Capital Investment: Macroeconomic Insights based on the Growth Accounting Literature

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August 2025

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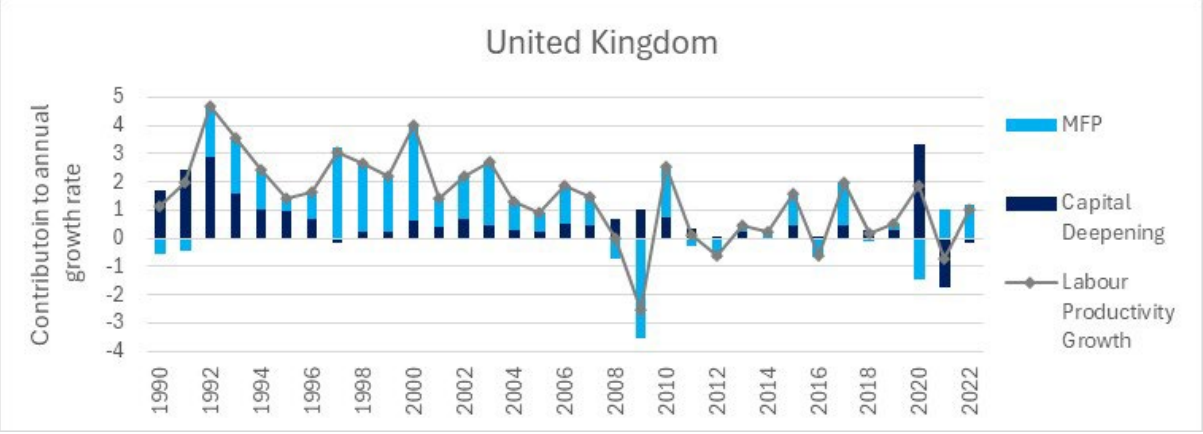
Evolution of UK Capital investment

- Capital investment plays a critical role in supporting economic growth and enhancing productivity. Despite its widely recognised importance, the UK's capital investment rate, measured by Gross Fixed Capital Formation as a share of GDP, has seen a marked decline over the past three decades. The rate fell steadily throughout the 1990s and then plateaued between 2000 and 2007. The Global Financial Crisis added to investment challenges, resulting in a pronounced decline. Although there has been some recovery since then, the UK continues to rank lowest among G7 countries on this key measure.
- Decomposing labour productivity into underlying components using OECD Growth Accounting data demonstrates the macroeconomic impact of capital investment on UK labour productivity and by extension economic growth. The growth accounting methodology disaggregates labour productivity into the contribution from two factors: Capital deepening and Multi-Factor Productivity (MFP). As shown in the figure below, the contribution of capital deepening (i.e. the amount of capital per unit of labour) to UK productivity has deteriorated over time. The Global Financial Crisis had an acute negative impact on capital investment due to weak demand and heightened uncertainty. Following a period of short-term cyclical effects, capital deepening made only a modest contribution to annual UK labour productivity growth over the course of the 2010s. While investment levels improved somewhat during the second half of the 2010s, robust job growth largely offset the productivity enhancing benefits of this investment; the rise in investment was insufficient to significantly raise capital per worker.

Contribution of Capital Deepening and MFP to UK Labour Productivity Growth



Source: OECD Productivity Indicators

- The decomposition of UK labour productivity also shows that the contribution of the MFP component has declined, which is closely tied to the creation/integration of new technologies and more efficient business processes. The deterioration in MFP is not unique to the UK, as demonstrated by the decline in the role of this component in most of the other G7 countries. However, the OECD statistics suggest that the UK experienced a more marked reduction, particularly compared to the US.
- The slowdown in MFP is particularly concerning, as it was previously the main determinant of productivity growth in the UK. The declining contribution of MFP to productivity demonstrates the need to invest in intangible assets linked to knowledge and learning, such as R&D and training and development. Insufficient investment in intangible assets could be holding back the dissemination of new ideas, the ability to integrate them into new or existing processes, alongside the benefits of new technologies[1].

Policy implications

- OECD growth accounting data and related literature show that persistently low levels of capital investment have constrained labour productivity growth in the UK. This underscores the need for a policy environment that boosts investment.
- At the macro level, reducing uncertainty is crucial to support investment. As demonstrated in the aftermath of the Global Financial Crisis and the Brexit referendum, economic and policy uncertainty can significantly deter investment activity. More recently, escalating global trade tensions due to increased US tariff barriers have emerged as a significant source of economic uncertainty. In this context, the recently agreed UK–US trade framework represents a positive step, offering some reassurance about the future stability of trade relations between the two countries.
- Furthermore, by providing a clear and credible growth plan, the agreement and implementation of City and Growth Deals in Northern Ireland is an important development in terms of providing greater clarity. In addition to the provision of concrete government funding for infrastructure investment, these City Deals are also valuable in terms of drawing in additional private investment by providing businesses with confidence and institutional support.
- At the firm level, recent analysis undertaken by UUEPC[2] points to the importance of improving the awareness and understanding of the range of finance options available. It also highlights the need to foster a stronger culture of investment by increasing awareness as to how to leverage innovation interventions, particularly those that provide a means to recruit skilled talent and support industry-academic linkages.

[1] Goodridge and Haskel (2022).
[2] Bonner *et al.* (2025).

- As economies become more advanced, the imperative to strengthen innovation and facilitate the diffusion of ideas and knowledge grows. This includes stimulating domestic R&D through targeted support such as R&D grants and public investment in research. Beyond supporting homegrown innovation, local firms can also benefit by absorbing new technological developments and best practices from international businesses. Strengthening global connections, through deeper integration into global supply chains, attracting multinational enterprises, and encouraging FDI, can play a key role in this process.
- As the knowledge based economy continues to evolve and technologies grow more complex, there is an increased need for complementary investment in intangible assets, particularly in areas such as workforce training and business process innovation. For instance, rapid advancements in the New Digital Economy, including cloud-based storage, data analytics, and digital applications, deepens the need for firm-specific training. Such investment is critical to support the effective adoption and use of emerging ICT technologies.
- This also underscores the policy imperative to raise educational attainment and develop skills aligned with the anticipated growth of the Northern Ireland Government's priority sectors: agri-tech; life and health sciences; advanced manufacturing, materials and engineering; fintech and financial services; software; screen industries; and the low-carbon economy.

