17,000 to 180,000, with the expansion of textile mills, turning a small enclave of Britain into 'Cottonopolis' – the world's first industrial city and the home of industrial textile production.

By 1850, Manchester produced around 40% of the world's cotton textile production. A similar pattern of population growth across resource-rich areas and those suitable for industrial production was witnessed in this period. Slate mines in Llanberis, North Wales were said to 'roof the world', whilst Liverpool Docks facilitated 40% of world trade in the early 19th century.

Scotland also rose to become a textile powerhouse; mills in New Lanark, near Glasgow were some of the largest in the world. Scotland also grew to become a major supplier of coal as industrialisation progressed into steam. Wales became the 'world's first industrial society', with industrial workers surpassing agricultural workers by 1851. South Wales was a key supplier of coal, supplying local smelting works to produce iron ore, and, due to its high-carbon content, Welsh coal was transported for use in industrial processes throughout the UK.

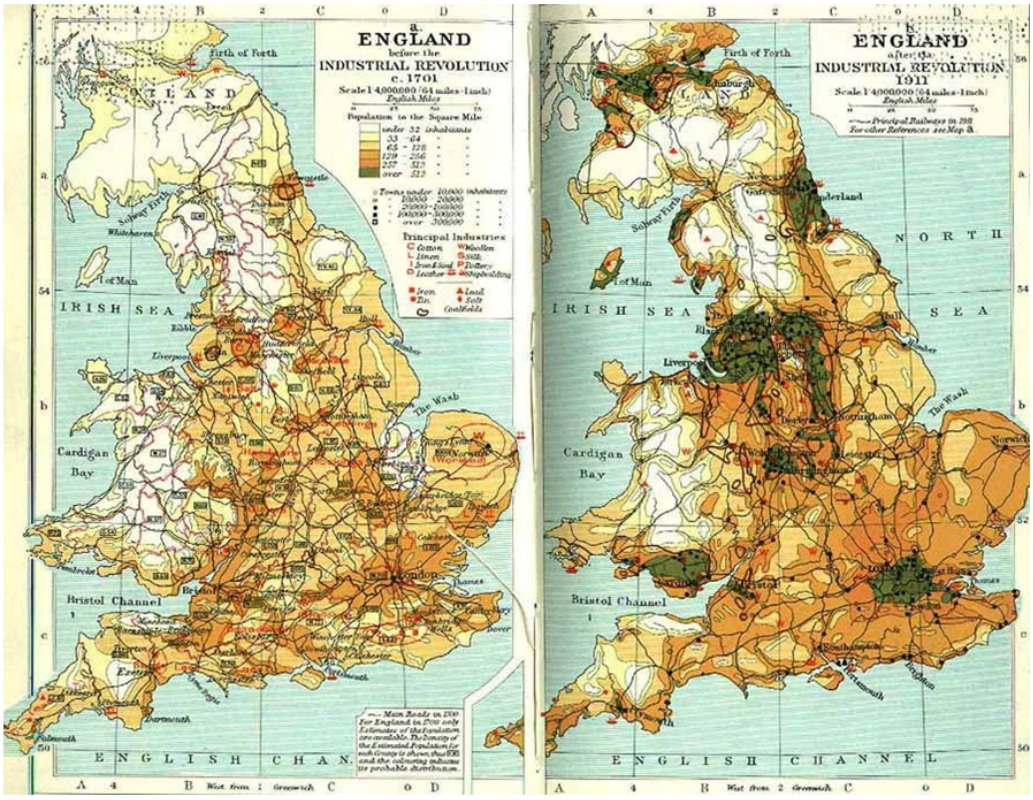

Figure 2: Urbanisation in the Industrial Revolution: During the Industrial Revolution population density increased in industrial hubs. As such, population density accurately depicts locations of industry..
(Source: Map courtesy of Philip's, A division of Octopus Publishing Group, originally featured in Philip's New Historical Atlas for Students, 1911.)

Sheffield, South Yorkshire became world-leading in production of steel. Britain, particularly North of England, Scotland and Wales, had transformed into the industrial powerhouse of the world. The British Industrial Revolution spanned beyond factories and machines, the nation became the world leader in transportation and logistics.

Reacting to the mismatch between coal supply and factory demand, and the slow transportation provided by ships around the coast, Britain embarked on a major canal building programme, constructing 2000 miles of canal by 1815. The canals enabled Britain to transport raw materials and finished products across the nation. By the advent of steam, trains revolutionised cross-country travel, increasing productive potential, as trains could move goods to destinations across the country

much faster than before. To benefit from the increased production output potential of new industrial processes, rapid demographic and population change occurred, drawing vast portions of the rural population into rapidly urbanising areas.

The 1870s saw a reduction in fertility rates across Western Europe. Although reduced fertility is often associated with reductions in mortality rates, this was not the case in England, occurring 140 years after reductions in mortality rates. Reduced fertility rates led to a decline in population growth, which in combination with the booming growth of industrial output contributing to GDP, made the English population comparatively richer per head, thus leading to an increase in GDP per capita.

Oded Galor accredits declining fertility rates to increasing demand for human capital in the Second Phase of the Industrial Revolution. During the Second Phase, physical and manual tasks were largely overtaken by automation and mechanised industry, requiring mental skill executed by both men and women. As a result, schooling became more favourable and there were more employment opportunities for women. Large families increased the costs of schooling and the opportunity cost of female unemployment.

5.2 A Global Monopoly

Aside from technological progress, how did Britain sustain such a radical and rapid transition into industrialisation? Just as areas of Britain had become intrinsically connected, Britain set about creating a global monopoly. Areas that later became fundamental to maintaining industrial might became the focus of British attention during exploration in the 15th and 16th centuries. Britain, like other European powers, began traversing the globe by sea to seek out trading partners.

Using power and waging conflict against opposing powers, the British establishment defeated other European powers in certain regions, in doing so, laid claim to large sections of the world's economy, using the areas of the world as extra fuel to grow the nation's wealth during British industrialisation. Following the establishment of the East India Company in 1600 and its subsequent expansion for trade, during the 18th century, Britain tightened its grip on India, through war, forced treaties, annexations and alliances with local rulers. Major wars continued throughout the era of British industrialisation as Britain forced control over successive regions of India to secure easy access to resources for the future of British industry.

Between 1793 and 1813, British manufacturers campaigned against the East India Company, defeating its monopoly of Indian trade, making India an economic colony of the industrial might of Britain. Economic and land policies enforced by the British enabled economic con-

trol of Indian production for British industrialists' benefit, regulating the nature of crops, including dedicating land to indigo production to be shipped to Britain to dye textiles.

The empire expanded the amount of different products Britain could produce (hence trade), the quantity of produce and the trade links to generate exchange. The trade, often forced, helped to sustain the productivity of Britain's manufacturing, enabling Britain to trade material goods manufactured in Britain for production resources. Indian crafts and goods were heavily taxed on export, whilst the Indian market became flooded by British-made textiles, forcing many Indian semi-industrial workers back into agricultural work. By 1850, half of the world's textiles and iron, and two-thirds of the world's coal originated in Britain. Britain had achieved market dominance in many areas of the globe and had become the foremost international power.

Increasing demand for sugar consumption in Britain, owing to the transition of sugar from an upper-class delicacy to a working-class staple during the Industrial Revolution, caused British sugar imports to skyrocket. Between 1710 and the early 1770s, records of sugar imports and population suggest that British per capita consumption of sugar rose 3.5-fold. As a result, maintaining the industrial productivity of Britain's urban powerhouses meant the rapid increase in numbers of slaves sold to Caribbean plantations to increase sugar production for export.

Although some commentators attribute the rise in sugar consumption to 'a change in tastes', we cannot view this as one would comment on a modern-day 'change in tastes' one must add that 'taste' does not imply 'fashion'. The uptake of sugar in working-class households likely originated from the necessity to sustain strenuous work, which drove demand for a diet that provided more energy. Further, North American plantations produced raw cotton to be shipped to Britain for use in textile production.

Not only did the British establishment increase wealth through increasing industrial production, they devised means to profit from other nations' trade, further boosting national income. British companies established the Indian railways with a profit guaranteed by the British government, securing ownership by British private companies of the lease of land on which the railway was built.

British companies owned the ships exporting beef from Ireland to the Caribbean. North America incurred trade deficits to Britain, meaning North America traded with the Caribbean to generate surplus, hence the Caribbean needed more slaves (which the British provided from West Africa, selling to the Caribbean at a profit). Britain acted as a production line for the world, importing cotton from plantations in North America, processing it into

textiles and exporting worldwide.

Through trade and global expansion, Britain had risen to become the dominant global superpower. Industry – and producing more output – had become entwined into the mentality of gaining power. To continue extending power across the globe, Britain claimed more territories and waged wars to maintain market share, such as the Opium Wars with China to retain market dominance of opium grown in India.

5.3 Class and Economic Inequality

It is widely understood that the Industrial Revolution was the first time that standards of living increased within a generation's lifetime. However, this is not to say everybody, or even the majority of the population, immediately experienced a higher quality of life as a result of economic growth. During the Industrial Revolution, the national wealth of Britain increased, with it, more individuals benefitted – the number of wealthy individuals increased as a result of opportunities to profit from new industries.

However, this came at the cost of the deprivation of the urban poor. Alexis de Tocqueville remarked in his writings on the conditions in Manchester in 1835: 'From this foul drain, the greatest stream of human industry flows to fertilise the whole world. From this filthy sewer, pure gold flows.' Despite greater wealth distribution as a consequence of the Industrial Revolution, the extra wealth was forged from the declined standards of living and health outcomes of those subjected to urban squalor.

Beyond the cities, many of the ground-breaking feats necessary to facilitate the rise to Industrial prominence entailed dangerous work. Many of those who built the canals and railways ('navvies') were Irish immigrants escaping the Potato Famine (1845-1852), arriving in Britain as unskilled workers at a time when industry was specialising into skilled work.

The dawn of rapid economic growth not only saw an increase in production, it forged more social and class disruption and division than before, rattling the rich-poor social structure of British life into a class ladder ranging from the affluence of the landed 'old-money' through the new money rich middle classes to the neglect of working people. Many political and philosophical thinkers of the 19th century journeyed to Britain's industrial heartlands to chart the impact of extreme and sudden industrialisation on working communities, citing the deprivation impacting the health and living conditions of the urban poor.

Notably the life expectancy in Manchester at the height of the industrialised 19th century was reported in 1845 to be 17, with modern estimates in the range of 25-32. It is important to acknowledge that

modern estimates, like constructions of historical GDP, are derived from archival materials only able to display a portion of the total picture of complete information from the period.

The political aspect of economic growth in the Industrial Revolution showed its head through lobbying of the government by industrialists to maintain the conditions necessary for rapid accumulation of wealth. The lobbying included protection of their industries through import duties, the opening of new markets through political and/or military force (colonisation) and lobbying against ending child labour, passing labour protection laws, cutting work hours, introducing labour unions and raising wages. Economic growth came at the expense of human cost, controlling other nations' trade and production, facilitating, and profiting from, the West African-Caribbean slave trade and controlling the working class in Britain.

6 Measuring Growth

In this section of Part I, we will look closely at how and why nations began measuring economic growth. To measure growth, a nation first needs to compile its National Accounts to determine the production and consumption that takes place in the economy in a given period. It took several centuries for the idea of calculating National Accounts to gather momentum and attract the political attention necessary for its formal implementation as a means to represent the national economic condition. Two major economic crises (the Great Depression and the Second World War) – during which governments realised the need for more statistical and numerical understanding than ever before – cemented National Accounting as a primary statistical objective of nations. On the eve of the Second World War, a single metric with which a nation could view its level of income in comparison to others, and calculate growth rates, was invented. We will discuss the most prominent economic thinkers who forged ahead with National Accounts in Britain, before reviewing the creation and significance of GDP as the most dominant metric for quantifying a nation's economic position.

6.1 Knowledge is Power

William Petty (1623-1687): Son of the Enlightenment

Petty believed that the truth could be found in numbers and evidence. Often cited as the founding father of measuring national accounts, Petty attached great significance to the political benefit that could be gained from building a quan-

titative representation of the nation. Whilst the field of statistics, developed over the following century, gathered data to paint an accurate picture of a nation at a moment in time, Petty's numerical representation was devised for political means. He intended it as a method by which to govern, evaluate governance success and identify areas for further action, terming it 'Political Arithmetick [sic]' – the name says it all.

Petty worked with John Gaunt to gather data to compile mortality tables for London, published in 1662, which gave a picture of how many fit and healthy men could be called upon should the nation go to war. Petty developed national accounts that proved Britain had a power advantage over their fellow European powers should conflict arise, displaying early ideas that a nation's status could be assessed through comparison with other nations. Calculating national accounts, Petty attributed some of the rise in British wealth in the past 40 years to improvement in infrastructure in the British Isles and progress in agriculture, hypothesising that employment transition from primary sectors would occur as a nation continued to increase its wealth. This moved away from the view that population changes, and the expansion of the empire, contributed solely to the wealth of the nation.

Petty's view of national accounts arose from a 'self-serving' (Philipp Lepenies) perspective. He found that workers contributed to the national income, not just landowners, concluding that the tax base could be increased to reduce the share of the upper-class contribution to national income (written in Verbum Sapienti around 1665 and published in 1691). Petty was upper-class and had gained political status (and a large Irish estate) from his role in drawing up maps enabling the British to drive out Irish communities, quashing the Irish Rebellion (1641-1651).

Petty often saw that upper-class political gain could be boosted by knowing more about the condition of people of the nation. Introducing 'the worker' as a taxable entity can represent the birth of 'the worker' in the cultural, political and sociological sense, representing a significant shift in the political and class psyche. Discovering that taxing the poor could benefit the rich represents a transition to the value of the waged worker as a means to a political end and creates ground for exploitation for the maintenance of the class structure. Thus, international comparisons justified increased pressure on British workers to improve the nation's image through increased national wealth.

Although Petty's national accounts never gained political momentum at the time (although written in 1676, Political Arithmetick was not published until 1690, after Petty's death), the term political arithmetic and the concept of national accounts circulated in economic spheres for the following century. It marked a brief

and early shift towards economics as a quantitative field. It also paved the way for the idea that an economic viewpoint and gathering economic data could evaluate past and inform future political policy, moving away from the idea that government is a snapshot in time.

Adam Smith (1723-1790): Goods are good

Adam Smith resurrected discussions about national incomes through seeking to develop a general theory of economic progress, wanting to establish why countries gain wealth, manifesting in his 1776 book 'Inquiry into the Nature and Causes of Wealth of Nations' (commonly abbreviated to 'Wealth of Nations'). He defined 'annual produce', concluding that the more goods a country produced, the better it would be for the economy and that refined division of labour was key to greater production.

He theorised that over the course of an economy's development, there would be a shift from agriculture to manufacturing. Through assessing how nations gained wealth, industrialisation was developing a theoretical underpinning. By gaining an academic analysis of the mechanisms behind national wealth, the process of increasing national output was transitioning from an unconscious demographic and technological rite of passage for human society to the idea that a societal shift towards the adoption of industrialisation could present a holistic strategy to actively make a country richer.

Smith's economic era represented a return to qualitative discussion in economic theory, thereby not progressing the development of quantitative means to numerically assess national wealth and growth. In addition, Smith believed in the role of the state to ensure the best conditions for increasing the annual produce. However, he believed the state's role was to maintain unregulated markets in order to achieve this aim, developing the 'invisible hand' argument and emphasising that people being free to live out their will to grow their own wealth without control would create the best results for everyone.

Nevertheless, the assumption that the market, buoyant through production of goods, would enable sufficient wealth for all to invest as per their whim would later be questioned. The deprivation of the Industrial Revolution and persistent material inequalities simply did not match the benevolent view of free and unregulated markets.

Alfred Marshall (1842-1924) and Arthur Cecil Pigou (1877-1959): Wealth to Welfare

Marshall's 'Principles of Economics' (1890) factored in goods and services to computation of national accounts, provided they had a market price. His era of economic thought followed the mass impoverishment from industrialisation. Marshall believed in increasing national income to improve material living conditions

to fight poverty, that increasing goods was a social policy necessity. With the improvement in national wealth, he believed the standards of living of the poor could also improve. Since Adam Smith's assertion that, despite maintaining the class structure, national wealth would enable all to act with choice in how they invested their money, poverty had become a pressing issue in economic and political thought, as a result of the impoverished urban conditions that had drawn international academic attention in the mid to late 19th century.

Arthur Pigou agreed with Marshall, shifting the perspective of the field of economics from the study of wealth to the improvement of the social situation. His book 'The Economics of Welfare', published in 1920, studied the aspect of welfare that was measurable in money. Pigou considered that increases in monetary economic welfare brought about improvements in social and general welfare, therefore he saw a link between generating national income and increasing economic welfare. He viewed that the political motive to encourage increasing national wealth should stem from the will to improve social welfare.

Colin Clark (1905-1989): Measurement is Meaning

Colin Clark reignited the position of quantitative evidence for economic reasons; he demonstrated that the measurement of national income and growth is fundamental to quantifying a nation's status in the world. He connected national income to the concept of growth, identifying the growth rate of national income as a measure of economic progress.

Clark worked with Beveridge (a pioneer of the British welfare state), was research assistant at the newly-formed National Economic Advisory Council and provided Keynes with statistical data for use in his theories published in 'The General Theory of Employment, Interest and Money' (1936). Later, he became demoralised by the lack of political motivation to adopt his revolutionary perspectives, and took his ideas to Australia in 1937, where National Accounting methodology had gained ground in the late 19th century. He published 'The Conditions of Economic Progress' in 1940.

Clark's work consolidated the ideas of those who had previously studied national wealth. Embarking on an ambitious project to quantify the national wealth of as many countries as possible, given the availability of data, he succeeded in numerically representing the international positions of nations based on their wealth. In so doing, he proved that no nation, or region, can quantify or understand its own position without a) a standardised measuring stick or b) comparison with other nations.

His work marked a shift in comparing national accounts towards understanding that non-industrialised nations had not benefitted from Western industrialisation, leading to

the focus on development aid. He also encouraged the use of estimates and devised measurable macroeconomic aggregate indicators. Further, he worked to construct historical growth data stretching to the early 19th century, evidencing that economic growth does not develop from capital accumulation, but by the process of the employment shift from agriculture to industry and services, validating the theories of Petty and Smith regarding employment transition as a vital step in economic development.

John Maynard Keynes (1883-1946), James Meade (1907-1995) and Richard Stone (1913-1991): Perspectives from a War-footing

Keynes, Meade and Stone viewed the significance of national accounts through the lens of crisis; their work on national accounts and income gave rise to a new philosophy of British governance by data interpretation. Keynes proposed that government spending was a vital policy focus during crisis and reconfigured national income to incorporate the state in a pivotal position in evaluating the nation's economic situation, publishing his conclusions in 1940. Meade and Stone formulated Clark's international metrics of comparison into an 'internationally valid methodological framework' (Lepenies), forming the pioneering System of National Accounts (SNA), which is still stipulated as the international standard for measuring and recording National Accounts.

The Second World War called for up-to-date national accounts. Only with systematic updating of a national picture of production could Britain efficiently service the production necessary for the war effort. As such, political and state need drove measurement of national accounts to the fore. April 1941 saw Meade and Stone's White paper: 'Analysis of the Sources of War Finance and an Estimate of the National Income and Expenditure in 1938 and 1940' presented to government, which included a triple method of calculation (akin to today's system to calculate GDP), cross-checking and statistical estimates, spelling the birth of official national accounts and enabling national coherence in production for the war. Further annual White Papers were produced from 1941-1951, until in 1952, the government began to publish annual national accounts in the Blue Book, a publication still released by the British government to this day.

Political impetus to adopt National Accounts signified a revolutionary change of attitude, mentality and national structure, a shift in the British political psyche, needed to match necessary outputs for progress. It enabled government to tackle impending problems that would otherwise cause economic confusion, and defined the origins of macroeconomic monitoring for the purpose of crisis management. Due to the policy implications of national statistics on the

economy's condition, the theme of economic growth and national wealth itself cannot be extracted from the emotional and political aspects of nation structure – economic perspectives on growth must always hold hands with political interpretation to give the metric meaning.

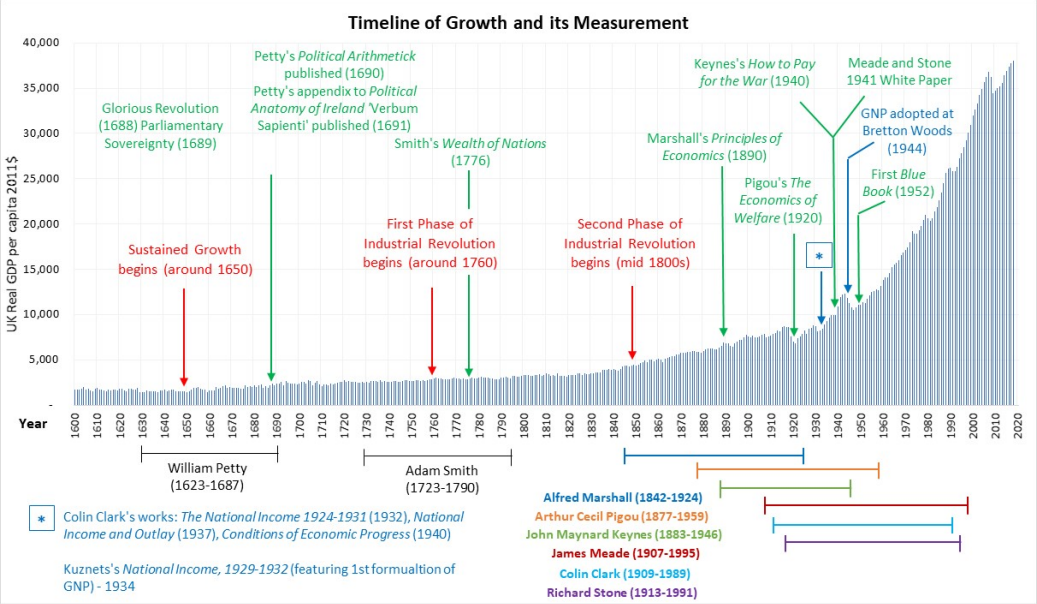

Figure 3: Evolution of growth's measurement against the backdrop of growth. (Source: Broadberry, S. N., Campbell, B., Klein, A., Overton M. and van Leeuwen, B. (2015) via Maddison Project Database, version 2020 by J. Bolt and J. L. van Zanden, licensed under a Creative Commons Attribution 4.0 International License.)

6.2 GDP: Greater than the Sum of its Parts

Drawing both influential critics such as Nicholas Sarkozy and Joseph Stiglitz, along with vehement supporters, GDP measurement has become a global fascination, particularly in developed economies that have experienced rapid industrialisation. But when did a unified metric of national economic progress arise?

Despite major developments in government assessment of national income, this did not, however, develop into active governmental measurement of growth. Britain was very influential in developing the means to build an aggregate picture but could not gain the final step into developing a metric, GDP, that could enable a comparable figure from which growth

rates could be calculated. Major advances in National Accounting had been made by Simon Kuznets (1901-1985) in the US as a result of the US government requesting a greater numerical and statistical representation of the economy in the midst of the Great Depression.

Kuznets, whilst at the US Department for Commerce, compiled the idea that the entirety of national production could be embodied in a single metric, formulating the first version of Gross National Product (GNP) in 1934. As the Second World War broke, as in the UK, the US government required accurate representations of national production. In common with Keynes, Milton Gilbert (who continued Kuznets's GNP developments) viewed government spending as a significant factor. His team adapted GNP into the specification that was adopted by the US and the UK in 1944 as part of the Bretton Woods Conference.

Over time, GNP was replaced by GDP. GNP for a given nation had accounted for all production undertaken by citizens and companies of that nation, wherever in the world production took place. In an increasingly globalised economy, including production by citizens outside of a nation (such as a UK company based abroad) could misrepresent the wealth produced within a nation.

GDP on the other hand restricted production to within a nation's borders, whether produced by a citizen or company of that nation or otherwise. GDP has gained global prominence, becoming one of the most significant measures of political successes and failures in developing and developed economies. GDP is the primary indicator of economic growth – measured as the percentage change in GDP between two periods. Since its adoption, the focus on GDP and discussions around economic growth have been inherent to the functioning of the British political system.

What is GDP growth and what does it tell us? GDP enables governments to give a monetary value to the total production in a given time period which occurred within the boundaries of a nation, by companies and individuals registered within and out of the nation's boundaries (so long as they operate within the nation). The rate of increase in (inflation-adjusted) GDP provides a measure of economic growth between periods.

The measurement of economic growth enables us to quantify the increase in the quantity and quality of economic goods and services that a society produces and consumes. With three methods outlined to measure GDP – 'production output', 'expenditure approach' and 'income approach', GDP is verifiable.

The data to calculate GDP is collated in the National Accounts, a strategy of national bookkeeping. GDP represents an aggregate asset that through international standardisation enables cross-national compar-

ison of economic condition. In addition, GDP is measured and collated by public agencies, demonstrating a further significance of institutions in not only the development, but the active monitoring, of growth, endogenously associating economic growth with the state and public-order systems.

Despite its critics, as a measure of economic performance, GDP is thus far an unrivalled success with regard to international usage. As a multipurpose metric, it does not accommodate the necessary socio-economic factors to paint a holistic national picture. However, in its role as a measure of output and consumption, GDP is viewed as an apt representation of the material condition and macroeconomic health of a national economy. With it, economic growth has become a central focus, not only in economic circles, but in political dialogue and social commentary.