Section 1: Introduction

1.1. Capital investment refers to expenditure on long-term fixed assets that contribute to future production, including buildings, machinery and Research and Development (R&D). Increased capital investment is widely regarded as a key means to stimulate economic growth[3]. By improving operational efficiency and productivity, capital investment provides businesses a means to attain a competitive advantage and support long-term growth. Government investment in public infrastructure is also a form of capital investment, which has the potential to boost the future productive capacity of the economy[4].

1.2. Despite the well-established importance of capital in driving economic growth, the UK compares poorly to similar economies in terms of both business and government investment. In 2021, the UK ranked 27th out of OECD countries in terms of business investment, with UK private capital investment as a share of GDP equaling 10% compared to 19.8% by the highest ranked country (Switzerland)[5]. Moreover, it ranked the lowest out of the G7 countries; Japan ranked the highest at 17.2% of GDP. The UK also performed poorly in terms of public sector capital investment. At 3.1%, public capital investment as a share of GDP was below average within both the G7 and the group of OECD countries in 2021.

1.3. The contribution of capital investment to growth varies across different types of capital. Section 2 expands on the impact of different types of capital, while Section 3 draws on OECD growth accounting data to show the macroeconomic impact of capital investment on labour productivity and by extension economic growth. The growth accounting methodology provides a means to decompose the contributions of capital and labour, as well as the efficiency with which these factors are used to produce output, to labour productivity. Identifying the role of these factors and their interplay is helpful to gain a deeper understanding of the underlying drivers of growth.

[3] McGowan *et al.* (2015) and Ahmed, T. and Bhatti, A.A. (2020) and Cette *et al.* (2021).
[4] Bom and Ligthart (2015).
[5] Dib and Murphy (2023).

Capital Categories

2.1 Capital investment encompasses a wide range of assets. Tangible assets are physical assets, such as buildings and machinery, which provide the infrastructure and tools used to produce goods and services. Intangible capital refers to non-physical items that cannot be touched but nevertheless contribute to the production of products and processes. These intangible assets are particularly important for inducing innovation and include assets such as computer software and R&D. The role of these assets in driving growth at the macroeconomic level is discussed below.

Tangible Capital

Traditional forms of tangible capital: Machinery, equipment and buildings

2.2. Tangible capital refers to physical assets that are expected to be repeatedly used in the production process for several years, such as **machinery**, **equipment** and **buildings**. Provided the capital stock increases at a greater rate than the workforce, higher capital investment increases the amount of capital available per worker. This process is sometimes referred to as **capital deepening** and generally leads to higher labour productivity. The effectiveness of capital deepening is impacted by diminishing returns, whereby adding additional capital to an already well-equipped workforce might lead to smaller and smaller increases in productivity. However, this diminishing effect may be offset by technological progress if the new capital acquired as part of the investment incorporates better technologies.

2.3. The growth rates of the prices of both capital and labour impacts the magnitude of capital deepening[6]. Higher wage growth relative to the price of capital may lead to the substitution of labour using capital, thereby resulting in an increase in capital deepening. Conversely, a decrease in wage growth relative to capital price growth may lead to a slowdown in capital deepening. Thus, the extent of capital investment is strongly influenced by the wage growth rate.

2.4. Capital deepening by businesses is vulnerable to recessionary impacts, which may lead to cyclical fluctuations[7]. Given that capital deepening is dependent upon both growth in capital and labour, a contraction in the workforce in the aftermath of a recession may lead to an artificial increase in capital deepening. However, low demand and uncertainty about future economic conditions may result in weakened capital investment, exerting a downward impact on capital deepening. The duration of the recovery period for capital deepening is influenced by expectations of future economic conditions. More generally, uncertainty has an adverse impact on business investment, delaying expenditure until conditions become clearer. Based on a large sample of UK businesses, the Bank of England estimated that the uncertainty regarding trade arrangements following the EU referendum in 2016 significantly lowered the level of business investment by almost 25% in 2020-21[8].

[6] Broersma and Van Dijk (2007).
[7] Modery *et al.* (2021).
[8] Bank of England (2021).

2.5. Investment in **robotics** can significantly contribute to productivity growth by automating tasks, increasing efficiency and improving quality. Comparative analysis undertaken by Cette *et al.* (2021) indicates that the impact of robotics on overall productivity growth is modest and confined to specific countries during certain periods: Germany and France from 1995 to 2005 and France and Italy from 1995 to 2005. This is partly attributable to the tendency for robotics to be concentrated within a limited number of sectors such as manufacture of transport and electrical equipment. Using the number of robots per million hour worked as a measure of robotic diffusion, Cette *et al.* (2021) estimate lower levels of diffusion in the UK (<0.5 robots per million hour worked) compared to other G7 countries, with substantially higher levels in Japan and Germany (>2.5 robots per million hour worked).

ICT capital

2.6. In addition to the above physical assets, tangible capital includes **ICT equipment** such as IT hardware and telecoms. Since the early 1980s's the improvement and diffusion of information and communication technologies led to increased capital investment in ICT equipment, with a corresponding increase in the share of ICT to total capital assets in many countries. The increased investment in ICT assets was facilitated by a rapid decline in prices, reflecting the rapid progress in ICT technologies. The improvements in technology increased demand, which in turn led to economies of scale, lower production costs and falling prices. The falling prices boosted demand further, creating a cyclical effect that drives the technology forward[9].

2.7. As a highly-flexible, general-purpose technology, ICT capital is widely applicable to most businesses across all sectors of the economy and enabled firms to make major changes to the production process and thereby increase productivity[10]. As a result, multiple studies demonstrate the increased impact of ICT assets on economic growth during the 1990s and early 2000s[11].