From a product of technological, structural, institutional and demographic change, growth has become a political and social phenomenon of the modern age, becoming a mindset of policy-makers, and enabling a systematic process of evaluating past and informing future economic policy. Lepenies asserts that the transition from measuring national income (wealth) to measuring national production (goods, services and consumption) marked a move towards the political relevance of GDP. With GDP, the significance of economic processes surpassed a position of purely relating to 'the economy', tying the concept of economic growth to political goals.

Ensuring strong growth is often a mark of political success, with governments fostering growth to escape recessionary conditions, and even targeting growth through National Industrial Policy, attempting to channel government efforts into companies and sectors deemed most productive, in order to maximise national growth rates. Policies have experienced mixed success rates and there is little evidence to establish their overall effectiveness. In particular, Industrial Policy has attracted criticism, as it is difficult to ascertain which sectors will be most productive in the future. However, Industrial Policy continues to act as a mechanism of state intervention in the economy as a political policy tool intended to encourage growth.

The transition from national income to national production is a topic of contention when viewing GDP as a measure of economic progress – it is characteristically materialistic in nature, and it does not represent distribution of wealth, sustainable production or goods without market prices, such as unpaid domestic work. Simon Kuznets himself parted ways with GNP after its publication, disagreeing with the political perspectives that the metric could accurately represent economic progress and welfare.

He later produced influential work on the relationship between economic

growth and inequality, viewing that wealth distribution was as much a determinant of an economy's health as the wealth it gained from output. He won the Nobel Prize in Economics for his empirical analysis of economic growth and development, and is accredited as a key proponent of econometric analysis of economic history and of quantification of the economics discipline.

Data on the GDP per capita of a nation preceding the development and employment of GDP is derived from estimated national incomes gained through archival searches collating historical data. Angus Maddison, a British economist, dedicated many decades of his career to constructing historical GDP estimates to chart economic progress over time. Since his death in 2010, The Maddison Project (University of Groningen, The Netherlands) has continued his work and improved upon Maddison's original estimates. Constructing historical GDP has its drawbacks, not least as it is dependent on the quality and continuity of historical records and the data that can be collected from them. As we discussed regarding life expectancy, the accuracy of historical estimates is limited by the data from the period. Nonetheless, the GDP constructions have displayed significant international trends and divergences in economic development, leading the way in studies of long-run historical constructions of national income and GDP. In this paper, we present GDP graphs that we have produced using the most recent Maddison Project data: the Maddison Project Database 2020, which employs a data set created by Broadberry, Campbell, Klein, Overton and van Leeuwen (2015). Using the Database, we can view trends across centuries in GDP to explore the phenomenon of the relatively recent boom in economic growth, enabling us to compare the evolution of the past economy in terms of modern-day prices.

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Part II
Down But Not Out: Growth's Battle with Crisis

1 Introduction

The purpose of Part II is to examine how the era of sustained economic growth also gave rise to the phenomena of recurring economic crises, beginning in the mid to late 1800s, which caused structural changes to the UK economy. Discussing crisis is pertinent to analysis of growth.

Crises have significantly altered the structure of policy and work, altering productivity and impacting future growth potential. Crises also present an interesting lens through which to view the trend of growth, to survey how the economy reacts to negative or stagnated growth, and how the long-run growth trend persists despite periods of turbulence.

This part will begin with an explanation of what constitutes crisis, and will then introduce a potted history of the UK's economic woes up until the Second World War. This will include discussion of the latter half of the Industrial Revolution, the economic decisions during the First World War and the significant structural changes, particularly to policy and employment, in the interwar years, which were marred by continued economic turbulence. This discussion is particularly relevant to give context to later economic crises and their effects on policy and work.

This part will then constitute a study of the causes and restructuring effects of major crises in the second half of the 20th century. Following the analysis, there will be a 'technical zone' for readers who are interested in the macroeconomic mechanisms behind some of the discussed terminology.

Panic stations: Defining crisis.

A recession is defined by a fall in GDP over at least two consecutive quarters. Symptoms of a recession include rises in unemployment, real wage contraction, a fall in output and business activity, and reduced consumption. The UK experienced several recessions in the post-war era – not all are covered in this paper. Some recessions are quickly recoverable – the 1956 and 1961 UK recessions only lasted for two quarters each, but often, recessions signal underlying indicators of an unhealthy economic environment. We have selected three periods of economic distress for this section: the post-WW2 crisis, the 1980-81 recession and the 2008 Financial Crisis, as these had permanent restructuring effects on the UK economy and society.

2 Laissez-faire to Despair

2.1 The Long Depression

Industrialisation had brought the British economy unprecedented wealth. As the Second Phase of the Industrial Revolution, from the mid-19th to early 20th century, took hold (characterised by widespread usage of steam engines, specialisation of employment into skilled work and the contagion of industrialisation), the advent of a connected global economy meant potential crises were always just around the corner. The first major globally-interconnected economic crisis came in 1873.

At this time, the new British middle class, who had a penchant for speculating stocks, ran the nation through industrial private investment; political sway had reduced since the First Phase of the Industrial Revolution. Productivity was booming, creating a vast labour surplus in rural areas, heightening the structural transition to urban employment, with rapid urbanisation pushing down industrial wages. European production was becoming more integrated and outsourcing British production to reduce costs, particularly labour, was on the rise. In the age of transport, the investments of the new middle class included the development of railways in Britain and the US.

When the US railroad suffered overexpansion, triggering bank runs and a stock market crash in the US, the US experienced the Panic of 1873. At this time, the Suez Canal project failed – the project had attracted hefty sums of British capital to complete and the value of the wealthy elite's investments plummeted. The crisis hit the US and Europe hard across the population, however, the surface impact in Britain was primarily felt by the middle classes. The impact of devalued investments stifled investment into future developments in British infrastructure.

Continuing deflation led to a reluctance to invest now, knowing that prices will be lower the next day, resulting in a more than 20-year spiral of falling prices and wages which ended in 1896. Given productivity maintained aggregate output, the British economy stagnated, whilst international dominance declined with the emergence of newly-industrialised competition. The period has since been termed 'The Long Depression'; it marked the beginning of a tough relationship between British economic growth and recurrent economic crisis.

2.2 British Economic Crisis in WWI

The First World War marked a reversal of Britain's economic fortunes experienced during the previous two centuries. Britain incurred vast economic and human costs, both direct

and indirect. The first two years of the war were a mangled concoction of demand shocks and supply shortages. The latter half of the war was characterised by direct economic management, but a deteriorating financial position.

Over the course of the war, Britain incurred vast national debt and had extinguished many of its sources of cash revenues from foreign investment. Its position as the centre of the free-market world had dwindled, and the necessity to focus on economic policy and the role of the state in economic recovery had shifted centuries of economic focus on private industry for national wealth. Christopher Phillips notes that government spending contributed 38.7% of British GDP, in comparison to 8.1% preceding the war.

The First World War is a significant turning point in Britain's experience of economic growth. It ended the glory years of the Industrial Revolution, and through its impact on government, policy and Britain's macroeconomic conditions, it set Britain on a course that would prove irreversible and define Britain's prospects for growth, and international position, throughout the 20th century.

Before the war began, the 1914 financial crisis, triggered by murmurs of war in Europe, led to public bank runs to acquire gold. There was reluctance to relinquish gold in the financial sector due to fears of low gold reserves at the Bank of England. Trade and exchange markets froze, the ladder of financial and credit institutions, all contingent on each other, began to strain and could topple. This led to sudden internal demand by financial institutions for money from international debtors. It was not forthcoming due to risks associated with shipping gold on the eve of war.

The British government declared a 5-day bank holiday to halt the economy and give time to devise a plan to prevent the British economy from collapsing. As a result, Britain entered the First World War funded by short-term Treasury Bills (short-term debt) and Ways and Means Advances (designed to bridge temporary shortfalls in cash to cover outlay) under the belief that the war would be a short affair.

Economically, the war can be viewed as two stages: the first led by Prime Minister Asquith from 1914 to December 1916, and the second led by Prime Minister Lloyd George from December 1916 to Armistice Day 1918. The first two years of the war constituted confused economic choices and lack of directional leadership. Britain's government was torn between calls for state intervention to coordinate the war effort, and maintaining the free-market economy and British financial international superiority.

During this period, there was failure to adopt coherent economic strategies to adequately confront the conflict – the government was reluc-

tant to encroach on the free-market but realised the necessity to strategise the war effort. It requisitioned the railways and textile contracts, but not the control over manpower, meaning by mid-1915, large portions of workers in industries necessary for the war effort had voluntarily enlisted, leading to critical shortages on the frontline. The second half of the war saw conscription of employees from services, finance and commerce in order to maintain levels of production in British industry on home soil.

The tide began to turn with a change of prime minister in December 1916, a month after the Battle of the Somme. Lloyd George established direct economic management, founding new ministries to control different aspects necessary to supply the war, and replacing political decision-makers with business representatives accustomed to coordinating complex supply chains.

Complete state control of the economy turned the war around – Phillips highlights that in the production of munitions, 500,000 shells were produced in the first 5 months of the war but after the change of approach, 50 million shells a year were produced by 1917. British industrial production was soaring, economic growth was robust, with GDP estimated to have risen 14% from 1914-1918.

However, the substitution of workers in the first phase meant industrial workers returned to find their jobs replaced by unskilled workers from other sectors, or previously unemployed women. As such, fear of labour dilution and industrialists' reducing pay to increase profits, led to a surge in union membership, growing from 22% to 44% of the workforce during the war, leading to frequent strikes over pay.

Mechanisation of agriculture during the Industrial Revolution and increases in imports meant Britain was short on agricultural workers and food at the onset of war. In the free-market economy of the early phase of the war, the government was reluctant to regulate the food markets.

By early 1917 skilled agricultural workers were recalled from war, children were taken out of school in favour of agricultural work, and returning servicemen unfit to return to active service, and prisoners of war, were sent to work on farms. Non-farm land was utilised for arable crops and rationing was introduced in 1918. As a result, Britain's agricultural output climbed during the latter half of the war.

2.3 Debt Galore

Despite the shift in strategy in the second phase, the war was financially difficult. Britain jumped from one funding source to another, burning through cash in reluctance to take on foreign debt and reduce Britain's post-war financial superiority. An initial plan to fund the war with taxation fell short of the required cash flows to fund expenditures – it is estimated that wartime expenditures

were 26% funded by taxation.

Even under Asquith's government, the emphasis on the free-market was already diminishing through necessity, with free movement of goods reduced through import duties and excess profits tax to impede profiteering by private business. Borrowing constituted the majority share of war financing; with long-term borrowing supplanted in spring 1917, the government adopted a continuous borrowing strategy, amalgamating a series of short-term debt sources of funding.

As a result, management of the debt became administratively time-consuming, while diminishing cash and foreign investments meant the debt was increasingly unbacked by liquidity. Demand for Dollars to support trade with the US led the government to seize Dollar-denominated securities held by British private investors to be sold in the US, however the resulting cash was quickly exhausted.

By the end of the war, Britain had been forced to take on levels of debt estimated at 130% of its GDP, stifling the economy, which before the war had only debt to the value of 25% of GDP on its books. Economic growth was reduced through high interest rates and high taxes, hence reduced investment and a reduction in total factor productivity due to lack of technological development.

Loans that Britain had made to allies, hoping to recoup gold reserves through repayment – mainly France and Russia – were looking unlikely to be settled, whilst Britain had borrowed from the US, who were keen for prompt repayment. The most significant British policy decision following the war was the decision to return to the gold standard to prevent rising interest rates. Returning to the gold standard meant drastic deflation in the early 1920s, plunging the economy into a deep recession, causing a permanent increase in the rate of unemployment (average unemployment rate for all workers in 1921–1922 was 11.5%).

Nicholas Crafts highlights that this deflationary adjustment meant real earnings showed no growth in the years 1919–1926. Dramatically falling prices and the large 'differential between real interest rates and real growth rates' caused the real value of Britain's war debt relative to GDP to rise.

The real value expresses the quantity of goods equivalent to the monetary value of the debt, hence lower prices meant £1 had purchasing power over more goods. As the real value of the debt rose, it became increasingly difficult to clear the debt balance – in 1923 the public debt-to-GDP ratio stood at 1.76 (compared to 1.3 immediately after the war). Overall, reduced production once the war effort subsided, a surplus of labour once troops were demobilised and deflationary economic policy led to a rise in the unemployment rate, which reduced the annual real GDP.

A reduced trade-to-GDP ratio – which indicates the relative importance of international trade to the nation – meant the national cash inflows from international trade were reduced throughout the 1920s. The debt-to-GDP level grew from its pre-war levels, reducing economic growth hence reducing the annual levels of GDP year-on-year. In total, the macroeconomic effects of the First World War all pointed to reductions in GDP throughout the 1920s.

By the end of the Second Phase of the Industrial Revolution, Britain's economy was heavily reliant on import-export trade. Trade constituted a higher portion of Britain's GDP than its industrial and industrialising counterparts. Import disruptions during the war prevented Britain acquiring necessary supplies for manufacturing needed for the war effort. However, the true cost to the British economy was the long-term impact of loss of the trade advantage.

Before the war, Britain's economic prowess was gaining rivals due to recent industrialisation in the US and Europe. The British economy's struggle with the after-effects of the First World War only enhanced the global catch up to Britain's previous economic strength, and reduced Britain's status in the global economy.

The war prevented the import-export contribution to British GDP from continuing at its pre-war levels and other nations, primarily the US and Japan benefited, replacing portions of British exports in key regions such as India. Britain had attempted to maintain its economic position whilst concurrently trying to win the world's first major mechanised conflict.

Its biggest fear was surrendering its international financial centre – the City of London – to the US. By adopting this mindset, Britain finished the war both cashless and entrenched in debt. The era of British reliance on the purely free-market system was over. Crafts argues that the loss of GDP as a result of WW1 over the course of the 1920s approximately 'doubled the total costs of the war to Britain'.

The global economic fallout from the First World War is viewed as a key driving force of the Great Depression in 1929. After a centuries-long soar of sustained economic growth, the depression of 1920-1921 brought the first significant drop in British GDP per capita since the sustained growth began around 1650. The drop in growth took the wind out of the sails of the British economy, causing a 21.95% drop from the peak GDP per capita on record in 1916 to the hit in 1921 (calculated using Maddison Project Data at 2011 prices).

The hit took the British economy back to the GDP per capita levels of the mid-1890s and it took until 1929 to regain 1916 GDP per capita levels. Growth in the years immediately after the war acted to re-establish Britain's pre-war economic position, only to be thrown backwards again by

the impacts of the Great Depression. GDP fell again, dipping in 1931-1932, back to 1914 levels. Industrial areas of Britain were particularly impacted, with British exports halving, sending unemployment rates to around 20%. It was not until 1934 that GDP per capita exceeded 1916's all-time peak and regained its ascent of continuing economic growth.

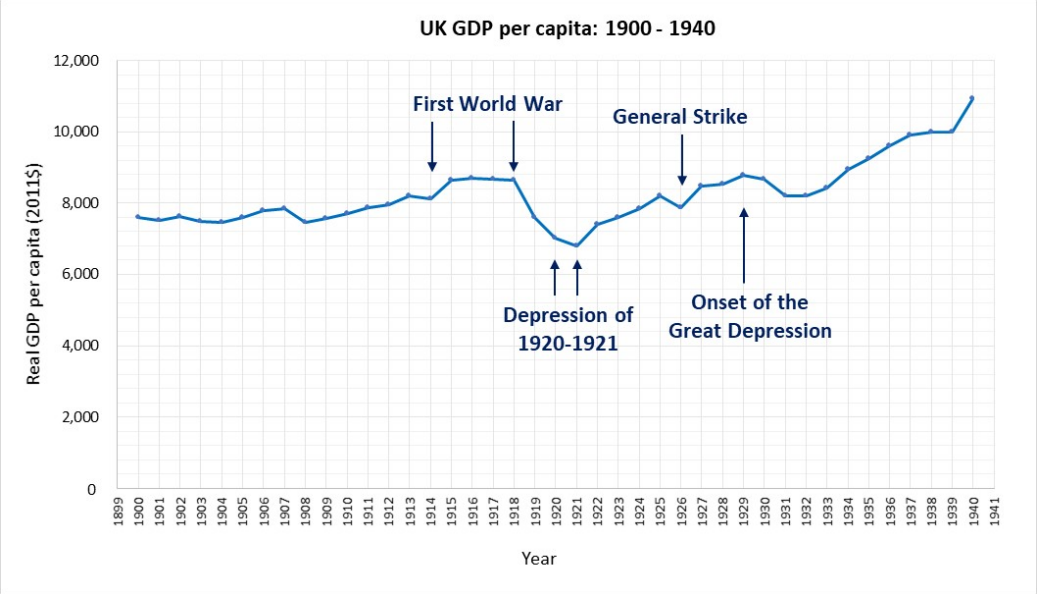

Figure 4: UK GDP per capita from 1900 to 1940, emphasising the crises of the interwar period.
(Source: Broadberry, S. N., Campbell, B., Klein, A., Overton M. and van Leeuwen, B. (2015) via Maddison Project Database, version 2020 by J. Bolt and J. L. van Zanden, licensed under a Creative Commons Attribution 4.0 International License.)

3 Interwar Shifts

The interwar years presented significant challenges to the maintenance of British economic growth. The post-war challenges presented difficult macroeconomic conditions for increasing output, whilst international economic turbulence festered throughout the period. The British economy never fully returned to its complete embrace of the frictionless free trade that had characterised the pre-war period, enacting protection-

ist policies to protect British industry amidst a declining global market share.

Protectionist policies were successful in regaining British growth, however, the interwar years set in motion long-run trends in employment and drivers of growth, impacting productivity, hence future growth even after the Second World War. The interwar period was defined by unemployment, changing structures in private business and the changing face of industry. Throughout the period disjoint in labour relations exacerbated high tensions due to unemployment and demand declines for British goods. This economically crisis-stricken era laid the foundation for a plethora of societal disquiet that persisted throughout the 20th century.

3.1 Protectionism

British economic policy in the interwar period emphasised protectionism, attempting to defend British production and strengthen ties with the 'Imperial Bloc' through trade, where a trading advantage had been diminished during the First World War. Pre-WW1 the British economy was fanatical about free trade amidst an increasingly globalised economy; attempts from the Conservatives to reform tariffs to favour an 'Imperial Bloc', wanting to strengthen British power against rising trade rivals, were quashed in favour of sustaining tariff-free unilateral free-trade.

The direct economic management of the First World War heavily influenced the post-war economic landscape. The government was reluctant to return to the 'laissez-faire' economics, which had contributed to the turmoil of early efforts in the First World War.

During the economic fallout from the First World War, international trade lost its multilateral nature and the UK became insular in its trading policies, backing discriminatory trade policies to complement its protection of British production. The UK explicitly favoured Empire nations over free trade with globalised economies such as Europe and the US.

The post-WW1 period saw the UK increasingly stringent on the quantities and types of goods which could be freely imported, with increasing commodity-specific tariffs, embargoes (such as the 1926 pork embargo prohibiting pork imports from Europe) and Acts to safeguard British industry. The Empire was already favoured in the period up to major reforms in 1930, with lower import duties on goods imported from the Empire and exemptions from duties on key goods in the 1921 duties.

The Great Depression led the British government to tighten restrictions on foreign imports – a series of Acts throughout the 1930s strengthened the UK position of domestic preference in supply to the British markets and Imperial Preference in imports. The 1931 'Abnormal Importations Act' introduced sweeping

tariffs and ad valorem taxes on goods produced outside of the Empire. In 1932, the Ottawa Conference brought together representatives from across the British Empire and stronger bilateral trade agreements were agreed to enhance 'Imperial Preference' for manufactured commodities and raw materials.

Political agreements extended beyond that evidenced in tariffs – the turn inward was boosted by active political will towards favouring Empire imports over 'foreign' imports. Although falling incomes due to the economic effects of the Great Depression are responsible for the majority of import decline, protectionist policies are estimated to account for approximately one quarter of the decline in imports the UK experienced in the period 1929-1933. Economic historians estimate that over 70% of the switch to Empire imports in 1930-1933 can be accredited to protectionist policy, whilst 50% of the shift can still be attributed to this policy as late as 1938.

Several economic historians view the turn to protectionism as 'paradoxical' – Britain tightened its grip on controlling its place in the market to protect a global dominance which was already fading. However, data evidences a positive impact of the '1932 General Tariff' (imposed a 10% tariff on British imports, with exemptions for some imports from the Empire) on the industries it protected. The 1932 tariff is attributed as a significant contributory factor to positive GDP growth from 1932 onwards. Industry-specific tariffs increased domestic productivity, improving output in protected sectors and encouraging substitution to British goods in the domestic market.

Given the economic environment at the time the tariff was enacted, protectionist policies of this kind were beneficial to increasing British industrial productivity and reigniting the trend of economic growth in the UK economy, contrary to many perspectives amongst economic theorists that protectionism is detrimental to growth. As such, these policies demonstrated that contextual economic conditions are a significant factor for a policy's success.

3.2 Corporate Structure and the Private Sector

The interwar period began to restructure British employment as the shape of the private sector altered. This era saw the idea of the 'corporate manager' in its infancy. Although 'merger waves' – where companies were combined to create larger and more powerful entities – had been prevalent during the final years of the 1800s, failure to understand the limits to managerial capacity of the sudden surge in growth led companies to redivide or collapse.

In the interwar period technological innovations, however, such as accounting machines and the increas-

ing prominence of the telephone, and new methods in accountancy, costing methodology and budgeting techniques, led firms to understand their financial position and market power potential. Some large-scale companies began to form, giving rise to the private sector professional, such as accountants and business administrators.

Further, the private 'trading estate' – an area of land developed by private industry, primarily for manufacturing – became a pivotal part of employment. New fields of work emerged in 'new industries' such as the expansion of electrical engineering and the new focus on consumer goods such as cars. With these changes, the face of British employment shifted, altering the drivers of British economic growth.

The changing private sector created institutional change – firms formed as hierarchical institutions, akin to central and local government and public systems. In some areas, private owners of trading estates funded local amenities and services, acting in the role of the state. Over time, the government began to structure itself to serve the employment needs of these private companies, directing the Ministry of Labour and Labour Exchanges towards offering jobs in manufacturing sectors on behalf of the employers.

The formation of corporate structure attempted to provide the private sector with longevity, by a business becoming an entity of itself (e.g., from Lord Leverhulme's estate to Unilever), and by planning for future economic performance. Although large-scale mergers were still infrequent, by 1939 there were 61 British companies with a market capitalisation of over £8 million (over a 2-fold increase from 1924, and nearly a 9-fold increase on the 1907 number).

The early stages of the modern structure of the divisional, decentralised corporate firm were developing and proving successful in some companies, such as Imperial Chemical Industries (I.C.I.), by the end of the interwar period, reducing competition in the private sector. I.C.I. had successfully acquired other firms by managing its long-term growth through staggered acquisitions over several years, so could decide which companies were absorbable without financially distressing the existing firm.

Although the foundations and strategy necessary to manage large-scale business were emerging, many companies failed to adopt it due to reluctance to acknowledge the power of trained management and strategised business operations, along with a resistance to rationalisation.

Aversion to the large-scale corporate firm would later impact Britain's productivity, severely impacting the economy's ability to generate the level of growth achieved by international counterparts.

3.3 Workforce and Productivity

Unemployment. Many political and economic commentators have sought to explain the drastic unemployment figures of the interwar period, which hovered regularly in double-figures from 1921-1938 (averaging 14% and never falling below 9.5%).

Some commentators and analysts have offered theories of 'voluntary unemployment' due to generous state unemployment insurance through the National Insurance scheme, suggesting that receiving benefits surpassed net earnings from employment for lower earners. However, others question whether a large portion of unemployment was voluntary, with difficulty finding empirical evidence to ascertain causality between unemployment and benefits, due to intricacies regarding eligibility. And some query whether, at such high national unemployment rates and destitution, discussions about whether unemployment benefits or paid employment were most financially beneficial were unlikely to have been central to employment choice.

The Keynesian school of thought argued that low expenditure decreasing aggregate demand contributed to high involuntary unemployment, advocating for government spending to refloat the economy. Whichever perspective prevails, high unemployment presented a significant source of inefficiency in the economy and reduced output. Idle human capital, in combination with declines in production output due to reduced demand in the market, meant prospects for growth suffered during the 1920s and early 1930s.

Human Capital. Adjustments in the structure of the private sector meant the traditional 'word-of-mouth' manner to gain employment was coming to its end, representing a significant overhaul in the nature of employment. Private firms began to develop recruitment strategies and also recruited from the government for personnel skilled in specific administrative tasks. The development of internal recruitment structures and the National Insurance Scheme formalised work.

The need to contribute to National Insurance to receive unemployment benefits meant the workplace became an all-in or all-out environment, restricting casual or temporary work which in previous eras had enabled many women to work. The interwar period has been identified as forming 'the housewife ideology', as to undertake temporary duties at home, women may have needed to become permanently unemployed. Further, changes in property purchase and rental reduced housing availability for unmarried women, making it difficult to live near workplaces – this catch-22 situation could bar women's participation in the workforce, hence from individual access to the economy.

The rising influence of the 'Fordist' system of corporate recruitment i.e., recruitment only of the 'typical family man' excluded many from the workforce. Reducing opportunity for work and selective employment practices creates efficiency losses in the economy by incurring wasted human capital due to able workers left unemployed, hence productivity is sub-optimal and growth potential is not fully utilised.

Reduced aggregate in industrial goods, led to high unemployment in heavy industries. The government sought to rid the unemployment problem through Labour Exchanges formed by the Ministry of Labour. This included moving young men from former industrial 'distressed' areas into boarding facilities where they were offered employment in local 'new' industries at a lower rate of pay than locals, or offering young men work in 'work camps' (later renamed 'instructional centres') to train them in manual labour.

Refusing to attend the work camp ('accept the job from the Exchange') resulted in withdrawal of unemployment benefits. However, training workers in generic manual labour did not provide workers in distressed areas with the precise skillsets necessary to gain employment in new sectors which were key drivers of growth. Hence workforce adaptability was reduced, making communities vulnerable to employment diversification away from heavy industries and manual labour.

A change in geographical distribution of industry during this period (with trading estates mostly established in the south of England) contributed to the fall of industrial heartlands, such as South Wales and the North East of England where workers were forced out of heavy industry areas into 'new' industries. Thereby creating pockets of prosperity, without rebuilding declining areas, which impaired future growth potential on a national scale.

Rigidities. The surge in industrial representation during the First World War led to prominent strikes in the 1920s against reduced wages and increasing work hours as a result of the rising costs of British exports (due to the decision to link British currency to the gold standard). However, the dominance of trade unions drastically declined in the post-war era. Bargaining power and the effectiveness of industrial strike action waned during periods of mass unemployment and decline in markets for industrial goods.

Collectives that still existed, however, displayed 'institutional rigidities' – the failure of trade unions and particularly employers' organisations to adapt to the difficult economic environment of the deep depression. This was restrictive for interwar British economic development. Organised collective bargaining was continually eroded, whilst some managers struggled, or refused, to adapt to new economic conditions.

Productivity across traditional industries in this era was poor, although employment in these sectors was still relatively high. Although the lessons from the First World War dictated that reliance on pre-existing systems was doomed to fall behind fast shifts in global economic conditions, heavy industry dropped behind in interwar Britain due to insufficient technological innovation (investing in capacity instead of technologies) and deteriorating employer-employee relations.

As a result, heavy industry, previously the jewel in the crown of British economic growth, struggled to maintain competitiveness in a global market. During the interwar period, the engineering workforce altered from 60% skilled and 20% semiskilled in 1914 to 33% skilled and over 50% semiskilled by 1939, deskilling industrial employment, representing a shift from the skills focus of the latter half of the Industrial Revolution and forging a distinct 'different-ness' in the British political psyche between the skills (therefore 'deserved' wages) of the lower earners and higher earners and managers in industry.

Deskilling reduces human capital accumulation needed to improve productivity in industry, which can reduce future growth potential. Further, a rise in piecework created short-term gains in productivity and income growth, masking underlying inadequacies needing to be rectified to secure long-term growth potential.

Socio-Cultural Restructuring. With the transition to a new form of internal firm structure, private sector employment began to create administrative jobs, forming new roles for 'workers', previously only able to work 'at the coal face' of industry – this gives 'employment' a new definition in the sense of the nature of 'work' in the UK economy but creates a division within 'workers' and a new hierarchy of employment.

'New' industries were badly unionised due to lack of established workplace collectives, whilst traditional means of union recruitment were significantly reduced as unions could not occupy the private land on which companies had established their 'trading estates'. These factors are not only significant for understanding the changing drivers of economic growth and industrial production in the British economy, but are relevant to assess future class and societal conflicts that arose during future economic crises. The interwar era not only strengthened class divide and sowed the seeds of employment polarisation, but sought to erode working culture established in industrial communities.

Searching for the New Normal. In the remainder of Part II, we will survey three crises that have been pivotal in structuring the modern-day British economy. The three crises had varying triggers – an international conflict, a domestic policy response to global macroeconomic instability and

financial collapse in a globalised economy – but displayed similarities in their effects and subsequent impacts on productivity.

We will review the causes of these crises and the circumstances surrounding the recovery of growth. Primarily, we will assess the restructuring effects of these crises, emphasising changes to industry, productivity and employment. We will observe that responses to temporary crises have long-term implications for economic growth, socio-economic structure, cultural identity and the economy's ability to absorb the effects of future crises.

4 The Post-WW2 Crisis

The sudden end to the war in Japan in July 1945 forced the UK into its post-war period prematurely. The war was expected to last a further 18 months to 2 years. As such, the abrupt end meant economic strategy was not prepared to begin recovery in such dire economic conditions. At the end of the war, the UK was penniless and heavily indebted.

4.1 Rebuilding the Economy

The UK's economic flexibility had been restricted during the war by mutual aid agreements with the US – a promise that Britain would not export goods received through the mutual aid programme. However, caveats to the agreement prevented the export of all goods within the category of a good received, hence barring the UK from exporting its own goods. Exports were at 28% of their 1938 level in 1944. The UK had also been a recipient of a large number of lend-lease import agreements, enabling the UK to receive US imports, deferring payment until after the war – including around a quarter of the total UK food supply.

Part of the post-war economic recovery was the challenge of extracting the UK economy from the US and Canadian economies, as it had become interwoven with them during the war. In the years following the war, all troops could not be immediately demobilised due to duties still required in Germany and the Pacific. Keeping on troops cost money, whilst also incurring the opportunity cost of lost output that they would otherwise contribute through employment in the UK economy. 'Normality' could not return until the UK had tackled a number of industry-level and employment-level factors, along with significant national economic troubles: a balance of payments deficit, shortages of steel, timber, coal and energy, and industry-specific skilled manpower. Initial

prospects for growth were bleak.

There were two phases to the post-WW2 crisis: 1945-1947 and 1947-recovery. During 1945-1947, US enthusiasm for an early return to a liberal free-market economy underestimated the financial toll the war had taken on the UK.

In an attempt to gain funds to rebuild the economy, the UK secured a loan from the US in 1946 (the Anglo-American loan), settling for $1,250 million less than needed (around $17.5 billion in today's money, approximately £12.76 billion given the exchange rate at time of writing) – and agreeing to conditions forcing through convertibility of sterling to the dollar in 1947.

The Sterling Convertibility Crisis following convertibility reignited UK and US financial panic due to an immediate drain on dollar reserves – Austin Robinson later reflected that this event 'seemed at the time the most serious economic crisis of those years', leading the government to ration bread and potatoes (which had not occurred during the war itself).

To climb out of the crisis, the UK needed to ascertain the exports required to finance necessary imports. Although export markets existed, other nations would rather use limited funds to rebuild their own infrastructures than create cash outflows through acquiring imports from Britain. Hence, the extent to which the UK could rely on these markets to acquire dollars was unknown.

Short-term expenditure was necessary to get out of the rut and create better conditions for growth. Britain had to prioritise – social investment (such as housing) was demoted in favour of capital formation. During the war, equipment had been worn out and not replaced, plants and machinery that were of no use in war time had been idle and were now in need of maintenance.

The UK set export targets – not usually used in peacetime – to incentivise industry to employ rationed raw materials towards achieving the necessary exports to provide cash inflows needed to meet domestic needs without imports. The managed economy sought to achieve the same aims that a free-market price system could provide, but enact them quicker through direct economic management. Following the convertibility crisis, the UK became a recipient of US 'Marshall Aid' intended to rebuild European economies.

Marshall Aid was conditional on recipients producing a viable plan for economic recovery by 1952, which drove the UK out of limbo towards long-term goal-setting. By 1951, the UK economy was stable enough that controls could be slowly lifted. The UK had achieved high employment, began to facilitate growth and had controlled wage inflation.

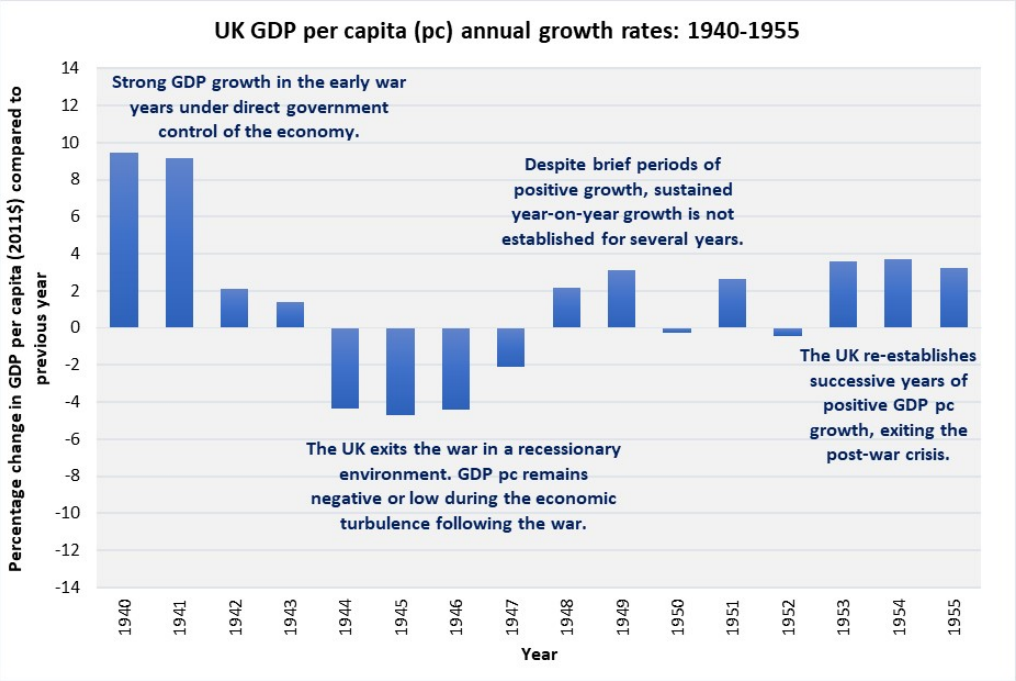

Figure 5: Annual growth rates as the UK exited the Second World War and regained sustained growth after several years of crisis.
(Source: Broadberry, S. N., Campbell, B., Klein, A., Overton M. and van Leeuwen, B. (2015) via Maddison Project Database, version 2020 by J. Bolt and J. L. van Zanden, licensed under a Creative Commons Attribution 4.0 International License.)

4.2 A Double-Edged Sword

Following the Second World War, Britain favoured the 'social contract' approach to recovery, however this has been attributed as a cause of later industrial decline and a struggling economic position in comparison to international competitors. Direct state control of the economy had achieved record-breaking growth in the early war years, resulting in new factory space, technology, and skills.

Britain faced difficult decisions in reconciling wartime economic prowess with post-war financial destitution. As a consequence, to prevent the rapid depreciation of sterling and appreciation of prices that would ensue from immediate consolidation into the international liberal economy, Britain implemented controls and maintained a level of government intervention, enacting a gradualist strategy intended for a slow and steady return to the free-market economic order.

Nationalisation and a mixed economy approach were favoured in fear

of a return to the interwar destitution, increasing the welfare state, including the formation of the NHS in 1948. The National Insurance (NI) scheme from the interwar period, which had caveats to eligibility and had in some cases precluded part-time work, was expanded, to cater for men and women, in both full and part-time work. NI provided state pensions and compensated for illness, maternity, unemployment, child support, funeral expenses and death or injury at work, whilst the 1948 National Assistance Act removed means-testing and expanded coverage to elderly and unemployed who had not paid contributions to the scheme.

Stephen Broadberry and Nicholas Crafts note that the 'short-termist' post-war economic strategies in Britain were by no means irrational given the limiting factors of the time. However, this 'contract' prevented industrial reforms necessary for long-term growth and productivity, leading to the industrial decline that marked later decades. Institutional barriers hampered Britain's ability to keep pace with its international counterparts as frictions forming in the interwar years re-emerged following the Second World War – powerful decentralised 'craft' trade unions alongside monopolistic company structure.

Tackling the sudden macroeconomic shocks of the transition from the Second World War to peacetime prevented implementation of supply-side reforms needed to make the economy flexible to productivity gains and capable of evolving. This meant short-term recovery masked long-term inability for the economy to grow in line with international competitors.

4.3 Old Habits Die Hard

During the early post-war period, Britain did not invest in research and development to the extent of their US counterparts. Further, Broadberry and Crafts note that Britain was slow to adapt to the 'Golden Age of European growth', where opportunities were taken to increase total factor productivity in production, meaning the UK economy was overtaken by European competitors.

The US had accelerated capital replacement during the war whilst Britain had continued to use depreciated capital that required huge expenditure to replace in the post war period. Loss of manufacturing made the UK economy import-centric. Despite balancing payments with measures taken after the war, following the crisis, from the 1950s, Britain returned to importing more than it could finance from exports and invisibles.

Britain's economic position became increasingly dependent on banking, finance and overseas insurance, manufacturing was increasingly outsourced and finished goods imported, whilst Britain encouraged foreign multinational corporations to establish bases in the UK. This

created cash outflows from the UK to import cheaper goods produced abroad, whilst reducing the manufacturing base.

The 'Golden Age of Capitalism' – the 'good times' following recovery from the war, constituting a global economic expansion – carried Britain's economy along, masking its shortcomings in economic strategy. Britain's economic position became globally economically subordinate following international economic reconfiguration, and lost its competitive global advantage.

The US became the dominant economy and Imperial strength was in decline, making Britain's position as an importer of food and raw materials unsustainable. Global economic restructuring reduced connections between developed and developing economies, centring the global economy around transactions between developed economies. Increasing international trade in finished manufactured goods made the most highly developed industrial nations more dependent on production in each other's markets.

Most significantly, Britain struggled to adopt the efficient large-scale divisional firm, leading British productivity performance to be weak in comparison to its US counterparts. Collusion, monopoly power and decentralised powerful 'craft' trade unions impeded the long-term productivity potential necessary to maintain high rates of future growth. As the US 'deskilled' the workers on the production line, it focused on improving human capital in managerial practices.

In the UK, resistance to rationalisation, which began in the 1930s, continued into the post-war era, meaning Britain had a lack of focus on managerial training for hierarchical corporate capitalism. Unions and management resisted the necessary reskilling and formation of human capital needed to establish effective managerial practices.

Prior to the war, Britain had sustained a competitive position through highly skilled workers. However, in the post-war economy there was a decline in focus in the British apprenticeship, which deskilled the working population. However, due to resistance to rationalisation, Britain did not compensate with managerial training. As a result, Britain suffered an overall lack of human capital accumulation relative to international counterparts, putting the nation in productivity catch-up, leading to lack of growth opportunities.

The UK became more interested in the US methods of production, but was slow to adopt capital-intensive mass manufacturing practices, due to resistance to standardisation from workers and employers. In the late 1940s, there was significant opposition to antitrust laws intended to break up monopoly power, from workers and employers, limiting the future growth potential through market competition of the private sector.

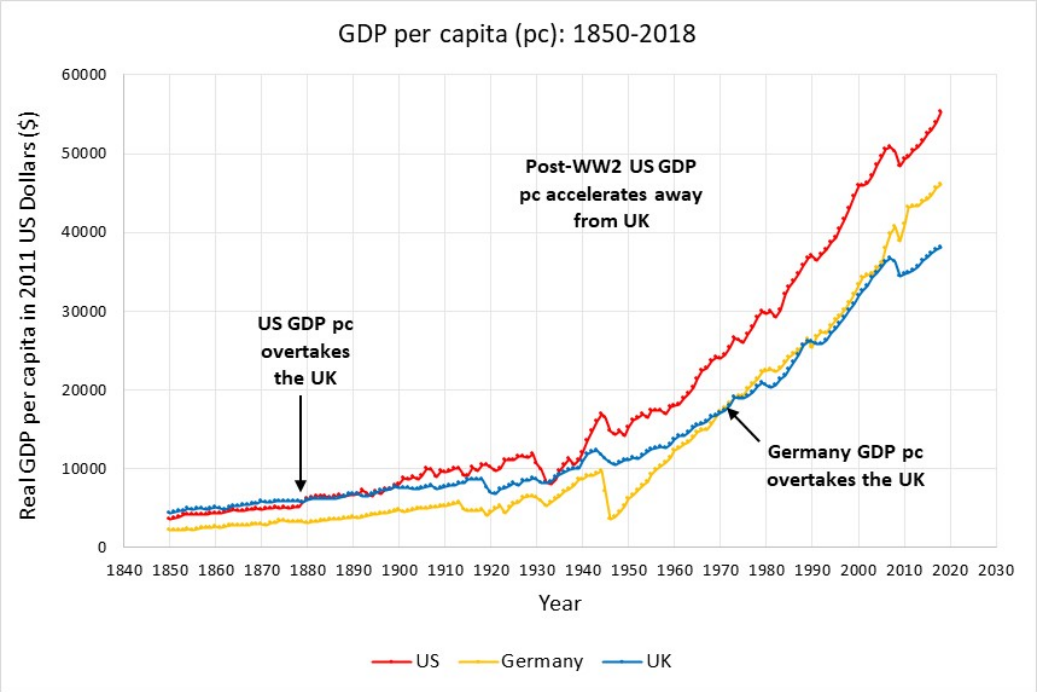

Figure 6: Comparative Growth: UK performance relative to major rivals, the US and Germany.
(Source: Broadberry, S. N., Campbell, B., Klein, A., Overton M. and van Leeuwen, B. (2015) via Maddison Project Database, version 2020 by J. Bolt and J. L. van Zanden, licensed under a Creative Commons Attribution 4.0 International License.)

The US transition to 'competitive managerial capitalism', where salaried managers decide the allocation of resources, manpower and operations for the present and future, has been attributed as a key determinant of US large-scale firm success. Britain maintained 'personal capitalism', a continuation of the Second Phase of the industrial revolution – businesses are often family-owned, the owners dictate the day-to-day operations and extract profit from the business as dividends, which hindered progress towards integrating the large-scale firm into the British economy.

Lack of adaptability meant the UK lost its competitive edge, leading to industrial decline. In the post-war period, it was expected that advanced industrial nations would experience employment sector transition from manufacturing to services, leading to a new stable economic system: the service economy. With the dawn of 'post industrialisation', employment ought to shift gradually

into higher skilled, higher waged jobs in services.

The post-war economic restructuring in the UK, however, led to deindustrialisation. The transition away from manufacturing accelerated, but higher waged services jobs failed to appear. Manufacturing employment went into decline from 1966, falling 34.5% (loss of 2.9 million jobs) in the 17 years up to 1983 – of this decline, 1.5 million jobs were lost between 1979-1983, as a result of policies enacted to tackle inflation, leading to the 1980 recession.

Although the UK experienced its best growth on record in the period following the war, other nations were growing quicker and were proving more adaptable to the new economic order, leading to relative decline of the British economy. The US led in GDP per employed person in the 1950s, however, the UK was overtaken by countries which had lower standards of living and productivity in 1950, and has been slow to close the gap to the US.

Due to lack of international competitiveness, the UK economy became more vulnerable to unexpected declines in international economies. As Britain lost its competitive position, it became a reactive player in the global economy. Government economic policy continued attempts to increase investment and output but they proved futile against strong international competition. Planning measures were continually put on the backburner by exchange rate crises calling for deflationary policy, leading to further decreases in productivity and worsening balance of payments deficits. Lack of both investment and industrial prowess made the new globalised economy a vulnerable situation for the UK economy. Recovery was slow from the economic downturns throughout the 1970s, as the UK had economic rigidities preventing speedy reconstruction. Britain's share of world trade continued to decline and economic growth was suffocated by high inflation throughout the 1970s.

5 The 1980-81 Recession

Britain was cossetted by steady economic growth following the war, benefitting from international prosperity through exchange rate regimes. However, the glory days soon faded into memory, as growth embarked on a rocky path through the 1970s. The political and economic events of the 1970s led to high inflation, high interest rates and poor productivity which was combined with a loose fiscal policy. Growth rates were volatile and the economy was grinding to a halt. The incoming Conservative government took drastic action.

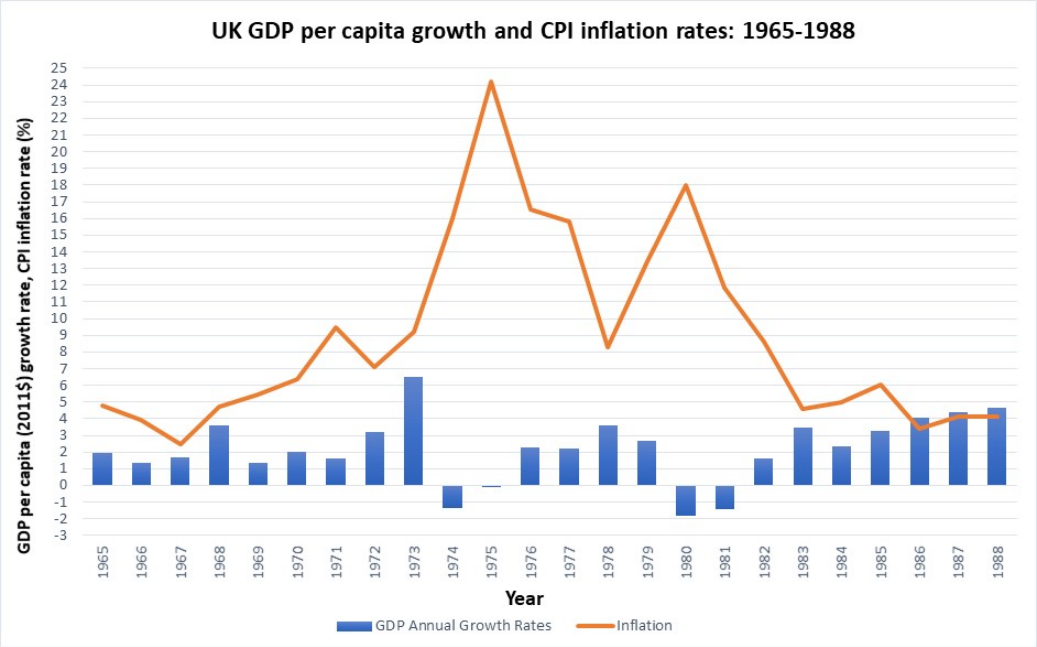

Figure 7: 'Stagflation' (1973-1981): Inflation skyrocketed and remained high, whilst GDP growth rates stagnated. (Deflationary policies in 1979 decreased inflation such that GDP growth was re-established in 1981 Q1 and inflation remained low.)
(Sources: GDP: Broadberry, S. N., Campbell, B., Klein, A., Overton M. and van Leeuwen, B. (2015) via Maddison Project Database, version 2020 by J. Bolt and J. L. van Zanden. CPI: World Bank via FRED, Federal Reserve Bank of St. Louis. GDP and CPI data sets licensed under a Creative Commons Attribution 4.0 International License.)

5.1 New Ideals

1971 saw the collapse of Bretton Woods agreement when US President Nixon suspended convertibility of the US Dollar to gold, breaking the agreement intended to stabilise global economies through the post-war period. In 1973, the Oil Crisis meant that a shortage in oil raised oil prices leading to inflation. This spelled the start of a rocky decade. Since the 1973 oil crisis, British North Sea Oil had become lucrative, making the UK a net exporter of oil and masking the decline in British industry. Monetary supply targeting and reduced government spending had been implemented during the 1970s in an attempt to reduce inflation, but had not made great inroads by the end of the 1970s.

Frugal government spending led to limits in public sector pay rises

in 1978, which created mass strikes in demand of greater pay rises (especially given that rising inflation decreases the real value of a set wage rate – fewer goods can be bought as prices increase, if the wage remains constant). The 20% pay increase achieved by lorry drivers in January 1979 set the precedent for calls for pay increases.

The Second Oil crisis of 1979 sent inflation spiralling upwards. Margaret Thatcher came into power, implementing deflationary policies to curb inflation, raising the interest rate and triggering the 1980-81 recession. Monetarist policies and fiscal restraint led to a speedy recovery of growth; however, employment did not respond, leading to long-term stagnation in the labour market. Major strikes became a lasting image of the 1970s and early 1980s era and its recessionary environment.

1979 is accredited as the transition to neoliberalism, signifying a shift in the political ideology associated with UK economic policy. The shift to neoliberalism led to increased focus and reliance on 'services', increased deregulation in financial sectors and increased interest rates, negatively impacting industrial sectors. Thatcher's government employed monetarist monetary policies, which target the growth rate of money supply to control the economy, purporting that the amount of money in the economy is the major driver of economic growth.

Economic policy in the UK shifted away from the welfare state towards tightening of fiscal policy. The government decreased public sector borrowing, increased taxes and imposed cuts in government spending. According to Meredith Paker, 'fiscal restraint' remained the government's economic focus following the growth in output which ended the 1980-81 recession. The Thatcher government also implemented a series of Acts to reduce trade union power. However, the services industry did not create sufficient cash inflow to balance the trade deficit caused by imports of finished goods.

5.2 Mind the Gap

Economic restructuring due to the 1980-81 recession represented an acceleration of manufacturing decline and industrial plight. The recovery from the recession can be viewed as 'jobless' – the second half of 1981 saw an increase in GDP growth, leading the economy sharply out of the recession as a result of stunting inflation but the growing economic environment was not reflected in employment levels.

The recession itself lasted 5 quarters but employment continued to contract until the second quarter of 1983 – 25 months after the recession had ended, peaking at 11.9% in 1984. It was still high by 1987 (over 10%).