2.8. However, while there is some variability across countries, the diffusion of ICT capital and direct contribution to growth appeared to broadly plateau in the early 2000s[12]. The slowdown in the role played by ICT is reflected in a deceleration of the decline in ICT prices. Using US data, Smith (2022) reported that the price of computer equipment relative to overall output fell by 5% per annum between 1970 and 2007, compared to 1% between 2008 and 2020.

2.9. It is important to note that a number of studies contend that the official ICT price statistics underestimate the rate of decline, with knock-on impacts on the measurement of productivity growth[13]. Upon applying alternative prices indices as deflators Coyle and Hampton (2024) estimate that ICT prices continued to fall beyond the timespan suggested by official statistics but still point to a slowdown in the mid-2010s.

[9] Roser (2023).
[10] Smith (2022).
[11] Wölfl and Hajkova (2007), Ahmed and Bhatti (2020) and OECD (2019).
[12] Cette *et al.* (2021).
[13] Coyle and Hampton (2024) and Fleming (2023).

2.10. The apparent diminishing influence of ICT capital investment on productivity has received considerable attention. The limited contribution of ICT to economic growth appears to be inconsistent with the rapid progress in the New Digital Economy such as mobile technology, access to the internet and cloud based storage, analysis and applications[14]. In a similar vein, Robert Solow observed in 1987 that:

"You can see the computer age everywhere but in the productivity statistics"[15].

2.11. Some researchers argue that although there may be some opportunities for growth using new technologies, including ICT, the potential impact is much less significant compared to the far-reaching technology innovations that occurred during previous industrial revolutions, such as heavy engineering following the development of steel and introduction of mass production lines[16]. This pessimistic perspective of technology developments suggests that the slowdown in productivity may be long-term.

2.12. Others offer a more optimistic outlook, positing that the full effects of recent technological developments have still to be realised. For example, Van Ark (2016) suggests that the New Digital Economy is still in its **installation phase**, wherein new technologies are still emerging and being developed. The full effects will be more apparent following the **full deployment phase** in which the new technologies are widely diffused and incorporated within businesses organisational processes. Based on previous technological revolutions, the deployment phase is a lengthy process and it may take time, even decades, before noticeable impacts on productivity are visible[17].

2.13. Given the role of diffusion in driving productivity gains from capital investment, it is important to consider the scope for increasing the rate at which innovations spread through the economy. McGowan *et al.* (2015) identified four key factors that drive diffusion:

i. Technology transfer may be enhanced through global connections that further international knowledge spillovers. This includes the diffusion of technology from foreign to domestic businesses through global supply chains, foreign direct investment and foreign skilled labour. In addition, it is argued that openness to trade encourages domestic firms to adopt new technologies due to competitiveness effects.
ii. A business culture which rewards entrepreneurship with new ideas, technologies and business models.
iii. A competitive business environment that encourages the growth of innovative firms and facilitates the efficient allocation of resources, including capital.
iv. The need to underpin technology investment by complementary investment in knowledge-based capital to facilitate the absorption and implementation of new ideas. This includes forms of intangible capital such as research and development, firm specific skills, and organisational know-how, which are discussed in further detail in Section 2.2.

[14] Van Ark (2016), Cette *et al.* (2021) and Coyle and Hampton (2024).
[15] Solow (1987).
[16] Gordon (2012) and Gordon (2015).
[17] Van Ark (2016), Cette *et al.* (2021) and Modery *et al.* (2021).

2.14. An important consequence of the development New Digital Economy is an apparent shift in business expenditure from ICT assets to ICT services[18]. The New Digital Economy is more conducive to external businesses providing external ICT services, such as cloud computing, data analysis and computer system design, resulting in a decline in investment in ICT capital. It is argued that it is beneficial for businesses to shift to ICT services as this type of expenditure provides cost-savings, greater flexibility and provides access to superior data capabilities. This shift has implications on the interpretation of ICT on economic growth. However, given that many countries have experienced weak economic growth rates over the last decade it appears that this shift to ICT services is still in its deployment phase and there is a need for further diffusion, along with the development of knowledge based capital.

Public investment in economic and social infrastructure

2.15. Investment in public infrastructure plays a critical role in driving economic growth through improving the productive capacity of the economy[19] . Investment in the quantity and quality of infrastructure is necessary to ensure the infrastructure system operates efficiently for both businesses and households. Businesses use infrastructure to obtain inputs and deliver goods and services to consumers, while individuals use infrastructure to commute to work, as well as pursue leisure activities. The literature differentiates between 'economic' and 'social' public infrastructure. The former refers to infrastructure that directly stimulates economic activity, such as transport and utilities, while the latter refers to broader types of infrastructure that have important social benefits such as schools, hospitals and other government buildings[20].

2.16. 'Economic' infrastructure contributes to economic growth through a variety of channels. In particular, 'economic' infrastructure lowers costs of production, allowing businesses to produce more goods and services for the same level of inputs. It also facilitates the efficient working of the housing and labour markets, providing a foundation for the economy to function. For example, providing suitable infrastructure allows individuals to follow employment opportunities and match their skills, which raises economic productivity[21].

2.17. 'Economic' infrastructure enables a higher density of people or businesses to operate within a specific geographical area and allow associated agglomeration benefits to flow. For example, the benefit of having a large pool of high-skilled labour within an urban area, or the networking benefits from having a network of related businesses working alongside each other in a cluster. 'Economic' infrastructure underpinned by technology such as digital connectivity promotes innovation and hence productivity growth.

2.18. There is widespread agreement that 'social' infrastructure also plays an important role in driving growth. While 'social' infrastructure is less closely linked to the production of

[18] Van Ark (2016).
[19] Stupak (2018).
[20] Fourie (2006).
[21] Keep (2021).

goods and services, it underpins productivity gains across the whole economy. Education infrastructure is linked to economic growth through human capital and the quality of the labour force. Typically, investment in education infrastructure leads to improved educational outcomes and the associated improvement in the skills base should raise productivity. In addition, education may increase innovation and promote the diffusion of knowledge and adoption of new technologies[22].

2.19. Investment in health infrastructure such as hospitals may also affect economic growth through the health of the labour force. It is argued that healthier workers are more productive and less likely to be absent due to illness[23]. Healthier workers also have more of an incentive to invest in their health and skills which will be rewarded over a longer working life.