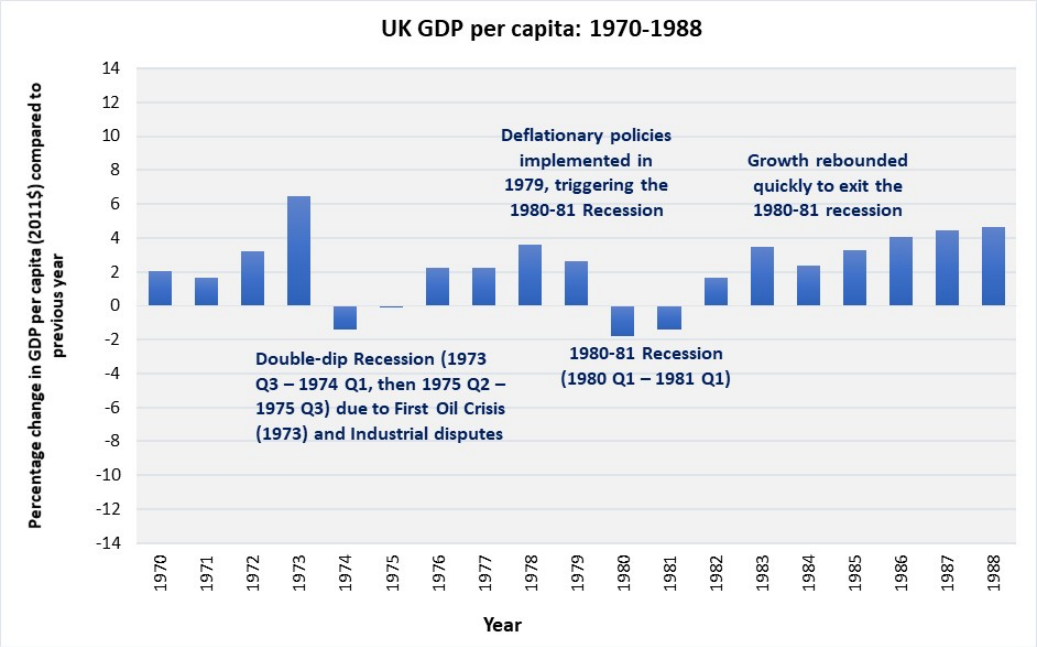

Figure 8: Annual growth rates as the UK navigated the rocky 1970s and the Recession and subsequent recovery of the early 1980s.
(Source: Broadberry, S. N., Campbell, B., Klein, A., Overton M. and van Leeuwen, B. (2015) via Maddison Project Database, version 2020 by J. Bolt and J. L. van Zanden, licensed under a Creative Commons Attribution 4.0 International License.)

Britain's poor productivity performance was masked by net exports of North Sea Oil at a time when oil was in high demand due to the Oil Crises. Even when removing the contribution of North Sea Oil to the recession recovery, GDP growth increased before unemployment reached its peak.

Over 3 million became unemployed after the 1980-1981 recession. Despite promising rebound growth, high unemployment underutilises human capital in the economy, producing inefficiencies. If employed, the workforce would increase productivity through labour hours worked and if acquiring new skills, build human capital.

Labour reallocation was a significant driving factor of the slow employment response to the recession recovery. Displacement of workers from permanently damaged sectors, such as heavy industry, led the unemployed to seek work in new sectors, requiring new jobs to be created. In theory, the rebound growth from an economic downturn should re-employ those laid off by recessionary conditions, into their previous industries.

Output often resumes following a recession in the industries that were strong before the recession. Due to accelerated industrial decline and drastic deterioration of the manufacturing sector during the 1980-81 recession, which continued to contract after the recession, jobs in heavy industries were no longer available to re-hire unemployed workers.

The permanent decline in heavy industry had a domino effect on associated industries that supplied and facilitated key sectors, creating further job loss, and eliminating a network of major sources of British economic growth. Across the board, employment in tradables (manufactured goods) decreased and employment in non-tradables (non-tangible sectors, such as services) increased, with large increases in employment in banking and finance.

Traditional 'British' industries suffered extreme job loss whilst employment in the financial sector grew, representing structural change in the British economy and worsening the class divide with respect to employment opportunities.

In the 1979-1987 period, the UK economy began to display job polarisation, whereby the central income jobs – 'middle-skilled' jobs – began to disappear, whilst the lowest and highest earning jobs experienced growth in employment share. Although this effect was not large during 1979-1987, it demonstrates momentum in the direction of a polarised employment market, signifying further structural change in employment. Britain became established in skilled trades and skilled middle-income occupations from the latter half of the Industrial Revolution.

Polarising incomes contributes to deskilling (which reduces productivity) in working class and lower middle-class jobs and also reduces social mobility – the likelihood that a low earner can leap into a high earning profession is markedly reduced when the bridge of incomes in between is removed. The polarisation that occurred during and following the recession was between-industry polarisation – it was driven by the larger shift in labour reallocation away from traditional industries.

Regional disparities worsened during the 1980-81 recession with growth in the share of employment in the South of the UK and a reduction across the North, Wales and West Midlands, particularly felt in the North West of England. Once recession recovery began, the Southern draw of employment continued and the regions affected by the recession continued to experience deterioration in employment opportunities. Regional differences are attributed as being caused by the high concentration of industries that rapidly declined in the North, West Midlands and Wales.

Employment in the public sector fell after 1979, particularly in the industries nationalised during the post-war years. 'New' industries of the interwar years, such as car

manufacturing, also experienced decline. Theories suggesting that post-industrialism would enable services to gather unemployed workers from manufacturing were proven to be incorrect in the UK economy. Due to the 1980 recession, 500,000 jobs were lost in services, indicating that the British economy was shedding jobs in secondary and tertiary employment. Manufacturing levels in 1984 equalled 1968 levels – as with the interwar years, the UK economy was growing to return to its position of decades earlier.

5.3 Dire Straits

Despite the political-economic shift away from the post-war structure in 1979, deindustrialisation continued. The 1980-81 recession accelerated the deindustrialisation effects set into motion following the Second World War and worsened the competitive landscape between the UK and other industrialised nations, such as the US.

The decline in British industry was much more drastic and permanent than the US post-recession economy, which experienced rebounds in major industries. Contracting employment in the key sectors of energy, transport, water, mining and communications only occurred in the UK. Industries that declined during and following the recession did not recover signifying a permanent structural impact on the British economy, impairing future industrial output, which had been a key driver of British growth.

The continued decline in the British export market in the 2000s can be traced back to the industrial decline surrounding the 1980-81 recession, demonstrating the permanence of the restructuring effects surrounding the 1970s-80s. In this respect, the UK's performance is not comparable to the US, which experienced a strong bounce-back following the rocky 1980s, with (manufacturing) output rising 30% by 2000 from its 1989 level. During this time, British output grew only 4%.

Although the decline in traditional heavy industries is not unique to the UK economy (the US has experienced reductions in those same sectors), it is unusual that those industries have not been replaced by newer manufacturing markets, such as computers. In contrast to the UK, the US government sustains pivotal areas of the economy through government spending, which encourages materials for US-manufactured finished products to be provided by other US-based industries, facilitated by the free-market economy. Investment in the shale gas industry created low-cost energy for the chemical industry, which is a key contributor to US economic growth. Further, a ready supply of gas lowers the cost of input factors in all US industries, leading to greater growth potential.

Nader Elhefnawy accredits the UK's failure to shift from fossil fuel industries and the lack of move-

ment into new markets, such as technology, as stifling UK economic growth potential, causing the declining industries to dominate economic trends. Facilitating a transition to new sources of rapid growth, such as computers, could have reduced long-term unemployment, increased British output and stimulated long-term growth, instead of enacting surface-level short-run rebound growth to recover GDP.

5.4 Identity Change

Socio-cultural restructuring as a result of the Thatcherist policies that marked the 1980-81 recession and its subsequent years were significant. The era of the loan made consumer credit opportunities widespread for the British consumer. The UK experienced a rise in use of mortgage finance, intended for home improvements, for instant purchase of consumer goods, which led to a prevalence of consumer durables and electrical goods in the home. However, this masked underlying economic inequalities.

As of 1984, around 15 million people lived on the margins of poverty, up 3.5 million in 5 years. The conflict between material possessions and economic inequality in British society redefined identity. It has been suggested that this era marked a transition from the lived experience as being defined by class structure and employment identity – a collective experience – to a rise in individualism, with experience marked by material social status.

A significant shift in the perception of class, wealth and value was marked by the craze of home ownership as marking societal status – council houses could be sold to their tenants, creating a new rift in the working class and influencing people's perceptions of their own political preferences and social standing. Hence, despite crippling unemployment, the cultural mindset shift towards Conservatism in previously staunch working-class households led to a re-election for Thatcher with overwhelming majority (a process termed 'class dealignment').

Following the war, 'citizenship' as a social structure was defined by the social contract formed by the government, emphasising access to the benevolent welfare state, enabling free healthcare and social support and a dialogue with a public-centric government. However, the restructuring of the Thatcher-era deconstructed the sense of national citizenship, leading people to become insular and self-focused.

During the deindustrialisation process, economic decline was spurred on by government policies in the late 1970s and early 1980s which indirectly threatened the collective identity of citizenship. The nation-state was increasingly ousted in favour of multinational corporations and opportunity became decided by the free-market, instead of government intervention. We build

on some of the long-term implications of the socio-economic restructuring of the 1980s in Part III, where we survey the impacts of inequality due to restricted access to growth.

6 The 2008 Financial Crisis

The negative impact of a highly interconnected economy and a deregulated financial sector came to the fore with the 2007-08 Financial Crisis, which resulted from ripples across the global economy as US investment banks collapsed due to exposure to subprime mortgages. Subprime loans enabled people to secure mortgages for properties without extensive credit checks and income documentation.

Governments could be inclined to accept a prevalence of subprime loans to encourage investment and create economic buoyancy. When house prices were rising, loan repayments were made, however when house prices started to decline, defaults increased. If large swathes of borrowers default simultaneously, lenders risk serious liquidity difficulties and banks can collapse. An increasingly globalised economy creates networks of foreign financing in domestic companies worldwide, which can create channels through which financial distress can spread and international financial systems can collapse.

The effects of the recession had spread to Europe by summer 2007 and all countries were in recession by late 2008. With construction and finance hit hard first, the recession spread throughout the economy like wildfire, and GDP contracted for five consecutive quarters. The beginning of 2008 saw the effects of the recession through a rise in unemployment, due to the shock to aggregate demand in the market.

Prior to the 2008 Financial Crisis, the UK had established a steady state to its economy, despite falling behind major competitors. Although the world suffered the repercussions of the Financial Crisis, significantly, as other nations began to rise out of the recession around the first quarter of 2009, the UK struggled to gain ground, establishing a new equilibrium at the low level of output and employment. Christopher Pissarides describes this malaise as due to the UK's macroeconomic rigidities – few or no new jobs were being created to absorb the high levels of unemployed.

6.1 Stuck in the Mud

The Financial Crisis led to the deepest UK recession since the Second World War and was the world's worst economic crisis since the Great De-

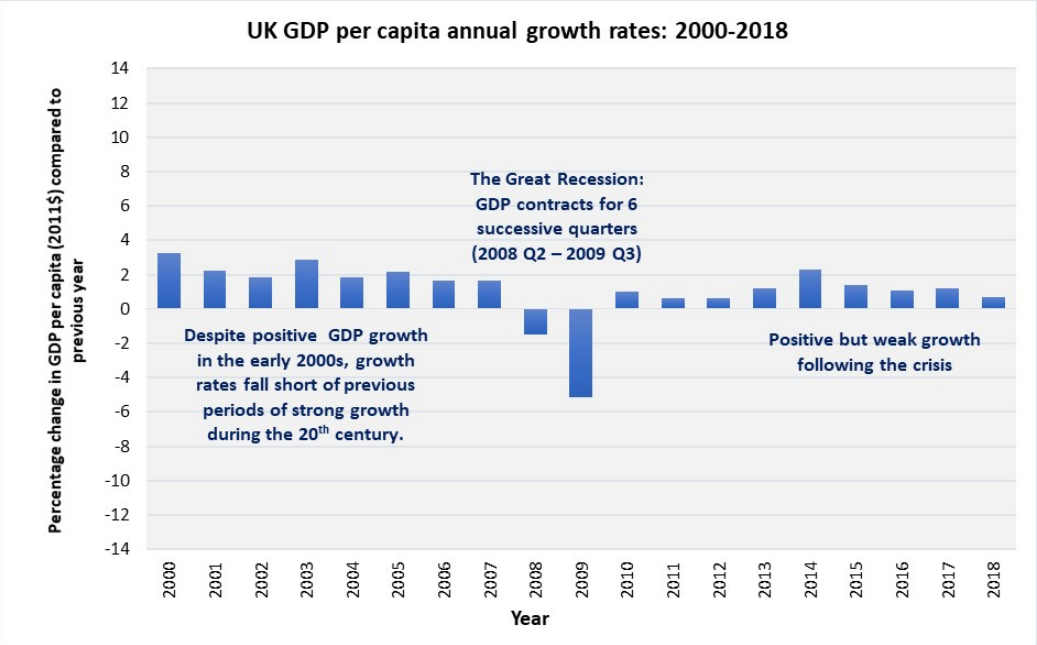

Figure 9: Annual growth rates as the UK entered and exited the Financial Crisis and subsequent recession. Before the crisis, growth rates lagged behind previous strong performance in the 20th century. The trend of weak productivity has marked the period since the crisis.
(Source: Broadberry, S. N., Campbell, B., Klein, A., Overton M. and van Leeuwen, B. (2015) via Maddison Project Database, version 2020 by J. Bolt and J. L. van Zanden, licensed under a Creative Commons Attribution 4.0 International License.)

pression. Inter-bank lending ceased as banks became reluctant to lend to other banks in the fear that they would not be paid back. Financial markets started to freeze up, leading to difficulty securing credit for individuals and businesses.

The UK government bailed out several major banks and enacted austerity in the aftermath to reduce the trade deficit. It took five years for UK GDP to regain its pre-crisis levels. Ten years on from the crisis, UK productivity was still stalling, wage rate rise had been weak and economies globally were still entrenched in debt. The discipline of Economics and the trustworthiness of financial institutions took a hit in the public eye as a result of the crisis, as many believed the extent of the financial chaos could have been avoided.

The subsequent structural reform to the financial sector sought to prevent a repeat of the crisis, but political action, taken after the crisis pe-

riod had subsided, received condemnation over the social impacts of fiscal restraint and long-term sustainability of the UK economy.

During the recession, the UK did not display structural difficulties at a microeconomic level, meaning there were little or no frictions in matching unemployed people to job vacancies, however the economy had stagnated at a low level of employment and lack of new job creation prevented the unemployment rate from decreasing.

Pissarides attributes the functioning market at the microeconomic level to reforms following the 1980-81 recession – structural changes shifted the incentive focus towards employment through lower taxation and more strict unemployment support, creating greater labour market flexibility which could absorb the structural difficulties other nations experienced on the pathway out of the Financial Crisis. (Although, the financial deregulation measures implemented during the Thatcher years are attributed as one of many contributory factors to the fragility of UK financial institutions when the Financial Crisis emerged).

Government policy out of the Financial Crisis was similar in form as the 1980-81 policies of fiscal restraint, with the coalition government reducing government and public sector spending. However, the intention that the private sector would absorb the unemployed appearing from the public sector did not materialise as expected. The contracting public sector had a negative knock-on effect on aggregate demand in the market, meaning the private sector was limited and not able to expand to create jobs to absorb the unemployed.

The sovereign debt crisis that occurred following the 2008-09 recession in Southern Europe reduced export potential for UK companies into the Eurozone, further limiting private sector expansion in the UK. The private sector was able to take over in the jobs that were lost in the public sector but had no ability to expand past that point, leading to a new lower-level steady state of employment. Due to low-level employment and stunted private sector expansion, productivity was heavily implicated, reducing potential for strong long-term growth once the recession subsided.

6.2 Austerity

In the wake of the Financial Crisis, the UK coalition government turned to fiscal consolidation and austerity measures in 2010 as a strategy to mitigate the effects of spiralling budget deficits that had emerged in order to finance the crisis. The measures included an increase in VAT to 20% (increased taxation) in 2011. The UK had attempted 'quantitative easing' programmes in the early throws of the recession – increasing money supply so that the government can purchase private assets with the new money.

Pissarides comments that this was not at an adequate level to 'offset

the fiscal austerity' (the cuts in public spending). Fiscal austerity immediately decreases aggregate demand, spreading contraction throughout the economy. However, austerity measures to suppress demand are not a long-term solution – to restore demand necessary for driving output and sustaining growth, the economy requires structural change in institutions and reforms in the labour market.

Surrounding fiscal austerity, the government promoted a dialogue that public services cost too much and that the market and its constituent organisations can operate the nation, cutting public sector budgets and reducing funding for public services. Austerity measures were officially brought to a close in 2015/16, when George Osborne (then Chancellor of the Exchequer) declared that the national deficit as a share of national income had decreased by half and that selling shares in banks (gained as a result of the bank bailout of 2008) was regaining taxpayers' money.

The measures succeeded in curbing some of the deficit but have been extremely controversial. A UN poverty envoy accused the government of 'entrenching high levels of poverty and inflicting unnecessary misery' with the measures, which have been attributed to worsening the socio-economic inequalities and health and social outcomes of many UK citizens. Child poverty, unemployment and the number of families (even those with at least one working parent) requiring food banks rose during the 'Austerity Age.'

Austerity does not so much 'fix' the economy through investments in innovation and skilling to promote future growth, but stalls the balance of payments from escalating further, which can lead to gaps in productivity relative to international counterparts when measures are removed. Critics and supporters continue to debate the fiscal and societal costs of austerity as a suitable policy tool in times of economic deterioration. There does not yet seem a consensus on prolonged austerity following economic turbulence, such as the 2008 Financial Crisis, and the battle between fiscal stimulus and restraints continues to be waged in political circles.

6.3 Puzzling Productivity

Many economists and economic historians have examined the 'productivity puzzle' that has emerged in the wake of the Financial Crisis; the UK's Office for National Statistics claimed 'it is arguably the defining economic question of our age.' UK labour productivity, measured in real GDP per hour worked, was merely 2% higher in the fourth quarter of 2018 than in the fourth quarter of 2007 (the pre-crisis peak). The UK economy has been lethargic in retrieving pre-crisis growth.

Although productivity slowdowns have occurred in the history of the

British economy during transitions to new eras, the slowdown following the 2008 Financial Crisis was unprecedented for the UK economy. The worst periods of labour productivity slowdown – as defined by the shortfall in labour productivity from trends preceding the slowdown – were the end of the Victorian boom in the mid-19th century (10% discrepancy between trend and actual productivity) and the transition from the 'Golden Age' of capitalism in 1971 (10.9% discrepancy).

The Great Depression saw shifts in international trade policy and exchange rate regimes, but a relatively swift rebound as a result, leading to only a 5.3% shortfall in productivity at the ten-year mark. Following the Financial Crisis, the shortfall in 2018 was 20.9%, massively exceeding the scale of any productivity slowdowns in UK modern history.

Nicholas Crafts and Terence Mills suggest that the extent of the post-Financial Crisis slowdown could be a consequence of three major concurrent macroeconomic shocks overlayed during the decade 2008-2018: the banking crisis of 2007-08, the petering off of productivity gains from information and communication technologies and uncertainties surrounding Brexit, which together contributed to an environment where UK labour productivity struggled to progress. Adverse economic conditions have coexisted before, but extreme crisis, shifting trade arrangements and a transition between technologies rarely coincide.

In the decade 2008-2018, the economy was recovering from the banking crisis that floored the UK economy. Neither of the worst two previous slowdowns had experienced a banking crisis, let alone that of the scale of 2008. Banking crises can generate permanent reduction in output due to breaks in access to capital inputs for investment, disrupted human capital accumulation (staff and skills redundancies), unemployment and liquidity drains reducing innovation, creating long-term productivity reduction.

Transitions between general purpose technologies (steam, electricity, ICT) can create a lull in productivity when the marginal gains from the most recent technology are dwindling but new technologies have not yet emerged. The peak intensity of the impact of ICT on the UK economy exceeded that of the peak of steam. The greater the impact of a single technology, the deeper the trough created when its impact begins to wane. ICT's revolutionary influence on productivity was slowing down by the end of the 2000s.

Compared to ICT productivity growth between 1996-2007, average annual growth between 2008-2018 was over 4-times lower. In 2016, the Brexit vote created vast market uncertainty. In the period of adjustment following the vote, firms employed time and manpower to planning for post-Brexit trading, incurring opportunity costs and financial costs that may have otherwise been dedicated to

productivity strategy and innovation.

Whilst planning for the unknown, export markets constricted and domestic firms struggled to match the productivity of international markets. Reluctance for banks to lend to new businesses, stagnating wage growth, unemployment and restricted investment have also been cited as contributing factors to the productivity slump.

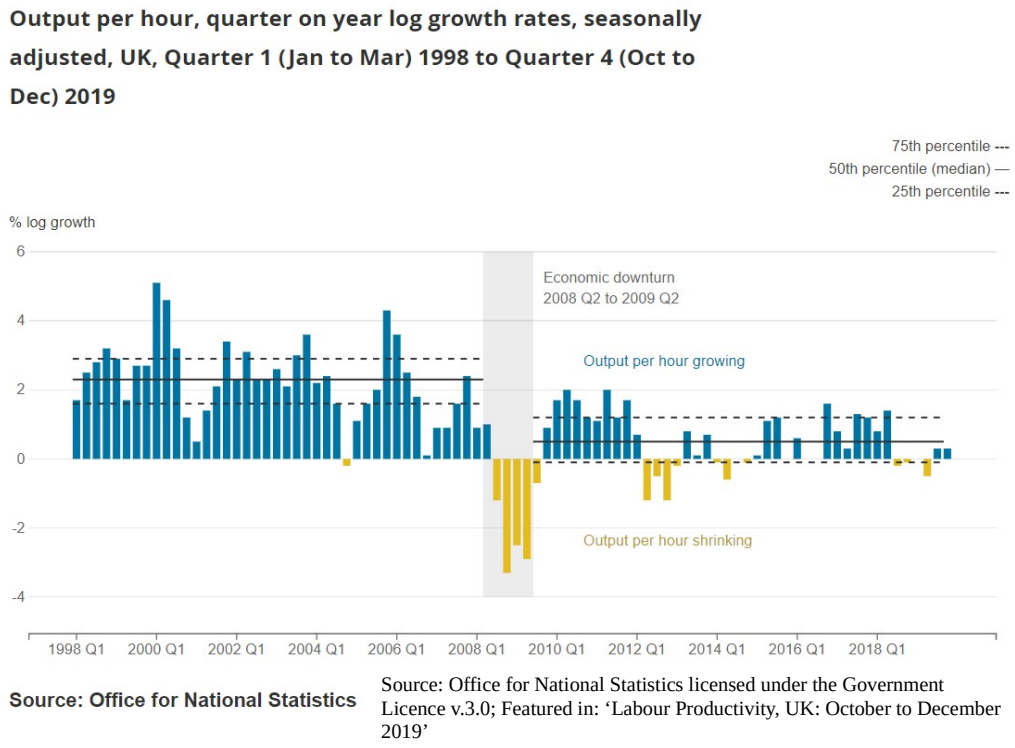

Figure 10: Productivity has remained persistently below its pre-crisis level throughout the decade following the crisis.

6.4 Financial Regulation

A positive outcome from the Financial Crisis was improvements in financial regulation. As the Financial Crisis spread through Europe, Northern Rock, a building society which had financed rapid expansion with international money markets, faced a sudden liquidity crisis. Bank runs began when their situation was publicised on 14th September 2007 and the bank was nationalised in February 2008. At the time of the Northern Rock bank runs, the protection on savers' deposits was limited to 100% reimbursement for the first £2000 and 90% of the next £33,000 (total pro-

tection of £31,700).

There was major panic amongst savers, who feared their savings would be lost. It took until 2020 for the FSCS to recover the final instalment from the banks to reimburse the customer deposits it had covered when major building societies collapsed in the crisis. As a result of the crisis, the regulations surrounding failsafe mechanisms in the event of bank failure have become more robust. From 2010, the Financial Services Compensation Scheme (FSCS) guaranteed cover for the first £85,000 of individual account savings at levy-paying institutions.

The 7th October 2008 saw the Royal Bank of Scotland (RBS) on the brink of running out of money. The UK government bought majority shares in RBS, Lloyds TSB and HBOS on 13th October 2008 to prevent the collapse of the UK banking sector. The government bailout of major banks came at a large cost to the British taxpayer. Due to UK financial regulation at the time, no single authority was responsible for recovering the situation.

Following the crisis, a significant overhaul of UK financial regulation took place under the Banking Act of 2009. The Bank of England (BoE) now takes responsibility for monitoring the banks and in the event of collapse, the BoE resolution regime comes into effect. Banks are put into insolvency to restrict damage to the wider economy and the FSCS covers customer deposits. In the event of a major bank collapse, the BoE manages recovery and prevents insolvency. The cost falls on shareholders and creditors (those who have provided the bank with debt financing), instead of requiring a government bailout.

These regulatory changes have continued to evolve since the crisis. In 2016, the BoE made changes to its stress testing systems – the BoE now undertakes 'what if?' studies on the financial condition of banks, given the wider macroeconomic situation in the UK economy, to judge whether they have sufficient capital reserves to absorb difficulties. Every two years, the BoE models what the effect would be of a major unlikely event, such as the collapse of a major bank. If banks are found to be precarious when stress testing is conducted, they are required to increase their reserves within a specified period of time.