2.20. Analysis by the OECD indicates that most countries would benefit from gains in economic growth by increasing the level of public capital stock[24]. This study indicates that the optimal public capital stock to potential GDP ratio is 75% to 110% and for countries with a ratio below this optimal level, additional investment in public capital has a positive impact on long-term economic growth. The study showed that, apart from Japan, investment levels are below optimal levels and the UK the public capital stock to potential GDP ratio was only 35%[25].

[22] Fournier (2016).
[23] Johansson (2016).
[24] Fournier (2016).
[25] Based on 2013 figures.

Intangible Capital

Knowledge and learning underpins innovation

2.21. Intangible capital refers to non-physical assets related to knowledge and learning that are key to driving innovation and thus underpins future economic growth. These intangible assets are sometimes referred to as knowledge based capital. While intangible assets cannot be touched, expenditure on intangibles is considered a form of capital rather than an intermediate cost as it is expected to yield a return in a future period[26].

2.22. Based on the official System of National Accounts, the following expenditures are treated as intangible capital: R&D, mineral exploration, copyright and license costs for the development of entertainment and artistic originals, computer software and databases. While the other items have long been classified as capital within the System of National Accounts, R&D was added in the 2008 revision of the System of National Accounts, reflecting its importance in contributing to technological progress and the creation of new products, services and processes. In the same way as tangible assets, expenditures on these intangibles are treated as gross fixed capital formation.

Wider range of intangibles

2.23. It is, however, widely recognised that the above intangible assets do not fully reflect the wide range of knowledge based capital that makes a contribution to innovation and added value. Corrado *et al*. (2005) developed a more comprehensive list of intangibles that capture the wider role of knowledge and learning within the economy. As shown in Table 1, this includes investments in industrial design, market research, branding, employee training and organisational know-how. Organisational know-how expenditure on, for example, coordinated supply chains or new business models may be expected to yield improvements in process efficiencies that generate returns on an ongoing basis. Expenditure on market research and brand-building are important in terms of expanding demand and may be regarded as a form of investment. Employee training is treated as an intangible asset which is separable from the labour input as it captures training specific to the processes within a particular firm[27].

[26] van Ark *et al*. (2023)
[27] Corrado *et al*. (2022).

Table 1: Capital assets included under System of National Accounts and broader definition

	Assets included within System of National Accounts	Broader definiion of intangibles based on Corrado et al. (2005)
Tangible Assets	**Dwellings**	
	Other buildings and structures	
	Machinery and equipment	
	Transport equipment	
	ICT equipment	
	Cultivated biological resources	
Intangible Assets	**Intellectual property products**	**Computereised information**
	Computer softwarre and databases	Computer software and databases
		Innovative Property
	R&D	R&D
	Mineral exploration and evaluation	Mineral exploration and evaluation
	Entertainment, artistic and literary orginals	Entertainment, artistic and literary orginals
		Development of financial innovations
		Archictectural and engineering design
		Economic competencies
		Brand equity (advertising expenditure and market research
		Firm-specific human capital
		Organisational structure

Source: Adapted from OECD/APO (2022).

2.24. While the broader list of intangibles is generally accepted as appropriate from a theoretical point of view, in practice they are challenging to measure and ensure consistency across countries. Efforts are ongoing to incorporate more intangibles within the National System of Accounts. In the interim, several recent studies have assessed the implications of adopting a wider list of intangibles[28]. Note that broadening the number of intangibles not only increases the volume of the capital stock, but also increases the level of value-added and hence productivity as the intangible assets are no longer treated as intermediate costs[29].

2.25. Adopting the wider list of intangibles, Van Ark *et al.* (2023) demonstrate that the UK has experienced a shift in investment towards intangibles over the period 1996 to 2019. In particular, comparing the pre-financial crisis period (1996 to 2007) with the post-financial crisis period (2012 to 2019), tangible investment as a share of GDP (provides a metric of investment intensity) decreased by 1.8%. Conversely, intangible investment increased by 1.2% over this period of analysis. Underlying the total intangible component, the intangible assets included within the National Accounts remained broadly constant, while investment in non-National Account intangibles as a share of GDP exhibited a marked increase. Focusing on the most recent period, it is evident that although the level of total UK investment intensity is significantly lower compared to North West Europe and the US using the National Accounts definition of capital assets, the differential is less marked using the broader definition of intangible assets. This

[28] Hazan *et al.* (2021), Van Reenen and Yang (2024); van Ark *et al.*(2023) and Kostarakos *et al.* (2024).
[29] Van Reenen and Yang (2024).

reflects the higher level of non-National Account intangibles in the UK. The authors highlight the important contribution of marketing, branding and organisational capital in the UK, which is consistent with the role of the Knowledge-Intensive Business Services and retail sectors in the UK.

2.26. Analysis of the Irish economy by Kostarakos *et al.* (2024) also demonstrates the important role played by the wider set of intangibles. After making adjustments for multinationals, the authors find that non-National Account intangibles made a larger contribution to capital deepening than National Account intangibles. This contrasts with official statistics, which suggest National Account tangibles made a sizable contribution to capital deepening, reflecting the distortionary impact of the transfer of intellectual property products to Ireland by a few large multinational firms.

Knowledge spillovers

2.27. In contrast to tangible capital, some intangibles may yield wider benefits beyond the firm that made the initial investment as knowledge based capital is only partially excludable. In particular, R&D and design are particularly prone to knowledge spillover effects, with the knowledge created by a firm privately investing in this form of capital spreading beyond its place of creation. These knowledge spillover effects imply that investment in these types of intangibles are especially growth enhancing from an economy wide perspective[30]. However, the partial excludability of knowledge means that private firms may invest less in this form of capital than is socially optimal and consequently there is a policy need to provide incentives for private investment in knowledge based capital such as like R&D tax incentives or intellectual property regulations[31].