Larger and riskier banks will be required to hold more loss-absorbing capital than institutions which are viewed as more shockproof. These regulatory changes aim to shield the wider economy from the impacts of turbulence in the financial sector. Hence, through controlling financial collapse, the detrimental impacts on growth, output and employment trends experienced during crisis can be buffered and, if possible, largely averted.

7 Can Governments Plan Growth? Lessons from Bretton Woods

Economic recovery is, by definition, a period where the economy returns to a trend of growth. Although we would expect this to accompany a decrease in unemployment, a rise in business activity and growing GDP, however, as we have seen in this section, unemployment may not decline. The key factor in determining whether a recession, depression or economic crisis is ending is that economic growth returns. Therefore, economic policy intended to navigate out of a crisis is a planned exit enabling the economy to grow its own way out of crisis.

7.1 A Golden Age

The period of economic stability and record growth following the Second World War can be attributed to the Bretton Woods Agreement of 1944 and serves as a good study in 'planning' growth. The agreement also identifies significant international economic structural change that crafted the shape of the world economy in the post-war period. It redefined the UK's place in the world economy – by denoting the US Dollar as the world's reserve currency, it demoted pound sterling from global prominence and removed Britain from being the financial capital of the world. The Agreement endorsed global use of GNP as a competitive metric to actively monitor wealth and growth across nations party to the Agreement. Further, the conference gave rise to international institutional changes to global finance, namely the inauguration of the IMF and the International Bank for Reconstruction and Development (which later became part of the World Bank) – the birth of the intergovernmental institution era.

With the fear of a return to the interwar period's erratic exchange rates, unfavourable for growth, it was decided that a constructed monetary system could enable the world economy to navigate out of the Second World War in a more stable market environment. Returning to the gold standard was, throughout the early 20th century, a technique used in an attempt to stabilise currencies. At the time of Bretton Woods, the US held two thirds of the world's gold reserves. It was decided that many international currencies would be pegged to the US dollar and that the Dollar would be convertible to gold. Any country could exchange Dollars for gold, on demand, via the US. In the early post-war period this system was an immense success. It led to exchange rate stability, enabling economies to re-establish themselves in the post-

war period without the need to interrupt recovery. The Dollar-peg avoided the fluctuations in exchange rate that can cause inflationary pressures, hence avoided the need for recurrent changes in monetary policy. The stability brought record levels of growth – during this time, the UK surpassed any level of GDP per capita that it had experienced in its history.

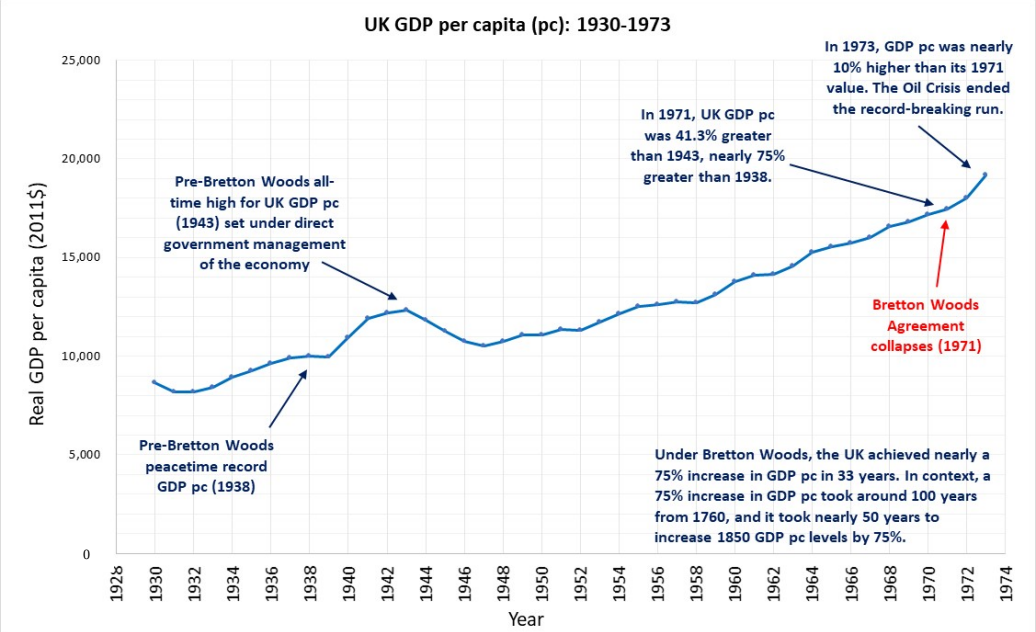

Figure 11: Despite poor productivity performance relative to international counterparts, the UK experienced its most successful period of growth to date under the Bretton Woods Agreement.
(Source: Broadberry, S. N., Campbell, B , Klein, A., Overton M. and van Leeuwen, B. (2015) via Maddison Project Database, version 2020 by J. Bolt and J. L. van Zanden, licensed under a Creative Commons Attribution 4.0 International License.)

7.2 Under Pressure

For the Bretton Woods Agreement to continue, it necessitated that all member countries continue to adhere to the monetary outlines of the agreement – breaking the pact would ruin the agreement. This is what spelled the death of Bretton Woods.

Nations who were party to the Bretton Woods Agreement held Dollar reserves that could be exchanged for gold. By 1959, the outstanding Dollars held by nations party to the Agreement matched US gold reserves

and pressure began to mount that the gold reserves would not suffice if the outstanding Dollars grew and needed to be converted into gold. A series of Acts passed by the US government to dissuade gold conversion ensued throughout the early 1960s.

In 1965, the US, whilst running a balance of payments deficit, encountered a series of expenditures, which would need to be financed. As a result, they implemented expansionary monetary policy in an attempt to fund the shortfall created by increased expenditure in the Vietnam War and President Johnson's Great Society (a sweeping overhaul of public services). Nations holding Dollar reserves needed a way to store them. As a result, they invested in Treasury securities (US government bonds).

Increased demand for Treasury securities increased their price (as they are fixed in number). As paper dollars were exchanged for the Treasury securities sold by the US, the US gained more paper money by securities being sold at a higher price, hence increasing money supply. Inflationary pressure grew, leading to fears that instability of the Dollar would lead to an international clamour for US gold reserves.

In 1971, US President Nixon suspended convertibility to protect US gold reserves and the Bretton Woods Agreement collapsed. This was a significant change as world currencies became free-floating for the first time – under the agreement sterling had been devalued twice (in 1949 and 1967) in order to maintain the exchange rate peg without free-floating currency exchange. The Bretton Woods Agreement illustrates the highs and lows of planning economic growth stability. Although the period of stability benefited many nations, the period that subsequently arose, of high inflation, recessions and economic turbulence was a stark contrast.

8 Technical Zone

1. What was the gold standard?

The gold standard was a historical mechanism used to determine the value of paper money. Under the gold standard, the value of a nation's paper money is directly linked to the value of physical gold. The amount of paper money that can be printed in a nation's economy is limited by the quantity of gold in that nation's reserves, hence prevents exuberant money printing and controls inflation. Nations exchanged gold for currencies in order to purchase goods in foreign countries.

2. What's the problem with high inflation?

When inflation begins to spiral upwards, this indicates that the

prices of goods are rising quickly – one pound will buy less units of a good tomorrow than today. This makes buying goods and investing today more favourable than tomorrow, reducing long-term investment. Businesses struggle to estimate their future costs so are less inclined to embark on investment projects, reducing future economic growth potential. Further, the cost of borrowing increases. If wages are fixed, the purchasing power of wages reduces as prices increase so cost of living increases. If interest rates are lower than inflation, there is no incentive to save money.

3. Why can deflation cause unemployment?

Deflation lowers prices, thus reducing the revenue that companies can gain through producing and selling goods. As companies and industries lose revenue, it becomes less viable to retain full employment at existing wages, so wages are reduced or workers are made unemployed. Further, as incomes decrease, purchasing power decreases, lowering demand for goods, further reducing prices. Debt retains its same nominal value, therefore as incomes decrease, debt constitutes a greater proportion of income.

4. Why can a rise in interest rate cause a recession?

As interest rates increase, the cost of borrowing increases, making businesses less likely to borrow to start new projects and consumers are less likely to borrow to make purchases. People favour saving over consumption, reducing demand for goods and decreasing available revenue from produced goods. As consumption and business operations slow, wages reduce and unemployment rises. The slowdown of the economy reduces output quickly, leading to a recession.

5. Why does the exchange rate affect inflation?

If pound sterling depreciates against the Dollar, more British pounds are needed to purchase one US Dollar. The relative price of imports from the US will increase. Demand for US goods by British consumers will decrease and they will favour UK-goods. Further, UK exports become relatively cheaper so will be in greater demand. As demand for UK goods increases, the price of those goods increases, causing inflation. Free-floating exchange rates are volatile to macroeconomic changes and beliefs about future economic conditions. In a turbulent economic environment, such as the post-WW2 economy, frequent changes in economic expectations would have made it difficult to prevent inflation – economic policy would have been distracted from rebuilding the economy following the war. Bretton Woods fixed the exchanged rates by pegging currencies to the Dollar in an attempt to remove this policy pressure.

6. What is a currency 'peg'?

If a currency is 'pegged' to an-

other (such as pegging sterling to the US Dollar), a fixed exchange rate is maintained between those currencies. A fixed exchange rate indicates that the number of units of one currency needed to purchase the other is constant over time. Fixing the exchange rate removes the two nations' abilities to implement changes to money supply as an economic policy tool. If money supply was altered, for example increasing the money supply decreases interest rates. If a nation's interest rate is lower than that of another nation, there is an incentive for savers to move their money to the higher interest rate. To do so, they would convert their money into the currency of the higher interest rate nation, so would demand that currency. Demand for the currency of the low interest rate nation would be reduced and its currency would depreciate (it would require more sterling to buy one Dollar). The rate of exchange between the two currencies would no longer be fixed.

7. What is convertibility (and why would you want it)?

Convertibility indicates the ease with which one currency can be converted into another through currency trade. When sterling was not convertible to the Dollar, the only way to purchase goods in the US market was through acquiring Dollars. The US wanted sterling to be convertible so that UK consumers could trade with the US with ease to kick-start the post-war liberal free-trade economy.

8. What is devaluation?

It is difficult to maintain a fixed exchange rate given market forces – demand for a nation's exports is constantly changing. When a foreign currency is needed to make foreign purchases, the demand for that currency continually changes and this should be reflected in the exchange rate. However, under the peg, there must be fixed exchange rate. To realign the exchange rate, sterling was forcibly devalued in 1949 and 1967. As a result of devaluation, more sterling was needed to purchase one Dollar, making UK imports cheaper for the US but making foreign imports to the UK more expensive.

9. What is free-floating currency exchange?

Paper money is a good, just like potatoes or cars. People demand paper money as it can be redeemed for other goods – demand gives it value. The exchange rate between two currencies is the number of units of paper money denominated in one currency (e.g., pounds sterling) needed to buy a unit of the other currency (e.g. US Dollars). The demand for a particular currency varies depending on the perceived value of that currency and its purchasing power, influenced by economic factors such as the country's economic growth rate or demand for its exports. Exchange rates do not reflect an intrinsic value for a currency, but beliefs about its

value. Free-floating exchange rates automatically adapt to reflect the demand for a given currency relative to another at a given moment in time.

10. Panic, crisis, depression or collapse?

Financial Panics can occur when fear influences speculation and investment behaviour, market activity is 'feverish' (frantic and frequent transactions) or market players act irrationally (withdrawing investments due to fear of imminent loss of value), leading to a market crash. Panics can create temporary paralysis in financial markets as banks freeze withdrawals, and sudden market collapse.

Crises occur when a sudden economic downturn, often prompted by distress in financial markets, creates rapid deterioration in macroeconomic conditions. A collapse is a rare event that can follow a severe crisis if the economy is structurally damaged and cannot rebound – this can be sudden or the result of compounding economic weaknesses. A depression occurs when a recession is unusually prolonged, lasting several years. It begins with a sharp decrease in GDP (GDP remains persistently low) and increases in unemployment.

11. Monetarism, Neoliberalism and Keynesianism: What's the difference?

Monetarism countered the prominent Keynesian perspective of employing fiscal policy to combat a recessionary economic environment. It emerged in economic thought, in the latter half of the 20th century, as a strategy to impose targets for money supply (as opposed to reacting to short-term macroeconomic conditions) to achieve economic stability.

The theory proposes that increasing money in the economy stimulates aggregate demand to encourage job-creation and create economic growth. Monetarism's proposed causality between demand and employment went hand-in-hand with the switch to neoliberalism during the Thatcher government. Neoliberalism promotes free-market capitalism through deregulation and stringent government spending or intervention.

Embracing neoliberalism symbolised a final dismissal of the Keynesian theory that had underpinned British economic policy since the 1940s, which had centred around the 'Post-War Consensus' (1945-late 1970s) of a mixed economy, characterised by heavy government intervention and expansion of the welfare state, building policy to stimulate growth from 'demand-side' perspectives.

Thatcher's neoliberal policies fostered a new approach to stimulating output to encourage growth, through 'supply-side' policies. Reaffirming the monetarist perspective that demand can determine employment, policies focused on tax cuts and deregulation to incentivise business, with the idea that a prosperous business environment will trickle

down into job creation, as opposed to job creation by the government to increase aggregate employment incomes and nurture market demand to boost growth.

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Part III

Bearing the Scars: Access to Growth and the Age of Knowledge

1 Introduction

The focus of this part is to investigate the modern UK economy, considering a wider scope than economic growth and national performance. Since the beginnings of sustained economic growth, standard of living has increased dramatically in the UK and life expectancy and health outcomes have improved.

Economic growth has proven itself throughout history, and globally, as a transformative force to lift people out of poverty and improve standard of living. However, significant inequalities, which are contributing to negative health, social and economic outcomes for groups of the population persist. A growing nation has become a divided nation.

During Part III, we will reflect on the legacy of industry, crisis and past growth, considering whether growth that has occurred so far in the UK has been equitable. We will identify the nature of UK inequality, study how some of the discrepancies in quality of life and health have occurred, and highlight how maintaining inequitable access to growth can impair future productivity and growth performance.

This section will also examine new drivers of growth as we journey through the 'Knowledge Economy', a stark contrast to the industrial might discussed in previous parts of this paper. Having surveyed new aspects of economic development and structure, we look at the implications of the 'Knowledge Economy' for UK employment. Will new horizons close the gaps in access to growth?

To bring Part III to a close, we will consider wellbeing and lastly, economic scarring. We will discuss how the nature of employment to sustain economic growth is impacting on employees' mental and physical health, whilst our discussion of 'scarring' surveys the long-term impacts of economic crisis on health, opportunities and inequalities, identifying how crisis recovery impacts future productivity needed for growth.

2 The Great Divide

Despite sustained growth, there remains a persistence of income and material inequalities, and significant discrepancies in the economic development of different areas and regions of the UK. Local disparities in wages, opportunities and employment along with investment inequalities and inequalities in wealth accumulation influence regional productivity and prosperity.

The UK suffers from inequalities that are both spatial (the UK displays interregional, urban-rural, intraurban and intraregional inequalities) and socio-economic due to occupation and class. Increased income per capita can improve standards of living if all groups within the population can benefit from it.

The decision of access to economic growth – the organisation of the economy as a distribution mechanism for allocating its benefits – is a political choice. So far, the UK has been unable to configure a system of economic policy that can enable an equitable, fair and poverty alleviating distribution of the benefits of growth.

The UK has succeeded in achieving continuing growth, even though productivity falls behind international counterparts. However, the distribution of the benefits of growth is not equitable. Inequality will exist within any market capitalist economy. Problems arise when unequal distribution significantly and persistently reduces health outcomes, life opportunities and standard of living. Inequitable distributions are maintaining preventable barriers to success for groups within the population. In this case, inequality is inefficient.

Aside from social inequity, there is a financial cost to maintaining high levels of poverty and deprivation through unemployment benefits, increased need for health coverage and the opportunity cost of lost contribution to national output. A healthy population, who have safe, meaningful work that pays fairly is a greater economic advantage.

2.1 Interregional Inequality and Poverty

Multiple articles and reports indicate that the governmental system in the UK that is, according to Philip McCann, 'highly centralized [sic], top-down, largely space-blind and sectorally dominated' is 'ill-equipped' to tackle the level of interregional inequality and deprivation in the UK. Although one-third of UK large urban areas are poorer than their rural surroundings and 'two-thirds of UK large cities are less prosperous than the UK average' (McCann), UK inequality is more interregional than urban vs non-urban.

In the UK, a large portion of inequality centres around the legacy of industry, creating spatially discon-

nected areas – such as Aberdeen and Dundee (Scotland), the South Wales Valleys and Teeside (North East England), which experience levels of economic decay commonly associated with urban areas. The industrial heartlands and periphery (the tributaries of supply to major industry, such as coalmining and smaller manufacturing bases) experienced the deprivation caused by loss of industry and have not benefited from the prosperity of economic growth.

Governments on both sides of the political spectrum have struggled to enact government intervention in such a way that an equitable distribution of wealth and opportunities can be achieved throughout the nation. Instead of setting long-term policy objectives, the government favoured short-term growth opportunities throughout the latter half of the 20th century, neglecting the long-term survival of industrial bases.

Although rationalisation and efficiency improvements were inevitable in UK industry, the sudden economic reform that occurred around the 1980-81 recession is a contentious issue due to the speed and intent with which communities were dismantled. The post-war decades of restructuring were forced over a few years, creating a long-term detrimental effect to the local economies on which it was imposed.

Forty years of productivity gains cannot be accomplished in the blink of an eye. Regions undergoing rapid thinning, to conform to economic modernisation aims of the government, experienced destruction without the creativity – or the liquidity injection – to rejuvenate. Areas that did not facilitate heavy industry have not only escaped much of the damaging consequence of deindustrialisation but had sufficient wealth to kickstart new investments and benefit from new innovations for soaring economic growth.

London has a disproportionate influence over the national UK GDP per capita. It has been estimated that for New York to have the warping effect on the US economy that London has on the UK, it would need to have a population of 65 million. London's urban metropolitan area (which encompasses commuters) is larger than Greater London – this is an oddity.

The urban metro areas of Birmingham and Manchester have smaller populations than the West Midlands and Greater Manchester, whereas London's urban metro population is nearly 4 million greater than Greater London. This is due to smaller inflows to Manchester and Birmingham from surrounding urban hubs but a large number of commuters into London (from towns such as Guildford and St Albans).

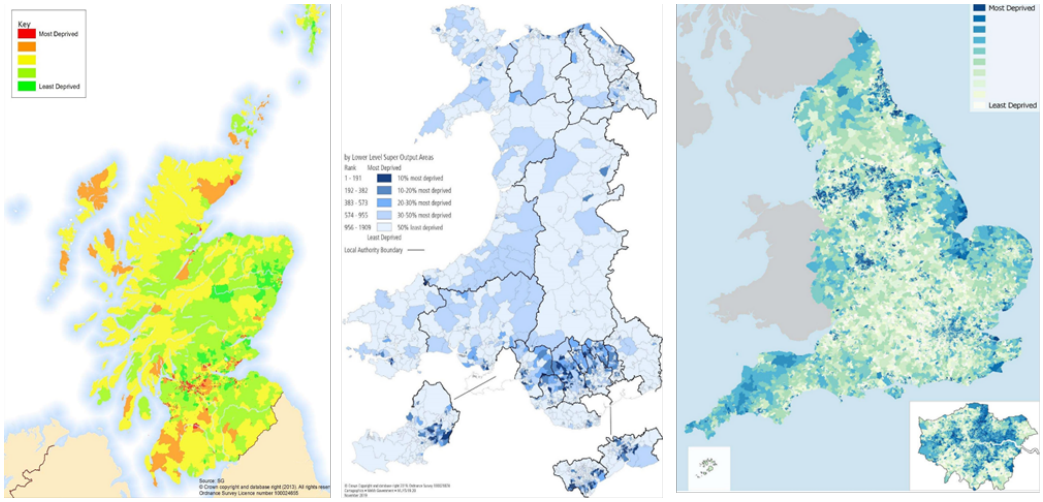

Figure 12: Index of multiple deprivation for Scotland, Wales and England. Darker regions display areas of most deprivation. Former industrial areas have the highest levels of most deprived areas.
(Sources: Scotland: The Scottish Government (Scottish Index of Multiple Deprivation 2012), Wales: Welsh Government (Welsh Index of Multiple Deprivation 2019), England: Ministry of Housing, Communities & Local Government (English Indices of Multiple Deprivation 2019), licensed under Open Government Licence v3.0. Note: Northern Ireland not featured due to copyright restrictions.)

Regional inequality can be well proxied by GDP per capita (which includes factors beyond wage income), as nations can be compared to one another. Using 28 metrics of inequality (such as the Gini coefficient, ratios of top 10% of regional GDP per capita to bottom 10% amongst others) across all regional classifications defined by the OECD, McCann found that the UK is an outlier amongst its peers for its levels of regional inequality. In some of the metrics, the UK is only outranked by small nations in Europe or former Communist countries with populations smaller than 11 million.

In comparison to other large industrialised economies, such as Germany, France, the US, Japan and Sweden (through comparing OECD members) the UK displays most interregional inequality. Only Italy comes close – of the 21 metrics of comparison with Italy, the UK outranked Italy on 11 and Italy outranked the UK on 10. Where Germany outranks the UK, this is due to lingering inequalities between the former West and East following unification.

Countries that display similar lev-

els of inequality in some metrics are those which have undergone significant restructuring (such as the unifications of Germany and Italy) or have long-standing regional divides, such as Spain. It is highly unusual that the UK, a large, highly industrialised economy, displays such persistent and large regional inequalities.

2.2 Disconnection

'On many levels the UK economy is internally decoupling, dislocating and disconnecting' (Philip McCann in 'Perceptions of regional inequality and the geography of discontent: Insights from the UK', Regional Studies)

The UK has areas of deprivation which stand shoulder to shoulder with areas that are major drivers of economic growth on a national scale. A series of disconnections – economic, social, institutional and physical – have meant that the most deprived areas have not been able to access the benefits from this growth. Cities are seen as some of the main drivers of growth but also contain areas which struggle to gain access to the wider economy.

Urban areas such as Greater Manchester are becoming patchworks of isolated deprived areas (experiencing multi-generational disconnection from the benefits of economic growth), gentrified areas (where high-income residents have moved into poorer areas) and frequent reshuffling and displacement. Close proximity between more wealthy residents and poorer residents can warp the average wealth profile of a neighbourhood, meaning it can be difficult to determine the areas needing most intervention. As such, these areas are not conducive to benefitting from national level one-size-fits-all policy.

Deprived areas have experienced residualisation, reducing social mobility – over generations, the benefits of nearby regional and urban growth have not enabled employment, housing and income to flourish, trapping the local area in economic stagnation. The nation is dappled with spatial mismatch (where jobs and employees are available but geographical distance prevents employment) and skills mismatch (where there are vacancies and unemployed but those unemployed do not have the necessary skills to fulfil the jobs).

Skills mismatches can create frictions in the employment matching process – jobs and unemployed people can coexist and not create employment. This can occur in inner cities (particularly evidenced in Glasgow) but also on urban fringes such as Speke, Liverpool. In Speke, it has been identified that a primary employment zone rubs shoulders with a deprived area where more people travel more than 5km to work than in similarly deprived areas, indicating that the employment in the nearby zone does not cater for the local workforce.

No area containing deprivation is the same. In Manchester, Liver-

pool and Glasgow, deprivation is spatially dispersed (the patchwork pattern discussed above) but in Cardiff, Leeds, Sheffield and Birmingham deprivation and affluence are more spatially divided (more prominent poor-rich spatial segregation). In isolated deprived areas, clusters of deprivation emerge. Pushing people into these areas through community displacement (as often occurs during new property development) creates a one-way street as the only areas for movement are into other deprived areas. Many cities (such as Liverpool, Manchester, Birmingham, Belfast and Glasgow) display clusters of deprivation which have little functional connection to less deprived areas with regard to residential mobility.

Cities such as Belfast and Salford have experienced regeneration in singular areas – the Titanic Docks and MediaCityUK – but there is little evidence that this influx of investment has filtered into the wider urban area. City regeneration that favours private investment can result in higher value housing to increase profit, reducing the size of the affordable housing market.

New housing is targeted at private buy-to-let markets for young professionals and students, which masks underlying deprivation due to a fast turnover of relatively wealthier tenants. Gentrification displaces poverty, whilst residualisation traps it – neither removes it altogether. There is evidence that gentrifying areas are experiencing increasing levels of poverty despite wealthier incomers, as gentrification can reduce social mobility – people in poor areas may have to move to poorer areas as property prices increase beyond their reach in their area and surrounding areas.

In former industrial areas such as Aberdeen, Dundee and South Wales, there are limited job opportunities within the area but also geographical detachment, reducing scope for job opportunities in close proximity to these areas. The increasing centralisation of employment in city centres ostracises ex-industrial areas such as mining, which, by the nature of pit locations, are distanced from urban hubs, such as in Newcastle and South Wales. Decentralisation of employment hubs in urban areas often occurs as an outpost of a central organisation, creating a skills mismatch problem despite close proximity to areas of unemployment.

2.3 Work for Work's Sake Doesn't Work

Evidence from a 2016 Joseph Rowntree report indicates that areas with high vacancies have high levels of deprivation and do not have higher employment. Almost 33% of Northern Ireland's most deprived areas and nearly 25% of Scotland's most deprived areas coincide with high numbers of jobs. Increasing the number of high-paid jobs does not increase local wealth if local people do

not have the necessary skills to undertake those employment opportunities. Further, surges in high-paid jobs can encourage commuting into the area, restricting employment opportunities for unemployed and underemployed city residents. Decreasing the distance between work and unemployed people also does not increase employment if there is a skills mismatch.

Job polarisation (where high-pay jobs and low-pay jobs increase in number, but middle-income jobs decline) reduces social mobility, perpetuating poverty and low incomes. In the period 1997-2002, although low-income rates increased faster than middle incomes, high incomes continued to outpace this faster rate, increasing the income gap.

Polarisation also exists between work-rich and work-poor households – if new employment opportunities go to households where there is already a member in full-time employment, it will exaggerate the income gap between poor and rich households. A 'jobs gap' has emerged between areas of affluence and poorer areas – the job polarisation is both occupation-based and spatial. The type of jobs now available in the former industrial areas do not, in the majority, provide the opportunities for increased income associated with the average job opportunity of the South-East.

The UK has high levels of in-work poverty, indicating that recurrent policy objectives of achieving 100% employment do not reduce poverty levels if there is a rise in low-paid work. In-work poverty is most prevalent in the sectors that the government is keen to 'open up' following COVID-19 lockdowns (temporary or low-paid work and those in hospitality, catering, retail and care occupations) instead of undertaking labour market and economic reforms.

This neglects to resolve the root employment causes of in-work poverty and persistent deprivation. Further, creating low-paid employment opportunities can create a dip in standard of living for the poorest – net incomes from low-paid employment and the costs of facilitating work (for example, transport) can be lower than solely receiving benefits. Undertaking employment following receipt of benefits creates a decline in standard of living, perpetuating in-work poverty.

2.4 Geography of Discontent

The 'North-South' divide is more than a cultural dialogue – it is the result of the UK's vast inter-regional economic inequality. As the drivers of growth in the UK have evolved, through new industries and into new technologies, previous sources of growth have successively become obsolete, and the number of areas encompassed by the 'North' have increased.

Ron Martin noted in 1988 that the 'North' over time has expanded

to engulf all regions of the country excluding the South East, London, the East Midlands and East Anglia. The entirety of post-industrial England, along with Scotland, Wales and Northern Ireland, fall on the unfavoured side of the divide.

The divide is not a new phenomenon. As early as the 19th century, unemployment was disproportionately high in northern Britain in comparison to London and the South East, despite the prevalence of industry. Wage discrepancies between London and industrial areas were visible, whilst London displayed a high concentration of employment in services and finance. The wealth of bankers and financiers in London trumped the wealth of industrialists in the industrial heartlands of the 'North'.

Regional disparities intensified during the interwar years as the UK's heavy industry began to decline and manufacturing for new industries arose in the South – the 'North' suffered the largest burden of unemployment. Following the Second World War, the manufacturing bases providing the 'Golden Age' were largely in the South East and West Midlands. The post-war economic boom did little to reignite the industrial strength of the former powerhouses of the North, Scotland and Wales, but made great strides in increasing regional wealth in the South-East. Employment in Scotland and North West England failed to reach pre-1930s levels despite manufacturing in the 'Golden Age'.

Throughout the post-war period, successive governments failed to address the widening North-South divide. From the mid-1960s, the divide began to grow. Through the latter half of the 20th century, the proportion of the population benefiting from the prosperity gains from economic growth dwindled and the economic 'North' swelled.

As manufacturing and heavy industry began to collapse, the banking and insurance centre weathered the economic storm. The fallout from the 1980-81 recession dealt the final blow to regional recovery. Shifts towards neoliberal economic policies accelerated UK inequalities – the ideological standpoint that accompanied the new rendition of the 'free market' reduced national equity in health outcomes, education and other areas of life.

Alex Scott-Samuel et al. note that 'the 1980s saw a rapid increase in income inequalities and poverty rates. By the 1990s and 2000s, these new high levels became normalized [sic].' Although the 'South' is not without poverty, deprivation and unemployment, there is a marked divide between the 'southern' and 'northern' regions on aggregate – McCann summarises that 'many of the UK's most prosperous places are small and medium sized towns, especially in the south of England, whereas many of the UK's poorest places are small and medium sized towns in the Midlands, North and Wales.' Disparities in city

productivity between the north and south of England have also emerged.

During 1970-2000, the spatial concentration of poverty in Britain increased, particularly due to areas suffering industrial decline experiencing high levels of unemployment and economic inactivity. The North-South divide grew between 2001-2008 and the economy displayed large growth spatial inequality – only a few geographical areas benefited from prosperity brought by growth and urban growth was not found to improve the rate of low-skilled employment.

McCann notes that 'higher interregional inequality is associated with higher nationwide interpersonal inequality'. It is evidenced that people's perceptions of their region and nation are heavily influenced by wealth and their experiences of other regions and those who live there. Those who live in the UK's 'North' will see a different picture of the UK from those who live in its 'South'. The North-South divide and interregional inequality has a large political and cultural aspect influencing the perception of the scale of the inequality and the lack of emphasis on measures to rectify it.

3 Socio-Economic Costs

Preventable inequality poses direct and indirect costs to the economy, through public sector spending on healthcare and benefits and productivity losses. Since the shock 'identity change' in the UK's political attitude towards government spending and the health and wellbeing of the population that occurred in the 1980s, the UK has struggled to regain lost ground in reducing inequality and improving access to growth.

It is evidenced that Thatcherist policies significantly increased socio-economic inequalities in the UK due to cuts to social welfare, reordering of areas of the public sector such as the NHS, sudden structural reform to labour and encouragement of home-ownership. Areas where deindustrialisation was concentrated were thrust into poverty and many have not recovered.

The pertinent aspect of 1980s UK policy was its legacy – despite decreases in all-cause mortality rates, life expectancies improved more slowly than comparable counterparts. Scott-Samuel et al. highlight that 'alcohol-related mortality increased dramatically during the late 1980s and early 1990s in the UK in contrast to the improving trends in other parts of Europe.' Further, in the UK drug-related mortality, suicide and violence – socially-produced causes of death – increased. Scott-Samuel et al. noted that even in areas where complete structural reform was not completed during the

Thatcher era (such as the NHS), 'she did enough to allow her legacy to be built on and taken further by her successors from both main political parties.'

3.1 Housing and Homelessness

Increasing trends in home ownership and reduction of social housing increases homelessness. Home ownership trends foster a society dependent on accumulating wealth, creating a material wealth gradient. People can become both isolated from employment and housing. Persistently low wages prevent wealth storage (e.g., savings, property investment, human capital accumulation (education)), meaning those with high disposable incomes also have an advantage in accumulating wealth, contributing to multi-generational earnings gaps, perpetuating economic costs of inequality.

The reduced supply of social housing since Thatcher's 'right-to-buy' scheme has concentrated poverty and deprivation around remaining council-owned estates. The most disadvantaged must be prioritised due to reduced supply and the residualisation of poverty due to low employment opportunities and economic disconnection has resulted in residents of social housing suffering double the poverty rates of those experienced by the population in its entirety, as of 2010 estimates. This is significant – originally social housing was the norm for employed households.

Surveys showed that in 1948, experiencing social housing in childhood showed no indication of increased adult unemployment and deprivation. By 1970 there was evidence that it created a differential in socio-economic conditions in later life compared to the wider population for both men and women. The shift to home ownership has concentrated the deprived into grouped social housing but significantly, has posed more of a strain on low to middle earners as they must now reduce disposable income to incur home ownership costs/high private rentals, perpetuating in-work poverty and lower standard of living despite regular wages.

3.2 Disparities in Life Expectancy

UK life expectancy improvements have stalled in recent years, whilst healthy life expectancy – the average number of years a person is expected to live in 'good' health – has displayed widening regional discrepancies. Life expectancies closely mimic uneven socio-economic conditions, dependent on living standards and income, along with lifestyle factors. In the UK, discrepancies are pronounced due to areas that witnessed decline in industry.

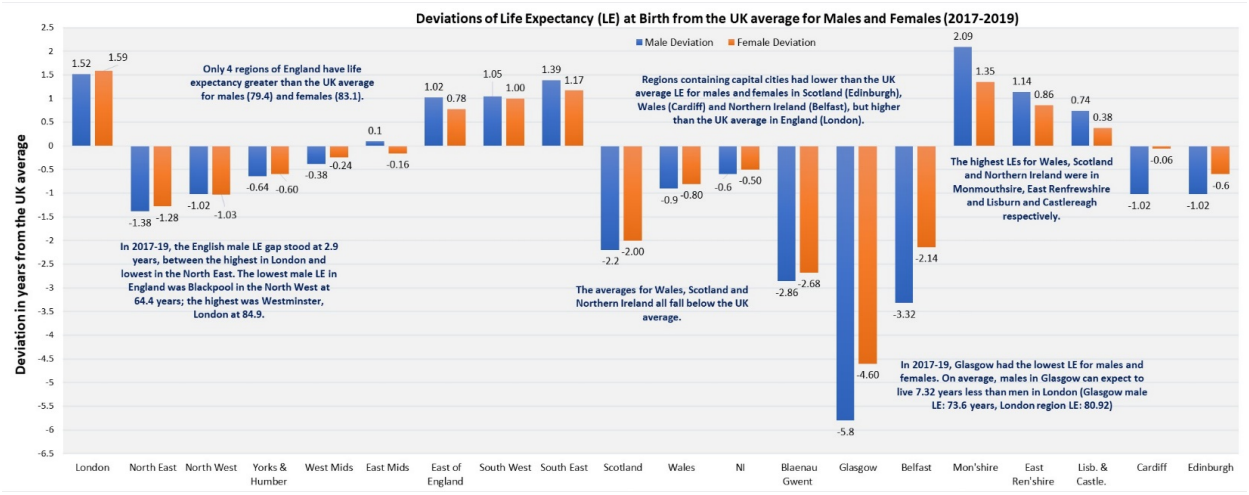

Figure 13: Deviations from the UK average life expectancy (LE) for selected UK regions and districts.
(Source: Life expectancy for local areas of the UK: between 2001 to 2003 and 2017 to 2019, Office for National Statistics, licensed under the Open Government Licence v.3.0.)

The UK also exhibits phenomena such as the 'Scottish Effect' and more acutely the 'Glasgow Effect', attributed to lower deprivation-adjusted life expectancies in Scotland (particularly Glasgow) than the UK and Europe. Disposable income, health outcomes, education, lifestyle and employment all contribute to standard of living, hence health, impacting on life expectancy.

Gross disposable household income (GDHI) measures the average household money available for spending and investment, 'seen to reflect the "material welfare" of the household sector' (Office for National Statistics). Disposable income levels indicate capacity to spend on housing, diet, education and goods – lower income reduces diet quality, and increases prevalence of poor housing and fuel poverty, all of which reduce standards of health. Reduced material wealth can impact mobility (e.g., securing transport), which can influence employment, whilst lower educational outcomes due to wealth can decrease employment prospects.

GDHI between 1997-2017 surpassed the UK average in only three regions: London, the South-East and the East of England. London grew fastest, whilst in Yorkshire and the Humber GDHI fell. Wales, Scotland and Northern Ireland trailed behind the UK average, with Wales and Northern Ireland aligned to the North East, England's lowest disposable income. Unemployment can worsen health and wellbeing due to increasing levels of depression, anxiety and

disillusionment, reducing life satisfaction. It can reduce future employment prospects, hence future earnings, further impacting on standards of living.

Unemployment-induced unhealthy behaviours vary, yet long-term unemployment can be associated with increased alcohol consumption. The worst life expectancies in the UK correspond with a high prevalence of lifestyle-related causes of ill-health. In Glasgow during 2003-2007 'approximately half of "excess" deaths under 65 years of age were directly related to alcohol and drugs.' (David Walsh et al.).

Despite negligible differences between premature deaths in the North and South in the mid-1990s, stark disparities were evident by 2016, with major causes being alcohol, drugs and suicide. Analysts attribute the deaths gap to persistent deprivation in the North as a result of long-lasting poor employment prospects due to the decline in industry in the 1980s. Lower funding for GP practices in the North reduces primary care outcomes, needed as the first port of call to maintain health. Failings at primary care level can exacerbate health conditions and overwhelm hospitals. Successful preventative care is a major factor in closing health inequalities.

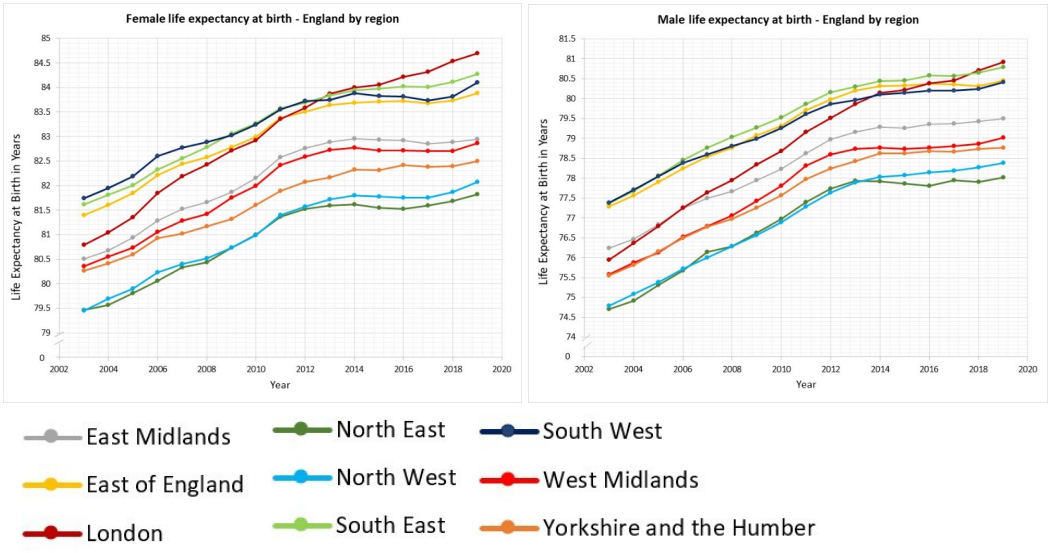

Figure 14: Life expectancy by region for England 2002-2019. Note: Life expectancies represent the average for the preceding two years.
(Source: Office for National Statistics, licensed under the Open Government Licence v.3.0.)

Despite upward trends in life expectancy in all English regions, life expectancy rate of increase has slowed in recent years. Further, regions that fall behind have not caught up with the highest life expectancies during the 21st century. In recent years, London's life expectancy surpasses all other English regions. The North East and North West continue to lag behind the next lowest, Yorkshire and the Humber, for males and females.

Healthy life expectancy is the number of years lived in 'good' health. Healthy life expectancies show little variation between genders, yet in some areas female healthy life expectancy is lower than for males, indicating females, on average, spend more years of their lives in poor health. 'Those living in the most deprived areas could expect to live the smallest proportion of their lives in "Good" health', according to the Office for National Statistics.

Poor health reduces employment productivity and can impact on ability to maintain work, further reducing income, hence living standards. The healthy male life expectancy gap in the UK stood at 18.6 years in 2016-18 – Richmond-Upon-Thames topped the table at 71.9 years, whilst in the lowest, Blackpool – one of England's most deprived areas – it was 53.3 years. Blackpool male life expectancy fell 8 years behind Richmond-Upon-Thames. The healthy life expectancy gap for females stood at 19.1 years between the Orkney Islands (73.3) and Nottingham (54.2).

Education influences lifestyle habits and enables higher paid work, which is less likely to correspond with unsafe working environments and job insecurity. Educational attainment gaps between richer and poorer areas of England are stagnating at early years and secondary school leavers, whilst growing at primary school level. Average teacher salaries in shortage subjects (such as maths and sciences) are £1,500 lower in disadvantaged than affluent schools, attributed to a 'much larger share of less experienced teachers' (Education Policy Institute).

However, when educational attainment is deprivation-adjusted, the gap largely closes in London, but persists for other areas, indicating that disparities are not limited to deprivation levels. As educational attainment is a key determinant of future salary, persistent attainment gaps preserve income discrepancies. Given education builds human capital, areas with low educational attainment have less human capital to call upon for regional growth, stagnating wealth, hence standards of living. Further, investment inequalities are evidenced to reduce education and training opportunities.

Why are disparities in life expectancy an economic problem? Poor life expectancies point to underlying persistent health inequalities, which can be caused by (and contribute to) economic inequalities. Health and socio-economic status are self-

reaffirming – those with a more favourable socio-economic position in society have better health. Persistent deprivation and decline feeds into permanent health inequalities, which pose significant direct and indirect costs to the economy as a whole, hence will also impact the healthy and the wealthy.

In 2010, it was estimated that 'inequality in illness accounts for productivity losses of £31-33 billion per year' (the Marmot Review) in England, with an extra £20-32 billion incurred due to lost taxes and higher welfare benefits for a population that recurrently misses or cannot secure work due to ill-health. Given that efficient operations of an economy are contingent on the inter-relations between various people and groups, the health status and socio-economic opportunity of groups within society impacts on the functioning of the overall economy and creates economic costs that impair national productivity performance, especially given healthier people are more productive at work, miss fewer days due to ill-health and fewer direct healthcare costs.

4 Political Economics of a Divided Nation

4.1 Trickle-Down Regeneration

Many government initiatives have fostered a 'personal capitalism' or 'entrepreneurship' attitude towards poverty alleviation and tackling deindustrialisation decline, however lack of impetus to connect stranded areas to the wider economy has limited people's ability to undertake 'entrepreneurial' activities. Neil Lee and Paul Sissons note that in the UK, productivity increases have benefited high wage earners instead of low earners.

Evidence shows no correlation between growth and poverty reduction, even in areas of poverty in the 'South' such as London. (Poverty has increased in London as the local economy has grown.) Once a wage is over the threshold of the national median, the worker benefits from economic growth. For those who drop below the threshold, as the economy continues to grow, it becomes more difficult to climb up and over the threshold. As a result, wage inequality is associated with growth – as higher percentile wages grow due to benefiting from growth, the lower wages fall further behind.

As potential for economic growth gravitates towards new technologies and sources of productivity gains, those who are ostracised from taking part in these opportunities, due to education, training, financial position or regional distribution of growth op-

portunities, benefit less from the rising tide of national economic growth.

Although there are suggestions that 'spillovers' from clusters of high-income individuals can benefit local communities, the extent to which spillovers can reduce poverty is debatable. The Marmot Review emphasised that in the 30 years up to 2010, tax had 'seldom had a redistributive effect'. In the decade after 1978, the pattern of gross income distribution flipped, and never reverted again, leading to a minority share of income for the bottom 60% of the population and a concentration of income held by the top 20%.

Areas of deprivation and industrial decline struggle to benefit from 'trickle-down' policies, as decline can be self-enforcing. A deteriorating local economy reduces employment prospects and skills-training, creating further unemployment and the area sinks deeper. Areas with struggling local economies do not have the start-up capital necessary to access the wider market economy in order to lift the region.

Strategies to enable depressed regions to 'help themselves' through entrepreneurialism have struggled to gain ground. Economic stagnation fuels poverty and poverty fuels stagnation, limiting pathways for depressed areas to grow their way out of decline. As property prices in the 'South' have boomed, limits to southward migration for employment have emerged – a combination of lower wages in the 'North' and high property prices in the 'South' severely limits ability to move from 'North' to 'South'.

4.2 Political Attitudes Towards Bridging the Gap

As inequalities have widened, the government has sought to rescue the situation, but successive governments have struggled to land on the necessary policies to do so. In the 1960s, poverty was viewed as 'pathological' – originating from personal and social characteristics. It was believed that changing housing and reshuffling communities would solve the problem.

Over time, there was a greater understanding that economic structural factors are major driving forces of poverty. However, government programmes attempted to create 'entrepreneurial' mindsets within deprived and declining areas in the 1980s, in the belief that people could gain access to the wealth 'trickling down' from growth.

In the 1990s, dysfunctional labour and housing markets, along with supply-side mismatches, such as skills training, were identified as perpetuators and instigators of poverty; in the late 1990s-2000s, poverty alleviation became seen as a multi-agency strategy. However, in 2010, post-Financial Crisis economic policy saw a return to the idea that the free-market will determine which areas

have long-term economic stability, neglecting direct government intervention to restabilise local economies.

As policies develop, generations pass and areas become more entrenched, and increasingly trapped, in deprivation. Wales, Scotland and Northern Ireland have begun to incorporate more localist approaches to poverty alleviation, with strategic regeneration frameworks in place. However, England is stuck in a vertical, top-down approach.

5 Welcome to the Knowledge Economy

We now turn to the sources of growth in the modern UK economy. Having identified the impacts of deindustrialisation and disconnection, we discuss the new 'intangible' era of 'knowledge', considering whether it can bridge the gaps formed during previous eras of growth.

During the 20th century, the world transitioned into the Information Age. Rapid increases in information and communication technologies (ICT) began to shape human civilisation, a marked shift from the traditional industries defining the 'Industrial Age'. With the expansion of ICT and later, the rise of the Internet, the world became more connected, scientific research became commercialised and intellectual property became commoditised.

Thrust into the era of Arthur C. Clarke and visions of an interconnected future, centred around computers, by the mid to late 20th century, science fiction was becoming reality. In recent generations, the UK (and most developed economies) has evolved into a 'knowledge economy'. In the knowledge economy, economic growth is driven by intellectual capital and knowledge is viewed as an infinite and easily transferable resource.

Despite the deindustrialisation that has plighted much of the UK workforce, the national GDP still throws strong punches at international competitors. Throughout this paper, we have discussed technological innovation leading to increased manufacturing output as a major driver of the UK's transition into a growing economy. How can we grow without traditional industries? A complex puzzle to unravel. The sources of economic growth remain unchanged in this brave new world – technological advances and human capital still improve productivity.

Innovation is not merely technical improvements but encompasses intangible capital, intellectual property and research. Knowledge-intensive sectors are driven by expanding the known world and designing a new future. Drivers of growth exceed the traditional definition of total factor productivity (labour and capital), en-

compassing intangible inputs, organisational structure and significantly, computer software.

The Office for National Statistics notes that the dominance of manufacturing was reversed in the final decades of the 20th century, to be replaced by 'professional, scientific and technical services including education and health' and services including hotels and catering. Together, these two categories rose from a combined share of the employment market of 24.7% between 1960-1979 to 48.43% between 2000-2016. By the 2000-2016 period, primary sector employment (agriculture) was all but eliminated, contributing only 1.42% of employment.

Retail and wholesale distribution, and transport, storage information and communications – all necessary for ordinary operations of UK daily life and consumer culture – together contributed 24.23% of employment. In terms of GDP, in 2019, services contributed 79% of output, with production falling behind at a mere 13% – a stark contrast to the trends of previous decades. Manufacturing that remains has undergone significant evolution – nowadays, the majority is dedicated to food production. High-end technology, particularly aerospace, contributes £35 billion to the UK economy and is the world's second-largest aerospace sector behind the US.

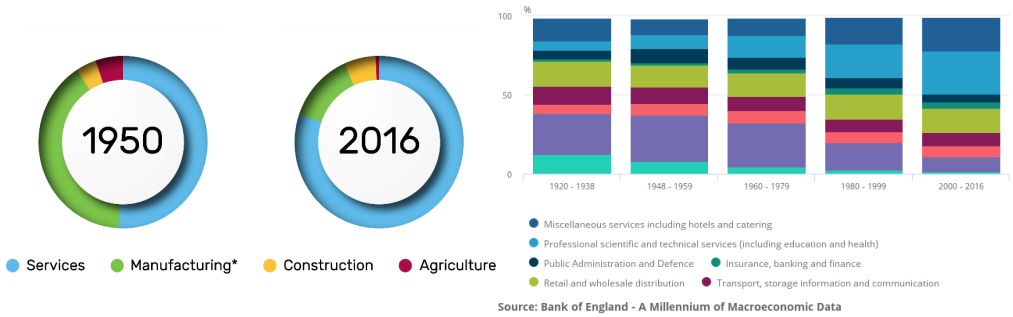

Figure 15: The changing face of UK employment. Left: The UK economy by sector (in terms of output). Right: UK sectoral shares of employment disaggregated by subsector, 1920-2016. Purple shows manufacturing, and blue represents services.
(Source: Bank of England, featured in 'How has GDP growth changed over time and Bank of England via Office for National Statistics, licensed under the Open Government Licence v.3.0, featured in 'Long-term trends in UK employment: 1861-2018'.)

'Creative industries' – defined by the Scottish government as industries 'based on individual creativity, skill and talent, or which have the potential to create wealth and jobs through the development or production of intellectual property' – contribute a remarkable tranche of the UK economy.

Prior to the 2020/21 pandemic, these industries were growing at more than 4-times the rate of the economy as a whole – the Creative Industries Federation highlight that the contribution of these industries in terms of GVA (gross value-added) was 'greater than the automotive, aerospace, life sciences and oil and gas industries combined' in 2018 and accounted for 12% of UK services exports.

These industries have been brought to national attention during the COVID-19 lockdowns due to the prevalence of self-employed individuals, small businesses (95% of creative industries businesses employ fewer than 10 people) and often the reliance on face-to-face customers as a sole revenue source. Tourism, like the creative industries, is reliant on footfall for revenue. It provides a large financial gain to the UK economy, with the Office for National Statistics stating that residents of other countries contributed £28.4 billion through travel and tourism in 2019.