Complementarities with human capital and ICT

2.28. The stock of human capital in the form of educational attainment and skills has important implications on the ability of the workforce to produce and effectively make the most of knowledge based capital. For example, managers and analysts require an understanding of the business benefits of data, while patents provide a means to protect the innovations that emanate from people's ideas[32]. The increased importance of the knowledge based economy, including knowledge-intensive business services and advanced manufacturing, requires a skilled workforce capable of fostering and using knowledge based capital related skills. Given the complementarities between human capital and knowledge based capital, there is a policy need to continue to raise educational qualifications and skills suitable for the anticipated growth of the NI Government's priority sectors: agri-tech; life and health sciences; advanced manufacturing and engineering; fintech/financial services; software; screen industries; and low carbon.

[30] McGowan *et al.* (2015).
[31] OECD (2013).
[32] OECD (2013).

2.29. There are also strong complementarities between investment in ICT capital and knowledge based capital. For example, investments in firm-specific training are likely to yield improvements in the adoption and effective use of new ICT technologies. In addition, investments in organisational know-how that improves business processes can lead to productivity improvements, e.g. use of ICT to improve the links in the supply chain from vendor to retailer[33]. Bloom *et al.* (2012) estimated that the acceleration in the IT-led productivity gap between the US and the EU can primarily be attributed to better management practices. As the New Digital Economy evolves, the links between ICT capital and various forms of Knowledge Based Capital will become increasingly complex, deepening the need for investment in these types of intangibles.

2.30. Finally, Hazan *et al.* (2021) emphasise the complementarities between different types of intangibles and highlight the contribution of intangible investment to resilience. The authors conclude that companies that invested in multiple forms of intangibles during the Covid-19 pandemic were able to maintain 2019 levels of growth.

Difficulties in financing intangible assets

2.31. Raising finance for intangible assets is generally more challenging compared to tangible assets. Intangible assets such as intellectual property or brand reputation are difficult to value and consequently, it is not straightforward for lenders to assess the level of risk[34]. In addition, intangible capital assets are often firm specific and as a result, they tend to be difficult to transfer across firms, e.g. branding and marketing are closely tailored to a specific firm and are of limited value to other firms. As a result, intangible assets cannot be resold easily in the event of a loan default and cannot be used as collateral in the same way as tangible capital. These characteristics mean that intangible assets are less appealing from a lender's perspective, making it more difficult to secure finance against them[35]. In order to raise finance for these types of assets, businesses may need to rely to a greater extent on retained earnings or use equity to raise funds.

2.32. Given the importance of intangibles in driving innovation and economic growth it is desirable to reduce barriers to financing these types of assets. This tends to be partly facilitated through government equity finance programmes, including direct government venture capital funds and co-investment funds[36].

[33] Kroszner (2006).
[34] Schoenholtz and Cecchetti (2018).
[35] Demmou *et al.* (2019).
[36] OECD (2013).

Summary

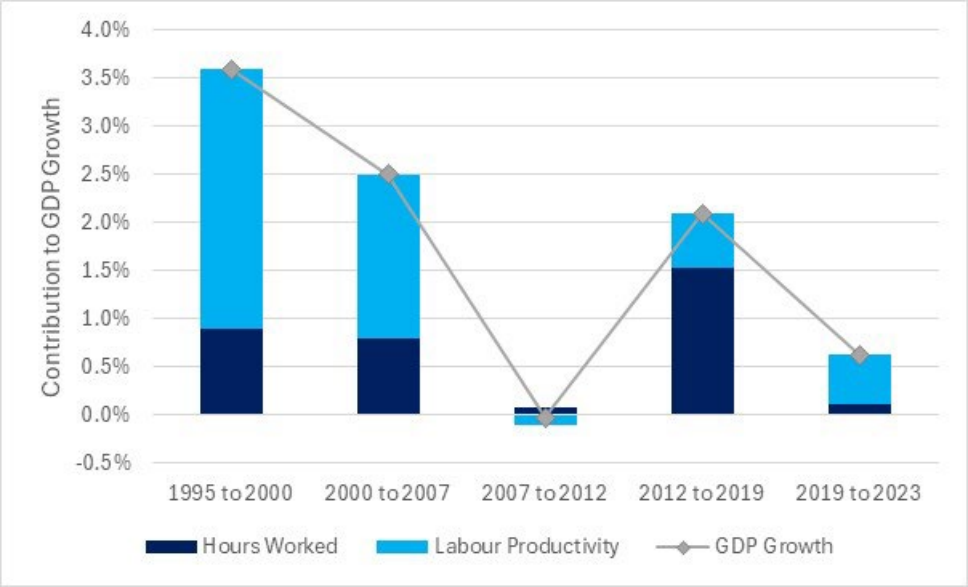
2.33. Capital investment drives economic growth through both tangible assets, such as machinery, and buildings, and increasingly crucial intangible assets such as R&D, software, and organizational know-how. While capital deepening boosts productivity by increasing capital per worker, its impact is subject to diminishing returns unless offset by technological advances. Although ICT investment surged in the 1990s and early 2000s, its growth impact has since tapered off. Public infrastructure, both economic (e.g. transport) and social (e.g. education and health), remains a cornerstone of productivity, enabling business efficiency, labour mobility, and human capital development. In addition, intangible capital, from branding and design to training and organisational expertise, is becoming increasingly important and plays an important role in driving innovation. However, unlocking the full potential of these assets requires overcoming financing barriers and ensuring that complementary investments in human skills and ICT capital.

Introduction

3.1. The underlying drivers of UK GDP growth have shifted markedly since the 2008 global financial crisis. UK labour productivity exhibited reasonably strong growth prior to 2008 and was the main factor driving economic growth (Figure 1). However, labour productivity weakened sharply following the recession, falling from an annual average growth rate of 1.7% between 2000 and 2007, to 0.6% between 2012 and 2019. Moderate GDP growth was maintained during the latter period through a significant increase in labour units (measured in terms of hours worked).

3.2. As shown in Table 2, the slowdown of labour productivity growth is a widespread trend, with the other G7 countries also experiencing lower productivity growth during the last decade, apart from Italy which also exhibited low growth prior to 2008. However, it is evident that the decline is particularly marked in the UK, which shifted from the 2nd highest ranked G7 country in terms of labour productivity growth prior to the global financial crisis, to the 6th ranked G7 country during the subsequent period.