5.1 An Intangible Era

The economic landscape of the modern developed economy is much more abstract and less tactile than the heavy industry of yesteryear. Investment in intangibles now surpasses investment in tangible assets in the UK. With the internet boom of the 1990s, although tangible investment increased due to computer hardware, 'intangible capital deepening' (increasing the proportion of intangibles per labour hour worked) was rapid. Even though the 2000s saw a decreasing rate of intangible investment, investment in intangibles firmly surpassed tangibles. In 2008, the largest fraction of intangibles was training and organisational capital (structures in a business which enable employees to be more productive). Significantly, training and upskilling alters the productivity of a working hour, altering the contribution of labour hours to total factor productivity.

Intangibles are commonly 'non-rival' assets – as usage is distributed amongst individuals, any individual's usage is not impaired, unlike tangible assets which cannot be used by more than one group of workers at the same time. Corrado, Huckel and Sichen define measurement of intangible assets into three categories: computerised information (computer software and computerised databases), innovative property (research and development, design and original intellectual work) and economic competencies (advertising, brand-equity, employee training and organisational capital). A large portion of intangible investment is own-account (completed in-house for in-house use).

Intangible assets are difficult to

define, quantify and incorporate into growth accounting. In-house intangibles can be firm-specific so are difficult to classify on a national scale. To quantify the contribution of intangible assets to national UK growth, analysts must determine – by interviews or employment surveys – job titles that undertake work in intangibles (such as product development) and those that produce intangibles as output. The proportion of their working hours dedicated to this activity is then estimated and its value measured through the average wages for that job role. The job title technique can also be used to measure the spatial distribution of intangible contribution to the economy, which can be proxied by the national distribution of job roles that most commonly contribute to intangible development and investment.

Unlike physical (tangible) capital – a machine or a factory – it is difficult to assess the life-span of intangible capital. How does one determine the amount of time that an employee becomes more productive as a result of 'firm-specific human capital' (in-house employee training)? However, in order to capitalise intangible assets, one must be able to measure their life-span and apply depreciation. Capitalisation – an accounting technique which expenses the cost of an asset over the course of its useful life – of knowledge and intellectual property is a key feature of the modern sources of growth. The measurement and collection of national statistics is regularly evolving to account for intangible sources of productivity, in an attempt to quantify the missing aspects of national growth, not represented in tangible capital. However, there are still difficulties in accurately – and comparatively – assessing the contribution of intangible assets to national GDP. In 2008, the UK government decided to treat Research and Development (R&D) expenditure as investment, first amalgamated into National Accounts in the 2014 Blue Book. The 2019 Blue Book saw the inclusion of in-house business software and updates to investment in copyrighted assets.

5.2 Tangible Inequalities

Has the 'Knowledge Economy' alleviated the problems with disconnection and access to growth? Tertiarisation is occurring in all regions of the UK, as the nation transitions towards a services economy, however the tertiary shift is not facilitating a transition to more creative, skilled or higher-paid work for many. Access to the knowledge economy's surging success is confined to its frontiers.

Limited access to the frontiers confines the wider population's creative talents and does not allow the knowledge-sectors to fully benefit from the proviso of the 'knowledge economy'. Frontiers employ a small number of people relative to the workforce and often require higher education or training, formalising the 'open-to-all' creativity of the 'knowl-

edge' ideology.

Life sciences (including pharmaceuticals), advanced manufacturing, creative and digital industries, enabled by financial and professional services are seen as major drivers of the UK's knowledge economy growth. A five-year 'Creative Cluster' programme has been developed to foster creative industries in hubs throughout the UK, aiming to build networks between organisations, businesses and universities.

The locations of the nine 'clusters', however, neglect to include the North West, North East, North Wales, the former industrial West Midlands, the Valleys and rural areas. Manchester represents a Northern outpost of knowledge-intensive sectors and creative industries, however, there is little evidence of a spillover of benefit into surrounding areas.

As we have seen, there are prevalent disconnection barriers preventing the benefits of growth dispersing throughout the regions and population. The UK has prominent difficulties in matching jobs to unemployed workers. It seems unlikely that disconnected areas would have the qualifications to participate at the frontiers, or access to the networks necessary to participate in creative hubs. Further, creative industries do not necessarily provide the type of work needed to reduce the socio-economic divide.

Although creative industries constitute over 3 million of the UK workforce, the Creative Industries Council reported in 2019 that 'there is little insight into the quality' of the growing number of jobs in the sector and that greater visibility of career progression and evidence on local skills and talent are still required. The House of Commons Library highlights that 53% of the UK total R&D was performed in the three regions of the South East, London and the East of England in 2018. Research and Development related roles employed 263,000 of the population in 2019. The majority were scientists or engineers (50%) or technicians (29%).

With the rise of knowledge-intensive sectors, how does inclusion of intangibles affect interregional output inequalities? Research has demonstrated that including intangible output in gross-value added (GVA) for Great Britain exhibits more pronounced regional disparities than GVA without intangibles. Regional distribution in intangible investments remains relatively unchanged in Great Britain – the majority of investment occurred in London and the South East in 1991, a trend which had not reversed through the early 2000s.

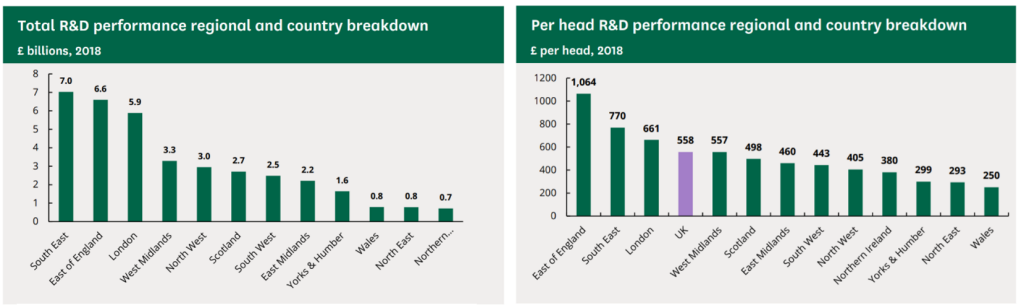

Figure 16: Research and development expenditure by region in England. (Source: Office for National Statistic, Gross domestic expenditure on research and development, Regional tables, via House of Commons Library, licensed under Open Parliament Licence v3.0.)

During the early 2000s, the share of intangible investment contributed by the East of England increased. The unequal GVA distribution between the tri-region (London, South East and East of England) and other regions of Great Britain grew in the 1990s and early 2000s. The extent of the 'asymmetric territorial effect' (Konstantinos Melachroinos and Nigel Spence) suggests that if the regional economic make-up of the nation does not adapt, it is increasingly unlikely that regional convergence will occur.

As intangibles grow faster than the economy as a whole, where there are concentrations of intangible production and investment (London, the South East and East of England), these regional economies grow apart from other regions at an increasing rate. Although intangibles are growing throughout the UK, the existence of pockets of concentration indicates that increasing government impetus to fund existing R&D facilities and knowledge-intensive sectors will further concentrate wealth and development in regions with an existing density of intangibles in the economy, worsening spatial inequalities.

6 Wellbeing

Restructuring of the UK economy over recent decades has had significant negative effects on societal wellbeing. Surveys showed that the era of deindustrialisation, beginning as early as the late 1960s, constituted a shift in the national sense of self and purpose – optimism and collective social purpose forged after the war had transitioned to resignation, disillusionment and cynicism about future prospects. When asked if the

next year will be better, worse or the same, those surveyed began to report that they believed the next year would be worse than their current year – a reversal of previous trends. Wellbeing from job satisfaction has been in decline since the 1970s.

With any level of lingering unemployment above the natural rate, the wellbeing of workers will be suffering, given that it has been evidenced that employed workers experience greater subjective wellbeing than their unemployed counterparts. Further, workers who earn a wage, rather than a salary experience lower levels of wellbeing, highlighting that the prevalence of uncertain working environments (temporary, casual and zero-hours work) in the UK will worsen wellbeing. Economic crises negatively impact worker wellbeing, with Jason Heyes, Mark Tomlinson and Adam Whitworth highlighting that 'employees who directly experienced changes to their pay, conditions and working practices as a result of the [2008 Financial] crisis experienced a decrease in wellbeing.'

Research into associations between consumerist culture and wellbeing has suggested a negative impact on wellbeing from over-consumption and status through material wealth. This is pertinent to the UK economy given the high proportion of service-sector jobs fulfilling consumer culture (such as retail, hospitality and marketing). Further, higher levels of personal debt are evidenced to influence wellbeing and mental health, with those in high debt reporting higher levels of stress and depression. There was a marked shift to individualism and material status in UK society following the 1980-81 recession, coinciding with a substantial increase in consumer credit and the trend has continued in UK households, with persistently high average levels of personal debt.

6.1 Underemployment

In the 1920s, the International Labour Organisation identified that unemployment and employment in aggregate are not sufficient to ascertain the condition of the employment market and highlighted 'hours underemployment' – when workers are involuntarily working fewer hours than they would like to. Subsequently, the definition of underemployment has been widened to encompass work below the skill level or qualifications of an individual ('overqualified') and pay below that which qualifications and experience should demand ('underpaid').

Underemployment incurs an opportunity cost of lost productivity and underutilisation of skills (human capital) in the labour market and is a measure of the quality of work. The levels of underemployment have been rising in recent decades and the race to raise employment in a market suffering from extreme polarisation does not consider the economic impacts of vast underemployment.

Despite employment levels returning to their pre-recession value in spring 2015 following the Financial Crisis, shifts in the labour market that had begun before the Financial Crisis were becoming more extreme. Underemployment (involuntary part-time work) became more prevalent following the Financial Crisis. Although employment levels began to rise after 2013, there was also a rise in underemployment.

The number of people working fewer hours than they would like rose and the proportion of underemployment in graduates – which had been increasing since 2001 – increased at a faster rate after 2008 (university graduates working in non-graduate jobs). Further, the proportion of recent university graduates employed in low-skilled jobs increased. This represents a significant shift in UK employment, as the investment-reward trade-off of university qualifications is reduced.

The recession had a downward-shifting effect on workers – skilled workers filled low-skill vacancies, whilst there was a higher proportion of unskilled young workers unable to move out of unemployment. Both underemployment and unemployment negatively impact on well-being, with underemployment reducing job satisfaction.

Underemployment is subjective and the level to which it is experienced varies based on a number of demographic and personal factors, however, surveys indicate that it is felt more commonly by graduates than non-graduates. This has pertinent effects for the UK economy, which has encouraged mass university education in recent years – despite a decline in university applications in 2012 when fees increased, the bounce-back in 2013 set a new record for applications, which was successively broken in each of the subsequent three years.

Given the evidence that underemployment is rising, sectoral structural change is slow and economic adaptability to new opportunities has been weak in recent history, this may suggest that the UK is persistently over-skilling groups of young people whilst under-skilling work, and suffering the efficiency losses, opportunity costs and missed growth potential of the surplus skill. Arbitrary skilling does not create jobs in these skill sets hence the working population must conform to either low-paid or high-paid work, with nothing in between. Further, hours overemployment – when workers must work longer hours than they would like to – has also been noted as a cause of decreased wellbeing in UK workers. It is evidenced to be a contributory factor for emotional and physical exhaustion.

6.2 Work-Related Stress

In the 1990s, knowledge sector workers reported reduced autonomy in work, contributing to underemployment through lack of opportunities to

employ the extent of their skills. The period also saw an increase in work intensification – when more tasks are demanded of an employee in a fixed amount of time, increasing the effort that an employee must exert to maintain the workload that an employer expects of them.

This trend has accelerated to the present day. The UK Health and Safety Executive (HSE) reports that work-related stress is on the rise in the UK (2020 report). The 2019-20 Labour Force Survey evidenced that 17.9 million work days were lost in Great Britain due to work-related stress, depression or anxiety. The highest prevalence of cases occurred in higher level professional positions and managerial roles, along with public sector employees such as police officers, teachers, medical professionals and health professionals.

Work-related stress, however, can impact employees in any sector or at any level of work. Work is cited as the primary cause of stress in the UK, with workload, pressure, lack of autonomy at work, workplace relationships (hostile working environment due to colleagues or managers), job security and work-life balance as major contributors. Workload pressures have been identified as the main cause of mental ill-health due to work.

7 Economic Scarring

As we saw in the analysis of crises in Part II of this survey, the effects on financial markets and monetary economies of crisis recovery can differ from the impacts on the real economy (unemployment, education, public sector funding for services etc). Although an economy can 'rebound' through reactive short-term growth, implementing policies in recessions and crises that are too myopic and do not lay roots for long-term growth potential can have 'scarring' effects on the real economy.

Although the cost of stimulating GDP in the depths of crisis can seem high, John Irons identifies that the long-term positive impact to the job market and educational outcomes of preserving employment, and government spending in crisis, can outweigh the short-term expenditure. Financing the growth boost via deficit spending further distributes the cost of the stimulus over many years, during which the economy should be more buoyant as a result of the stimulus and able to finance the debt interest repayments. As such, the value of interest payments decreases relative to the upward-trending economy. Future buoyancy also increases future tax revenues.

Financial crises alter financial courses and force households, individuals and businesses to undertake

decisions that impact their long-term futures, whilst financially constrained in the present. Thus, mis-managing a crisis can reduce investments in new technologies needed to foster future growth potential. It can restrict access to education (hence limit future potential earnings), implicate health and nutrition, and prevent individuals from undertaking long-term investments, such as housing, business start-ups and career progression objectives.

All of these factors can reduce the future economic output of the economy, and individuals' future prosperity and standard of living. Failing to implement long-term policy objectives in times of crisis will reduce future economic potential. As with health and social investment in childhood that can only reap dividends in later life, instant rebound policies in crises can push the cost of the crisis further down the line, felt in the missed opportunities for economic growth opportunities.

7.1 Shutting the Gate Once the Horse has Bolted

Once the economy has re-established growth after having rebounded from a crisis, it is already too late to implement catch-up programmes to recover lost ground suffered due to the recessionary environment. Early childhood educational deficiencies cannot be recovered at high school or university level. Decisions made on early childhood development whilst parents are financially strained can impact the future development of their children.

Nutrition and 'food insecurity', along with poverty and homelessness, impacts a child's physical, cognitive and mental development. Impacting children's early development will create long-term health and social implications. For those at school-leaving age during a recession, opting to delay or forgo university or skilled training due to short-term financial limitations prevents young people fulfilling their educational potential and reduces their future earnings.

Higher education is evidenced to reduce future unemployment and improve health and social outcomes. We can see clearly that impacting a young person directly impacts their future children's opportunities. In addition, human capital – accumulating education and skills – is a direct driver of economic growth. Educating people leads to a higher skilled and more productive workforce and sparks opportunity for new ideas and research, evolving technologies, methods and knowledge to improve future growth.

Restricted funding and access to healthcare services can reduce future wellbeing and health outcomes, impairing future earnings and workplace productivity, directly pushing healthcare costs and the costs of lost productivity into the future economy. With health insurance systems, this

is reflected in inability to pay insurance premiums, in public healthcare, such as the NHS, this manifests as fiscal squeezing, creating health backlogs and reduced standard of care.

Employment and earnings strategies, along with business plans, that function adequately in a non-recessionary environment can become unsustainable in economic crises. Existing start-ups become starved of market share as larger companies dominate the decreased demand market, whilst new businesses struggle to get off the ground. This is significant as the opportunity to seize a market gap for new businesses is often fleeting. Workers are demoted on the skills and hours ladder. Prevalence of graduates in low-skilled jobs increases, whilst unskilled candidates often become unemployed. Full-time workers who become unemployed often become re-employed in part-time work. Losing employment or involuntary low-paid or part-time employment implicates earnings accumulation for wealth storage and capital accumulation (both physical and human) and also reduces future earnings potential. Taking a lower-paid job to recover from unemployment can negatively impact future career progression.

There are, of course, mental and physical health implications to long-term unemployment and low-pay that are incurred in the long-term through temporary economic crisis. Further, unemployment and temporary employment reduce ability to secure loans, forcing people to burn through liquidity and savings, reducing future investment opportunities in capital, training and education. Job loss and difficulty finding re-employment can occur in all age groups and thus, can directly impact all family members. People who become unemployed at an older age are less likely to become re-employed as easily as younger candidates.

As we saw in previous parts of this paper, the driver of economic growth with the most impact is productivity growth. The key to a dynamic, buoyant and resilient economy is research and development to maintain adaptability to rapid economic changes and technological gains. There is a spiral of reduced business development in a recessionary environment – reduced consumer demand stifles revenue, low liquidity calls for debt financing but costs of credit rise in economic downturns. As a result of reduced investment capacity, businesses withdraw towards their staple services and products, reducing expansion into innovative new business directions. Reduced investment in physical capital reduces future productivity but also restricts employees' upskilling opportunities to train on new technologies. Lower future production reduces future revenue hence dampens future wages.

7.2 Salt to the Wounds

As we have seen through Part II, there is evidence of significant post-

crisis scarring as a result of the major recessionary periods of the 20th and early 21st centuries. Reforms to labour relations and corporations were not undertaken following the Second World War, leading to weak future productivity performance. Recurrent recession throughout the 1970s led to the 1980-81 recession, culling the remains of British industry and creating a generation of long-term unemployed, whilst widening the inequality gap.

The 2008 Financial Crisis permanently depressed employment levels, productivity and increased underemployment. Given the evidence that economic outcomes and opportunities transcend one generation, one can infer that recurrent crises and reactive rebound growth stimuli (without implementing structural alterations necessary for long-term productivity), have had a compounding effect on the economic and social opportunities available to every post-war generation in the UK.

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Part IV

Perspectives on the Future of Growth

1 Introduction

Over the previous three parts, we have learnt that economic growth has drastically increased standard of living in the UK, industrialisation has spread globally and with it, technology has undergone massive transformation as nations innovate for future growth. Going first has not been easy, however. The UK has struggled with persistent poverty and inequalities, and recurrent crises have taken a toll.

The future will bring many more challenges. In this final Part IV, we will enquire into key developments affecting economic growth in the near future, consider potential restructuring effects that current and future economic events could cause and survey suggestions from literature for long-term sustainability of growth trends. Firstly, we discuss climate change and the recovery from the Covid-19 pandemic. The former will force us to rethink our economy, whilst the latter should provide apt lessons for future crises. Our third topic, in-keeping with our focus during this paper on comparisons of employment structure as a key determinant of growth prospects and inequalities, we will look at automation. In this part, we turn to a more global picture – recent crises have shown that a national economy does not exist in isolation.

We view how adopting growth in developing economies can improve standards of living and economic versatility, and consider how catch-up growth can be aligned to the joint aims of climate readiness and accessibility to reduce inequality. We will then consider the form economic growth may take in the future, and how growth can enable a more equitable and resilient global economy, given that sustained economic growth can provide us with the wealth to make economies more sustainable, environmentally friendly, digital and accessible.

2 Climate Change

To curb global warming to 1.5 degrees Celsius above pre-Industrial levels, the temperature stipulated by the Paris Agreement to prevent permanent ecological damage in critical areas, the Intergovernmental Panel on Climate Change (IPCC) states that global carbon neutrality must be achieved by 2050, whilst global human-caused carbon emissions must be almost halved by 2030. However, much irreversible damge is already in progress. Carbon dioxide emissions are retained in the atmosphere for 300-1000 years.

As industrialisation has spread and global GDP has risen, carbon dioxide in the atmosphere has been growing at a faster rate. Beyond two degrees Celsius of warming, many ecological boundaries are crossed, with projections indicating major breakdown of the planet's critical systems. Weather systems will exhibit greater variability and unpredictability. Climatic events will become more extreme and begin to affect new areas. The routine structures of societies and economies will radically alter and markets will become difficult to coordinate. To mitigate these effects, we will need to change our approach to economic growth.

Two socio-economic factors significantly impact an economy's vulnerability to climate change: sensitivity to climate events and adaptive capacity. Alex Bowen, Sarah Cochrane and Samuel Fankhauser highlight: 'Economic growth almost always increases the adaptive capacity of people. A society's ability to cope with climate events is highly correlated with basic development indicators such as income, education and institutional quality.' Growth is adaptable to scarcity and access to economic growth improves economic flexibility to absorb climate events, through providing wealth to invest in infrastructure to protect against climate effects, to reconstruct in the event of sudden climatic catastrophe and improve adaptive capacity.

2.1 What Are the Likely Effects on Economic Growth?

Without appropriate mitigation strategies, climate change could be significantly damaging to economic growth and economic function. Studies have identified that extreme climatic events pose a significant threat to GDP per capita, and growth rates can be permanently impacted. As climate change intensifies climatic cycles and imposes unpredictability and variability, long-term strategy for sustained economic growth may become difficult.

As a result, innovations and human capital accumulation decrease, negatively impacting on future pro-

ductivity, hence growth. This will make the future economy more vulnerable to expensive shocks to infrastructure and drastic market reform, as it will be difficult to maintain sufficient national wealth to finance future economic crises. The 2007-08 Financial Crisis and subsequent recession demonstrated that globalised markets are vulnerable to macroeconomic volatility.

Although international trade reduces reliance on domestic networks, globalisation can create channels through which economic distress can spread. Extreme, prolonged climatic events can infiltrate financial markets and paralyse financial systems. International market distress could freeze credit markets at a time when large fiscal stimulus is required for economic and physical reconstruction. Trends in capital flight – which could intensify in the event of an international shock – could endanger domestic economic shock absorption capability. Compounding fiscal pressure (due to trade deficits or fiscal consolidation policies) with drops in national income induced by climate events could reduce stimulus adaptability to regenerate.

Climatic events will likely cause economic restructuring effects and scarring, altering unemployment rates, investment levels and trade connections, permanently affecting productivity. Rebound growth from economic crisis may not be able to regain macroeconomic stability. If shocks are recurrent or the productivity slowdown is too great, a nation may not accumulate sufficient wealth to implement long-term strategies for growth that require upfront investment.

Bowen et al. comment that 'if the frequency of extreme events passes some threshold, economies can fall into a downward spiral' where there are not sufficient resources to prevent further decline. Without long-term labour market reform and productivity mechanisms, climate change could create sudden reform, creating scarring effects, stifling future growth and widening inequalities.

Climate change may make current business models unfeasible, causing destruction of assets or shifting investment schedules. Wrongful specialisation of the labour force (due to time constraints and short-term market requirements) reduces human capital transferability and employment adaptability, increasing unemployment and reducing productivity. Adaptations become reactive, such as forced migration, as policy that may not be most beneficial in the long-term prevails.

Climate resilience will require strong long-term strategy to recover from past crises with sufficient availability of funds for government spending in order to mitigate permanent scarring effects. Bowen et al. identified that infrastructure resilience is a policy priority, to ensure the economy and the physical structure of society is equipped to confront the worst. This imposes a

large upfront investment, however, if the long-term economy is protected through adequate policy to protect economic function in the event of future crises, this cost can be expensed over many years. The ability to coordinate the economy by employing underutilised resources and labour can mitigate long-term impacts of temporary disaster.

2.2 Measuring the Economic Effects of Climate Change

To inform long-term policy decisions, it is necessary to quantify the impact climate change will have on an economy. A current popular mechanism to quantify the 'cost' of climate change is the social cost of carbon, which is discounted present value of damages from one additional ton of carbon dioxide emitted.

Damage functions map a simulated future environmental impact (such as rising temperature) into an economic outcome. The social cost of carbon is calculated as the difference between a future where the climate effect is predicted to occur as a result of present emissions, and the trend value that would occur if today's action (producing carbon dioxide emissions) is not taken. Economists calculate the social cost of carbon to inform policy surrounding fuel economy standards, standards for equipment such as air conditioning and for regulating greenhouse gas emissions.

The specification of the damage function is crucial as it will influence the effects one predicts as a result of the climate. Further, models that focus on the average predicted course of events will not acknowledge the drastic one-off events that pose the greatest risk to permanent growth scarring and productivity slowdowns. There is variability in results depending on the choice of discount rate, time horizon over which to measure damages, the model specification used to predict the economic outcome and whether to encompass local or global damages.

Quantifying the economic effects of climate change is difficult due to the dynamic human responses to climate change. As climatic events begin to influence people's way of life, individuals and communities will likely begin to adapt. These factors are significant as policy and infrastructure decisions must be future-looking.

Preparing the economy for climate change relies on estimation of how the economy will look when significant climate change effects emerge. How people react to a changing climate alters the climate impact of their behaviour, such as increasing use of air conditioning in response to rising temperatures, which in turn can contribute to higher emissions. Adaptive possibilities have huge variability. Developing and developed economies have different options available to adapt, having different effects on the climate.

There is a cost of adaptation – as-

suming costless adaptation could predict adaptive behaviour that does not materialise in reality due to large upfront costs to adapt. In the long-run there is generally more flexibility to adapt, however some adaptations may only be available in the short-run and adopting these for the short-term becomes unsustainable in the face of persistent changes in the local environment.

There will be more data for certain sectors and certain regions – regions with less data (on both weather and behaviour) will have more estimation variability in predicted outcomes than areas with more data. The aggregate adaptation response is difficult to accurately predict, therefore it is difficult to determine the policy that will be required to create the best-case future scenario.

Despite many projections on the climatic effects of climate change, Maximilian Auffhammer remarked in 2018 that the 'public resources targeted at understanding how these physical changes translate into economic impacts are disproportionately smaller'. There is a need for an increase in the intensity of research in translating environmental effects into economic effects, to inform policy.