Figure 1: Decomposition of Annual UK GDP Growth*



* Labour productivity measured as GDP/Hours worked.
Source: OECD Productivity Indicators

Table 2: International Comparison of Annual GDP, Hours Worked and Labour Productivity Growth: G7 Countries

	1995 to 2000	2000 to 2007	2007 to 2012	2012 to 2019	2019 to 2023
United Kingdom					
Hours Worked	0.9%	0.8%	0.1%	1.5%	0.1%
Labour Productivity	2.7%	1.7%	-0.1%	0.6%	0.5%
GDP Growth	3.6%	2.5%	0.0%	2.1%	0.6%
Canada					
Hours Worked		1.4%	0.6%	1.1%	1.2%
Labour Productivity		1.1%	0.6%	1.0%	0.4%
GDP Growth		2.5%	1.2%	2.1%	1.6%
France					
Hours Worked	1.1%	0.6%	0.2%	0.5%	1.2%
Labour Productivity	1.8%	1.4%	0.3%	0.8%	-0.6%
GDP Growth	2.9%	2.0%	0.4%	1.3%	0.6%
Germany					
Hours Worked	0.1%	0.0%	0.2%	0.7%	-0.3%
Labour Productivity	1.8%	1.4%	0.5%	0.9%	0.4%
GDP Growth	2.0%	1.4%	0.7%	1.6%	0.1%
Italy					
Hours Worked	1.0%	1.0%	-1.4%	0.3%	1.0%
Labour Productivity	1.1%	0.1%	-0.1%	0.2%	0.2%
GDP Growth	2.1%	1.1%	-1.5%	0.4%	1.2%
Japan					
Hours Worked	-1.2%	-0.1%	-0.9%	-0.1%	-0.5%
Labour Productivity	2.2%	1.3%	0.6%	1.0%	0.7%
GDP Growth	1.0%	1.2%	-0.3%	0.9%	0.2%
United States					
Hours Worked		0.3%	-0.7%	1.6%	0.7%
Labour Productivity		2.1%	1.5%	0.9%	1.6%
GDP Growth		2.5%	0.8%	2.5%	2.3%

Source: OECD Productivity Indicators

3.3. The contribution of capital investment to labour productivity growth in G7 countries is explored using the OECD productivity statistics database. Within Section 3.2, investment is broken down by asset type to identify shifts in the contribution of asset types over time. This is followed by an international comparison of OECD growth accounting data in Section 3.3.

3.4. The OECD productivity statistics database provides a means to decompose labour productivity growth into different factors[37]. Using the basic growth accounting approach, labour productivity is broken down into the contribution from two factors: Capital deepening and Multi-Factor Productivity (MFP).

3.5. **Capital deepening** refers to an increase in the amount of capital per unit of labour in the economy and may arise through either an increase in capital investment or a decrease in the amount of labour. Capital deepening means the workforce has more resources to use.

3.6. **MFP** measures the part of labour productivity growth that cannot be explained by the growth of capital and labour inputs. MFP captures the efficiency with which the capital and labour inputs are utilised within the production process, with growth attributed to a range of factors, including the creation/absorption of new technologies, more efficient business processes and organisational improvements[38]

3.7. The contribution of MFP growth to labour productivity is impacted by the definition of intangible capital, *i.e.* whether it includes knowledge based capital. The OECD data used in this report is based on the narrow definition of intangibles and hence the MFP component partly reflects the contribution of wider knowledge based capital.

3.8. MFP may also be affected by a number of external factors, including exposure to international trade, foreign direct investment, international knowledge spillovers, an improved allocation of labour and capital to more productive firms and government policies, e.g. bureaucracy and red-tape[39]. In addition, as a residual, MFP may capture errors in the measurement of outputs, inputs in weights, e.g. inaccurate output deflators.

3.9. Further details on the growth accounting methodology are presented in Box 1.

[37] OECD Productivity Growth Rate database: OECD Data Explorer • Productivity growth rates
[38] Diaz *et al.* (2013).
[39] Ahmed and Bhatti (2020), Riley *et al.* (2018), Diaz del Hoyo *et al.* (2017) and OECD (2024).

Box 1: Growth Accounting Methodology

Following Solow (1957), the growth accounting framework involves decomposing GDP growth into the contribution of labour inputs, capital inputs and the efficiency in how these inputs are used together. The latter is a measure of Multi-Factor Productivity (MFP) and captures the impact of technological progress and other factors not directly captured by input changes. As a starting point, it is assumed that output in an economy is represented using a Cobb-Douglas production function in which:

$$Y_t = A_t K_t^{\alpha} L^{1-\alpha}$$

where Y_t, A_t, K_t, and L_t are, respectively, output, MFP, capital input and labour input. α and (1- α) are the shares of capital and labour in GDP respectively. A_t measures MFP, with an increase in A_t leading to higher output without having to raise inputs.

Using logarithms and differentiating with respect to time, the Cobb-Douglas production function can be reformulated to express GDP growth between two periods into contributions from MFP, capital and labour growth:

$$\triangle Y = \triangle A + \alpha \triangle K + (1- \alpha)\ \triangle L$$

This decomposition of GDP growth can be re-expressed in terms of labour productivity by deducting $\triangle L$ from both sides:

$$\triangle Y - \triangle L = \triangle A + \alpha \triangle K + (1- \alpha)\ \triangle L - \triangle L$$

which simplifies to:

$$\triangle\left(\frac{Y}{L}\right) = \triangle A + \alpha \triangle\left(\frac{K}{L}\right)$$

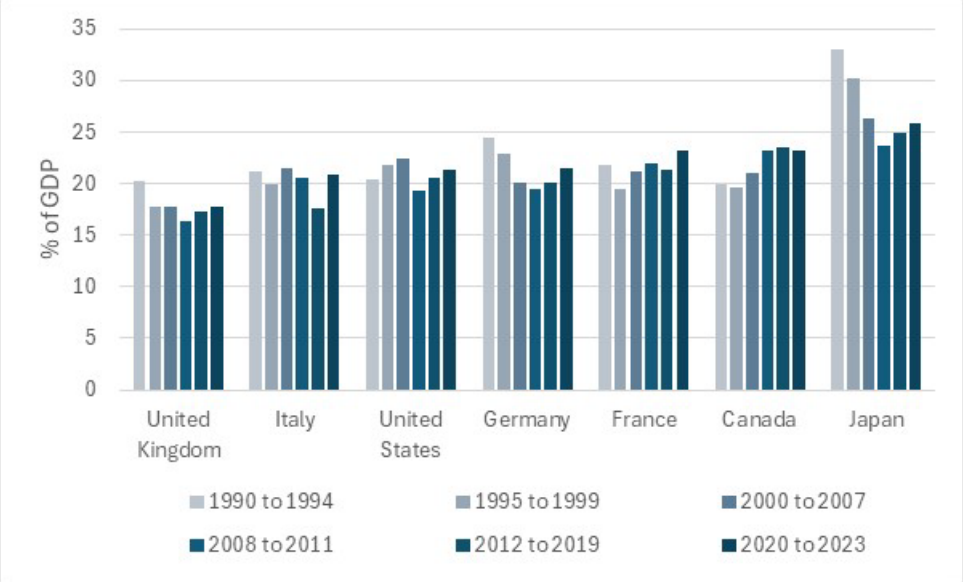
This basic formulation indicates that the growth rate of labour productivity is dependent upon the growth of both the **capital-labour ratio** (△K/L: capital deepening) and **MFP** (△A).

Alternative formulations may be employed to decompose capital by asset type (e.g. ICT capital and non-ICT capital) and account for the composition of labour, including age, education, employment class and sex across worker. Given the focus on capital deepening, the basic formulation is employed for the purposes of this report.

Capital Investment

3.10. The UK's overall capital investment rate (GFCF as a share of GDP) deteriorated markedly over the last three decades, falling from an average of 20.3% between 1990 and 1994 to 17.7% between 2020 and 2023 (Figure 2). The investment rate declined steadily during the 1990s, prior to stabilising around 17.7% during the period 2000 to 2007. The global financial crisis significantly impacted UK investment, leading to a further decline in the investment rate, which reached a low of 15.7% in 2011. While the UK investment rate has subsequently improved, the UK currently ranks at the bottom of the G7 countries in terms of this metric. Moreover, the extent of the gap has widened over time, with the UK displaying an investment rate 3.8% less than the G7 median between 2020 and 2023, compared to 1.0% less between 1990 and 1994.

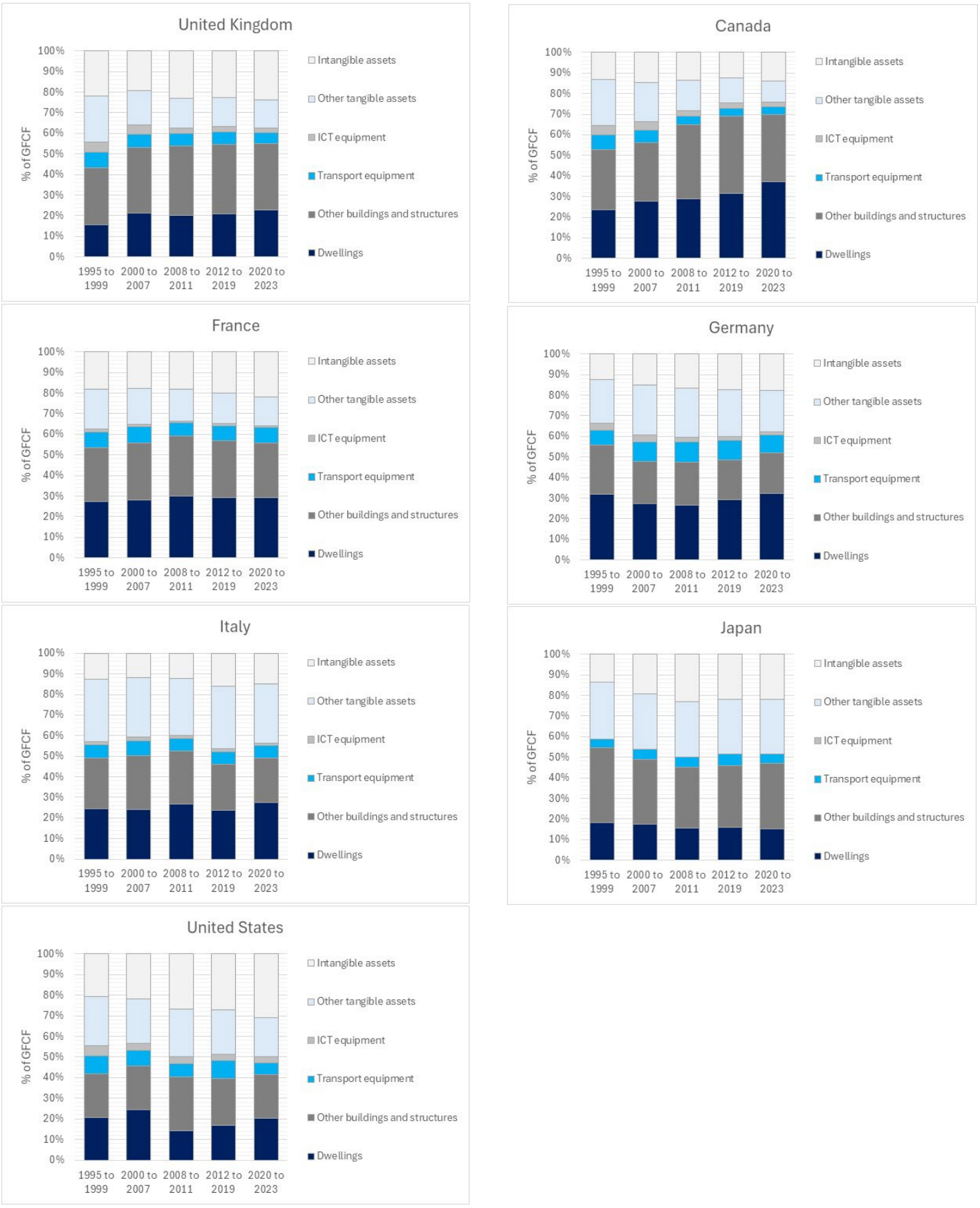
Figure 2: Comparison of GFCF as a share of GDP (Average over shown interval periods)