People act as a result of what they expect to happen, and adapt based on their expectations of the future, however, statistical and econometric analysis are based on historical data. Major events that do not appear in historical data are difficult to model. However, drastic events are predicted to have the most serious societal and economic impacts. Currently, efforts involve incorporating short-term impacts of previous climate events and assuming that these responses would remain comparable to future climate events.

If significant structural change occurs as time progresses, however, models could misestimate the future outcome. We understand too little about the future of society to superimpose simulations of the changing climate to accurately determine what the socio-economic effects of climate change will be. Further, we do not know the significant changes in technology that may occur.

Economic models will need to develop to encompass possible predictions of events that have never happened before. Auffhammer suggests that greater economic focus is needed to incorporate the effects of adaptations to climate events, improve measurement of welfare impacts and advance 'sectoral and spatial coverage of the damage functions' (i.e., to build models representative of wider geographical and industry areas to estimate aggregate effects). He describes the quantity of work thus far on the 'effect of climate on nonmarket goods other than mortality' as 'shocking'. He suggests that greater collaboration between economists, climate scientists, business strategists and supply chain experts is necessary to better predict the collective impact of major catastrophic climate events.

3 Covid-19

The Covid-19 pandemic has caused significant disruptions to the global economy. However, large-scale global crises are expected to become more frequent with pressures such as climate change. As the world transitions into economic growth recovery over the coming years, it will be important to show caution towards potential economic shocks in the near future and learn from the pandemic response to best inform future policy in the event of similar events.

3.1 What Will Growth Recovery Look Like?

The recovery of economic growth is predicted to be asymmetric, both within nations and internationally. In the period before the virus is eliminated globally, the long-term economic growth prospects on a global scale will be uneven and biased towards strong economies. Economic growth rates as the UK exits the pandemic are expected to be record-breaking by historical standards.

The easing of restrictions and vaccine rollout are predicted to create an economic resurgence led by consumer expenditure, forging promising short-term economic outlooks. Conversely, pre-Covid GDP per capita levels are expected to persist in some developing economies for extended periods, despite strong growth in some economies. However, due to uneven levels of fiscal support and vaccination rollouts internationally, it is expected that developing economies may suffer greater scarring effects such as unemployment, disruption of human capital accumulation, debt and reduced capacity for investment.

Countries that are unable to complete a vaccine rollout will struggle to initiate rebound growth, which will impact international growth prospects. Reductions in investment, innovation and macroeconomic stability in the least developed economies are expected to reduce growth to the extent that it will be difficult to offset the economic contractions of 2020.

3.2 What Should We Look Out For in the Post-Pandemic Economy?

As government support schemes diminish, there is expected to be persistent trends in youth unemployment and uneven recovery in sectors most affected by the pandemic, such as hospitality and customer-facing services. The British Chambers of Commerce emphasises: 'Beyond the strong short-term outlook, notable economic scarring from the pandemic is projected to weigh on economic activity once government support winds down and drive an uneven recovery

across different sectors and groups of people.'

Once the surge in consumer demand is exhausted, unviable business models may be exposed. Business investment is expected to increase sharply due to growth in consumer demand, however as the 'super-deduction' (a government scheme to enable businesses to experience a tax-cut if they invest) ends, business investment is predicted to 'slow sharply in 2023' (British Chambers of Commerce), which could reduce long-term growth.

Furlough. From July 2021, the UK furlough scheme began to taper, with its end date set for September 2021. As the furlough scheme ends, the UK economy will begin to witness how many jobs are still available, and how many workers become unemployed due to job losses during the pandemic (previously masked by the furlough scheme).

As customer-based services are predicted to experience slow rebound growth, it is expected that unemployment may rise as the furlough scheme ends. In September, temporary increases to Universal Credit will be removed. The Institute for Fiscal Studies (IFS) highlights that the transition from furlough to unemployment could present a large drop in income, given that furlough was based on previous employment earnings, whereas Universal Credit is means-tested on current household earnings.

The support available through Universal Credit will vary depending on the household, creating large discrepancies in individuals' incomes, even if pre-Covid, individuals earnt the same. Individuals who become unemployed but have significant assets or a higher-earning household member will be eligible for little or no Universal Credit. Higher levels of jobseekers' allowance are available for six-months after unemployment, however if unemployment is prolonged, some unemployed workers will experience a decline in earnings.

The IFS notes that the extent to which these government services will be required when furlough ends is as yet unknown, however if middle to high earners, and individuals with household income above the threshold for Universal Credit transition into unemployment, they will experience a drop in earnings. This could significantly impact future employment opportunities, skills training and investments, delaying the scarring effects from the pandemic. Further, reduced earnings could diminish consumer expenditure, causing declines in aggregate demand, reducing, or reversing, the positive growth trends of the early post-pandemic recovery.

Corporate Debt. Since the 2008 Financial Crisis, corporate bond issues have increased internationally. Whilst this can improve access to financing for company growth, monitoring the quality of corporate debt was identified as a concern prior to

the pandemic to prevent debt overhang in the event of a crisis. Riskier bonds were on the rise, with a large uptake of corporate debt in developing economies (accounting for two-thirds of corporate debt growth between 2007-2018) and debt extending to smaller firms in developed economies.

There were fears that an interest rate rise could expose vulnerabilities, increasing the risk of default. During the pandemic, fiscal and monetary response from governments injected large stimulus in the private sector, reducing firm bankruptcy rates across OECD economies and key emerging markets, even though major sectors (mainly customer facing services, energy and transportation) experienced significant contraction and debt build-up.

Damien Puy and Lukasz Rawdanowicz identify 'High corporate debt tends to reduce investment in the aftermath of economic crises, with negative implications for the recovery.' As such, debt overhang could negatively impact post-pandemic future economic growth. The large public stimulus to corporate firms could mask deficiencies in some sectors, artificially maintaining business operations for failing firms.

There is fear that government stimulus could create a wave of 'zombification' as propped up firms create drag against growth potential ('zombies' increased following the 2008 Financial Crisis and were identified as limiters to UK economic growth). Although the rise in 'zombies' has not yet been observed, it could emerge as the economy exits the pandemic, especially if consumer demand has permanently shifted away from certain sectors.

Policy during the pandemic has largely protected firms that issue risky debt, preventing insolvency – there is concern that the rise in risky debt could be exposed to rising interest rates, becoming unsustainable and causing future bankruptcies. Much corporate debt issued during the pandemic is due to expire in 2024 and could create an influx of defaults.

Public stimulus can prevent the permanent scarring effects that can result from allowing bankruptcies and subsequent rises in unemployment and stalling business potential. However, navigating out of a private sector webbed together by the state, could be a challenge. Puy and Rawdanowicz suggest converting corporate debt to grants, contingent on firm performance and assessments of firm viability, and encouraging equity financing in the private sector to extract the public sector from private firms.

The UK government reformed insolvency law, including permanent changes (such as opportunities for corporate debt restructuring for viable companies before insolvency and prohibiting supply reductions to companies in financial distress) and temporary measures to prevent business collapse due to pandemic-related financial pressures. Permanent mea-

sures should help to prevent a wave of bankruptcies when public assistance to private firms reduces. Temporary measures will wind to a close in the latter half of 2021.

Corporate debt restructuring and insolvency law will be a key factor in the post-pandemic economy to manage debt overhang, zombification and risky debt build-up, in order to transition to viable post-pandemic growth. The extent of the situation will be revealed when smaller firms, who together employ a large portion of the population, emerge from the pandemic and have reduced government support.

Large firms often have more scope for financial cushioning, whereas small firms are often sensitive to volatile demand markets and swift changes in financing. It has been suggested that following the pandemic, grants and loans for start-ups ought to prioritise companies with long-term growth potential and align with the future economy (such as those that assist the UK to meet climate goals and the increase in digitisation).

3.3 What Have We Learnt About Managing Pandemic Economies?

Long-term growth is heavily contingent on short-term policy reactions to the onset of the pandemic. The most effective strategy for fast economic recovery and to generate certainty over future growth is virus elimination. 'Stop-go' virus control (attempting economic recovery whilst the virus is still prevalent), 'based on reaction over anticipation' (Philippe Aghion et al.), has proven more economically damaging than creating and maintaining 'Covid green zones' (where cases have been eliminated).

Countries that favoured elimination experienced a faster return to economic growth and improved long-term growth potential. GDP in 'zero Covid' countries returned to 2019 quarter 4 levels at the end of 2020 and eclipsed 2019 levels on average in 2021. Economic and health literature has identified that lockdowns must be early when cases first emerge to have the most effective health and economic impacts.

Early and widespread screening, border restrictions, case detection, masks and social distancing help to mitigate long-term health and economic damage. Although stringent lockdowns create sharp reductions in GDP, without lockdowns, the presence of the virus creates economic slowdowns due to uncertainty and public anxiety, reducing business footfall, impacting negatively on growth. Workplace closures have been identified as effective for reducing infection spread but pose the greatest economic cost.

Short-term economic closure can create long-term scarring. Measures to compensate workers, such as furlough schemes, to prevent mass unemployment can reduce scarring ef-

fects. Government aid packages to prevent business failures and retain employees are accredited as reducing national unemployment and assisting the economy as it traverses through the height of the crisis.

'Stop-go' countries suffer longer recessionary effects; despite rapid growth in the UK, the economy is not expected to return to pre-pandemic levels until the end of 2021 or quarter 1 of 2022 (end of 2021 for the EU). Adopting 'stop-go' strategies prevents firms from planning ahead for the long term, encouraging businesses to hoard cash to cover the next wave of lockdowns and hiring on a temporary basis, instead of investing (physical and human capital) to improve future productivity needed for growth.

Aghion et al. suggest that disparities in growth and recovery between 'stop-go' and elimination strategies may extend into a post-pandemic economy and although vaccination is a vital part of exiting the pandemic, it cannot be the sole focus of elimination strategy and economic recovery. Successively creating 'green-zones' can restore the interconnected economy and free travel that was intrinsic to global economic function pre-pandemic.

Local restrictions can enable Covid-free areas to regain normal economic function and improve local economic recovery. To mitigate dangers of reopening, it has been suggested that social distancing should be maintained during vaccine rollouts to prevent a delayed surge that could cause further restrictions, whilst gatherings and large public events should still be prohibited until significant immunity has been reached, to minimise economic damage.

4 Automation

4.1 How Does Automation Affect Growth and Restructuring?

Automation increases productivity, which is a key driving force of economic growth. With an increase in automation, it has been identified in historical data that average incomes rise, increasing aggregate standard of living. Automation, however, is not a new phenomenon. We have experienced rapid automation before – during the mechanisation of the Industrial Revolution and in the latter half of the 20th century, the ICT age saw the widespread uptake of computers.

There is large variation in the estimates of how many workers' jobs will be replaced by computers, robots or AI. Perspectives on the world of robots range from a computer-led transition to mass human unemployment (accompanied by calls for Uni-

versal Basic Income) to labour reallocation into new fields of work, complemented by automated processes. James Bessen notes that in historical periods of automation, automating sectors have experienced increased employment.

This is due to the driving force behind the need for increased – and more efficient – production: market demand. Sectors that are in demand are striving to increase output, leading to mechanisation to improve efficiency, but also recruiting more workers. The demand an industry faces will determine the employment effects of automation; as Bessen highlights, 'while automation may eliminate jobs in some industries, it creates jobs in others.'

Automation increases efficiency, hence lowers the costs of production, lowering prices consumers face. The initial decrease in prices increases demand, however demand slows with time, so as price reduces further, there is reducing marginal increases in demand. As demand surges, employment increases, however as demand becomes satiated (consumers do not gain extra satisfaction from consuming more of a given good), employment begins to fall.

If there is unsatisfied demand in a given sector, automation may (given historical standards) increase employment in that sector. In the near future, it is estimated that there will be a reallocative effect, as jobs diminish in some sectors but emerge in others (such as those supplying the automation and computer technologies) due to trends in demand. The main policy difficulty is predicted to be adequate, timely and appropriate reskilling in order to improve labour flexibility so that workers can shift profession as sectors adjust to automation. If reskilling and opportunities for human capital accumulation are not forthcoming, there will be skills mismatches, leading to unemployment in automated sectors and vacancies in sectors with growing demand.

However, the effects of automation depend on whether workers can be reskilled or not. It has been identified that in many sectors, automation has been labour-replacing instead of labour-complementing. Many low-skilled jobs are replaced by machines as automation increases in manufacturing and supply chains. Further, AI is becoming increasingly efficient and precise in medical diagnoses, 3D printing custom parts and enhancing decision-making processes, whilst computerised processes execute tasks in finance. As a result, many jobs viewed as skilled and requiring higher level qualifications (such as university degrees) are automatable.

A pertinent question is, what is the expected effect of automation on inequalities? Given many routine tasks are easiest to automate, and provide improvements in productivity, it is estimated that wages in low-skilled work may stagnate whilst highly skilled sectors, such as robotics and computer software design will

likely rise as demand increases.

Without upskilling to create flexibility in the labour market, wage inequalities will increase. It has been noted that when robots can replace workers in certain tasks, labour and robots are labour-market competitors – the gain from a robot's output, however, contributes directly to firm profit, whilst human output is compensated with wages (outgoing from the firm). As a result, labour income share decreases.

The issue of automation in reshoring (when high-income countries re-adopt processes that had previously been outsourced offshore, such as car assembly) has been found to have a negative effect. Areas that lost manufacturing to offshoring in the past do not have their job reinstated, instead robots replace them.

4.2 Work-From-Anywhere Jobs

Covid-19 has been viewed as an accelerating force for adopting automation and changing the traditional office-based workplace. Firms have an incentive to replace workers with automation to continue business operations when people cannot work. However, working from home has been viewed as a Covid adaptation that could remain for many.

There are productivity gains associated with working from home, as employees can gain 'temporal flexibility' (choose which hours to work within the day). Over recent years, a new variety of working from home – working from anywhere (WFA) – has emerged. It is argued that WFA further increases employee autonomy in the form of 'geographical flexibility' as they can also choose where to live to complete their work. In a study of the productivity gains from WFA models, Prithwiraj Choudhury, Cirrus Foroughi and Barbara Larson identified that 'WFA policy can provide direct economic value to both employees and firms.' They found measurable productivity increases in workers who moved from working from home to WFA models and suggested that a progression to widespread WFA would likely be facilitated via a transition to working from home. Working from home and WFA models are viewed as 'non pecuniary incentives', meaning they derive non-cash/non-economic benefits for the worker (they affect the worker's lifestyle and perception of quality of life).

WFA reduces spatial mismatches (a cause of persistent inequalities identified in Part III), increasing employment and productivity. Jobs can enable specific skillsets to work in the roles where they are best suited, improving efficiency and hence, growth potential. Choudhury et al. highlight: 'Human capital has been documented as a critical source of firm competitive advantage', hence there is a 'firm-specific incentive to attract and retain skilled employees'.

As noted in Part III, work-related

stress and loss of wellbeing is on the rise. Lack of autonomy at work and pressure from within the workplace are identified as major contributors of work-related stress and anxiety. Enabling greater flexibility in how to conduct work and enabling the worker greater choice in where they work could allow employees to design their work environment to best suit their wellbeing. Working from home is evidenced to reduce sick days and breaks, increasing productivity. WFA extends these benefits to the possibility of moving to an area with a lower cost of living (increasing real income) or an area the employee likes to live (due to the climate, scenery or available activities).

4.3 How Can We Benefit from Automation and WFA?

David Bloom and Klaus Prettner suggest that investment in education will mitigate the negative employment effects of automation, particularly if educational opportunities are available to low-income households and individuals.

This strategy will act to reduce multi-generational compounding income inequalities. Retraining unemployed workers and investing in skills at school level that are specific to changing industry – in particular they note 'to focus more on skills that are complementary to automation technologies and less on memorising facts'. They also indicate that as unemployment rises as a result of automation, adjustments to social welfare may be required to accommodate the changing shape of the labour market.

It will also be necessary to promote sustainable sources of energy for increasingly mechanised workplaces/industries so as to promote environmentally sustainable growth. To maximise the benefits of WFA models, it is necessary to widen access to remote working technologies and make opportunities available for skilling in whichever sector people have talents and motivation (people no longer need to be limited to local work opportunities). Equal access to high-speed internet would also need to be a priority.

Choudhury et al. stress that further study is needed to identify how WFA models benefit working environments that have greater interdependence in the workplace and to study managerial decision-making with remote employees. There are also social costs of isolation and business costs of coordinating work and employees – these areas require further investigation.

5 Future Growth

5.1 What Next for 21st Century Industrialisation?

Economies that have not experienced sustained economic growth through industrialisation have been left behind and experience the worst life expectancies, health outcomes, educational opportunities and standards of living in the modern world. Nations that have not yet industrialised will be most adversely affected by climate change – intensifying weather patterns could threaten agricultural methods and at worst, make land unproductive, or inhabitable.

Developing economies will also be last to recover from Covid-19. All economies need to grow, and citizens need access to growth, to mitigate against adverse climate effects and increase national wealth to improve standards of living. Global growth improves international prospects, generates individual financial autonomy and reduces costs of inequality that impact economic flexibility and productivity.

How do we create growth in developing economies? Replicating fossil-fuel centric industrialisation in developing economies would accelerate the onset of climate change effects. This is problematic. Growth can enable adaptability but the wrong kind of growth can exacerbate existing problems. As such, for developing economies, nations must seek a sustainable path to growth.

Enacting growth in developing economies has many of the same principles as alleviating inequalities, building climate resilience and sustaining post-pandemic growth in developed economies. Inequalities, climate events and structural changes are expensive, posing societal and economic costs. Facing intensified weather cycles will be more expensive if there is a large amount of ill-health in the population.

Coordinating an economy in a crisis will be more difficult if human capital is wasted through inequitable skilling of the population. Devising new technologies will be time-consuming if the most talented individuals have not been able to access opportunities to maximise their potential. In the meantime, productivity and national income can increase if employment is improved and widened, whilst the economic costs of maintaining inequalities will reduce.

5.2 Inclusive Growth

The UK experiences significant economic inequalities, creating direct and opportunity costs. These regional inequalities manifest on a global scale. A 2016 Joseph Rowntree Foundation report indicated that governments would be advised to embark on a 'social deal' of inclusive

growth, which favours reconnecting poorer areas into the wider national economy to enable them to benefit from economic growth.

Inclusive growth can be viewed as a more holistic multidimensional view to growth, including policies on transport, employment distribution, urban planning, housing, skills-training and healthcare (many of the same roots as strategies to alleviate health inequalities). Lee and Sissons note: 'In the UK, around half of all people leaving poverty do so because their earnings increase rather than because they enter employment'.

Poverty levels affect growth and low growth perpetuates poverty. By lifting areas out of poverty through higher-paid skilled work, nations can create self-sustaining local economies to prevent recurrence of deprivation when government intervention is reduced. Enabling equitable opportunity, through education, skills-training and accessible networks can enable greater long-run growth, by alleviating persistent poverty.

Policy cohesion is a key aspect of more equitable distribution of growth, successfully assimilating local strategy with a national investment plan. Local factors are determinants of successfully reducing deprivation through access to growth – misidentifying an area's need perpetuates poor employment outcomes. These factors can inform economic policy to tailor devolved power and spending.

Regions are heterogeneous so contribute to different aspects of the economy, posing different challenges to budgets. Therefore, substituting one-size-fits-all economic policies with area-specific strategies could prevent further long-term economic damage. Levelling regional economies reduces fluctuations in local economies as a result of national economic trends.

The Marmot report commented that 'the most powerful outcomes that result from interventions at each stage in the life course are to be found later in life.' Thus, this indicates that measures implemented to improve the economic divide and its effect on health and standard of living would not have instant benefits but would reap dividends over the long-term. Although it is difficult to suggest large-scale reforms during periods of economic turbulence, to combat myopia, regeneration policy must be free-standing to outlive a given government.

5.3 Sustainable Growth

As industrialisation has spread, the strain on natural resources to facilitate growing demand has increased, tying economic growth to environmental degradation, as there are limits to the natural capacity of ecosystems and natural resources. Socio-economic and environmental problems have arisen from the manner in which we have pursued growth and the allocation of growth's benefits. This need not always be the case.

Achieving climate goals will require shifts from traditional growth policy to prevent damage in the future. It is predicted that there will be smaller impacts on GDP up to 2050-2060 from climate effects, however, if the current growth course continues, the damage inflicted as we reach 2060 would be irreversible. As climate change progresses, inequalities and pre-existing socio-economic difficulties will intensify – we will be trying to fight too many fires simultaneously.

There are two aspects to how we approach climate change: the economic and societal adaptations to decelerate global warming, loss of biodiversity and destruction of ecosystems, and mitigating the effects of climate change events when they arise. Growth need not be limited to the quantity of resources or potential be restricted by reducing emissions. Adaptations to production and consumption entail improving the efficiency of distribution and usage of scarce resources, substituting environmentally damaging inputs for new methods through innovations in technology and reducing consumption.

There does not appear conclusive empirical evidence that natural capital is both the determining factor and the limiter of economic growth (all regions with profitable natural capital have not experienced equivalent growth). Enabling growth is contingent on the quality of institutions, innovations in productivity and other macroeconomic conditions, such as trade. There is little evidence to suggest that environmental regulation reduces market competitiveness. It has further been suggested that any loss in competitiveness can be offset by reductions in taxes for conforming industries, reducing overall costs of adaptation to regulations.

Alleviating inequalities is a priority for improving economic resilience. Improving economic shock absorption enables the economy to withstand recurrent climatic events. Improving health equity reduces the health impacts of climate change, whilst education improves decision-making and equips the population with information to take actions that have greater societal benefits, and businesses to adopt more sustainable strategies. Improving human capital to enable better paid employment provides greater adaptability at a household level.

Those in poorer areas of developed economies are more likely to live in urban areas where air pollution and extreme heat will be more prevalent, and work in sectors of employment that could become unproductive and obsolete in the event of climate change altering the shape of industry. Microfinance, usually implemented in developing economies to widen access to the domestic market-economy, could be implemented in developed economies to break the self-enforcing poverty-low growth cycle, encouraging investment to improve household wealth and enable greater access to economic growth.

Being part of a sustainable national economy could enable groups to adapt with the changing tides of the national macroeconomic picture, instead of becoming increasingly disconnected. However, government intervention has been identified as a necessary step to ensure businesses and individuals invest and plan in the sectors necessary for climate resilience.

5.4 A Call for New Metrics

GDP has come under fire in recent decades as a sole metric of the vitality of an economy, with some economists and political figures reasoning that it does not provide a complete picture of an economy's wellbeing. GDP has primarily been criticised for three reasons: excluded nonmarket goods (such as unpaid domestic work, the value of leisure, used goods and transfer payments), sustainability (encompassing production, whether or not it contributes to pollution or poor health) and representation of wellbeing and inequality.

Recent research suggests emissions-adjusted GDP as a more representative metric, which views the impacts of pollution as, 'an unpriced cost associated with production and consumption of market goods and services' (Aniruddh Mohan, Akshay Thyagarajan and Nicholas Muller). Traditional growth accounting is expanded to 'deduct environmental pollution damage from the national income and product accounts' to quantify environmental damage in monetary terms.

In the late 20th century, some economists argued that the sole metric of GDP does not enable developing economies to demonstrate progress when measured alongside strong industrialised nations. Calls for more representative measures of socio-economic development generated the Human Development Index (HDI) in 1990, designed to incorporate life expectancy and educational attainment with average income per capita.

Measuring happiness as a metric of an economy's wellbeing has gained attention. Considering happiness as a measure of prosperity is not a new idea – the origins of 'utility' in the Enlightenment Era balanced pleasure and pain to gauge the happiness an individual derives from undertaking an action. Utility morphed into the most efficient usage of limited monetary budgets, as, like GDP, monetary metrics are simple to quantify and compare, as opposed to happiness which is subjective. However, happiness studies saw a resurgence with national opinion polls in the 1950s and 1960s.

With the modern rise in behavioural economics, psychological reactions to economic interactions are increasingly incorporated into economic studies. Research on the influence of monetary wealth on happiness has continued to develop with mixed results on increasing happiness as a direct result of wealth. However, it

has been suggested that it is opportunities wealth brings that can increase subjective wellbeing, not money itself.

As a result, a 'dashboard' of indicators has gained ground as an alternative to one-metric measures of society, increasing the indicators of economic prosperity to include measures of health, education, employment and opportunities. Diane Coyle asserted in 2014: 'There are good arguments for paying less attention to GDP and more to indicators of welfare and sustainability, but it would be a mistake to adjust or replace GDP.' GDP as a measure of economic output is powerful and dominant. To measure other aspects of an economy, we require more measuring sticks, not merely one new prevailing metric. The future will be a time for increasing measurement, to articulate the challenges we face and to design policy to confront them.

6 Concluding Remarks

Monitoring and encouraging economic growth is unlikely to fade into obscurity any time soon. Although it may be accompanied by a greater range of metrics to measure 'progress', growth will likely gain increasing significance as we confront future challenges. As Max Roser aptly affirms, 'economic growth does not matter for its own sake, but because rising prosperity is a means for many ends. It is because a person has more choices as their prosperity grows that economists care so much about growth.'

It is Britain's early relationship with economic growth that has sculpted global societies as the spread of industrialisation has determined way of life, constituting the modern sense of self, heritage and the lived experience. During the era of growth, humankind has progressed from handwoven cloth to speaking computers, determined the structure of an atom and been to the moon; we have developed aeroplanes, lightbulbs and vaccines, whilst the dominance of growth has forged new political systems and economic ideas. Without economic growth, who would we be? And most pertinently, where will growth take us next?

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