Source: OECD Productivity Indicators

3.11. Decomposing capital investment by asset type provides an insight into structural shifts in investment over time. As shown in Figure 3, investment in the tangible assets *Dwellings* and *Other Buildings & Structures* within the UK have increased significantly as a share of total Gross Fixed Capital Formation (GFCF) over time, increasing by 7% and 4% respectively between 1995-99 to 2020-23. At the same time, the investment shares in *Transport Equipment*, *ICT Equipment* and *Other Intangible Assets* in the UK have decreased, falling by 2%, 3% and 9% respectively. The decline in ICT investment shares partly reflects the sharp decline in ICT prices over this period, while the fall for *Other Tangible Assets* is consistent with the broader trend of the diminishing role of manufacturing within the UK economy as it is heavily reliant on tangible assets like machinery and equipment.

Figure 3: Investment by asset type as a percentage of total GFCF



Source: OECD Productivity Indicators

3.12. Investment in intangibles accounted for an increasing share of total investment the UK over the past three decades, increasing by 2% between 1995-99 to 2020-23. However, this increase is modest compared to most other G7 countries. In particular, the share of intangible investment of total investment increased markedly in the US, rising by 10%. As a result, data for the most recent period (2020 to 2023) indicates that the intangible investment rate, measured by intangible investment as a share of GDP, is substantially higher in the US (6.7%) compared to the UK (4.2%) (Table 3). Nevertheless, the UK intangible investment rate in 2020-23 is equivalent to the median of other G7 countries.

3.13. Note, that the OECD definition of intangibles accords with the System of National Accounts and thus excludes the wider list of intangibles. As noted in Section 2.2, research undertaken by Van Ark *et al*. (2023) indicates that the UK has shown relatively strong growth in broader intangibles such as marketing, branding and organisational capital.

Table 3: Average investment by asset type during 2020 to 2023 as a share of GFCF and GDP

	United Kingdom	Canada	France	Germany	Italy	Japan	United States
% of GFCF							
Dwellings	22.9	37.3	29.3	32.2	27.5	15.1	20.4
Other buildings and structures	32.0	32.5	26.7	19.8	21.7	31.9	21.0
Transport equipment	5.3	3.9	7.3	8.7	5.9	4.8	5.8
ICT equipment	2.4	2.3	1.0	1.6	1.2	0.0	2.8
Other tangible assets	13.7	10.3	14.0	20.1	28.7	26.5	18.9
Intangible assets	23.7	13.7	21.7	17.5	15.0	21.7	31.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
% of GDP							
Dwellings	4.1	8.7	6.8	6.9	5.8	3.9	4.4
Other buildings and structures	5.7	7.5	6.2	4.3	4.5	8.2	4.5
Transport equipment	0.9	0.9	1.7	1.9	1.2	1.2	1.2
ICT equipment	0.4	0.5	0.2	0.3	0.2	0.0	0.6
Other tangible assets	2.4	2.4	3.3	4.3	6.0	6.8	4.0
Intangible assets	4.2	3.2	5.0	3.8	3.1	5.6	6.7
Total	17.7	23.2	23.2	21.4	20.8	25.8	21.4

Source: OECD Productivity Indicators

Capital deepening

3.14. Using the OECD growth accounting dataset, the contribution of capital deepening and MFP to labour productivity growth in the UK and other G7 countries over the period 1990 to 2022 is shown in Figure 4. This breakdown suggests that capital deepening had a large growth enhancing impact in the UK in the early 1990s, contributing approximately 1.9% to annual labour productivity growth between 1990 and 1994 (Table 4). However, the contribution of capital to UK labour productivity slowed sharply after 1996, remaining below 0.5% in all but two years between 1997 and 2007. While the contribution of capital deepening increased in 2008 and 2009, this reflected short-term cyclical effects due to the contraction in labour hours in response to the global financial crisis.

3.15. Capital deepening returned to making a modest contribution (average of 0.2%) to annual labour productivity growth between 2012 to 2019. While investment intensity grew during this period (albeit limited), robust job growth following the aftermath of the financial crisis partially offset the productivity enhancing benefits of this investment. Moreover, despite recent increases in capital investment, the UK still ranks low in terms of capital intensity compared to other G7 countries. As discussed in the previous section, the omission of assets included in the wider definition of intangibles within the System of National Accounts may understate the growth in total intangibles and hence the contribution of capital deepening to labour productivity in the UK. The contribution of these knowledge based capital assets should be captured within the MFP component. However, as discussed below, this component has declined in importance overtime, suggesting that these intangibles are not presently making a substantial contribution to productivity growth[40].

3.16. The OECD growth accounting dataset indicates that capital deepening also slowed down in the other G7 countries but less rapidly. In particular, capital deepening continued to make a substantial contribution to labour productivity growth in the US prior to the global financial crisis. As shown in Figure 5 (pages 24-25) [41], this partly reflected a marked rise in ICT capital deepening (combines the contribution from Computer hardware, Telecommunication equipment and Computer software and databases) in the US. The importance of ICT capital deepening as a driver of labour productivity growth also increased during this period in the UK but to a lesser extent. Overall, the OECD dataset set suggests ICT made a fairly modest contribution to UK productivity growth in the last two decades (less than 0.5%). However, it is important to bear in mind that ICT may have important spillover effects on knowledge based capital which is captured within the MFP component within the OECD statistics.

[40] Van Ark et al. (2023).
[41] The results presented in Figure 5 provide a more detailed breakdown of the contribution of factors to labour productivity, distinguishing between ICT capital deepening, non-ICT capital and MFP. However, this more disaggregated dataset is only available from 1996.

Figure 4: Contribution of Capital Deepening and MFP to Labour Productivity Growth

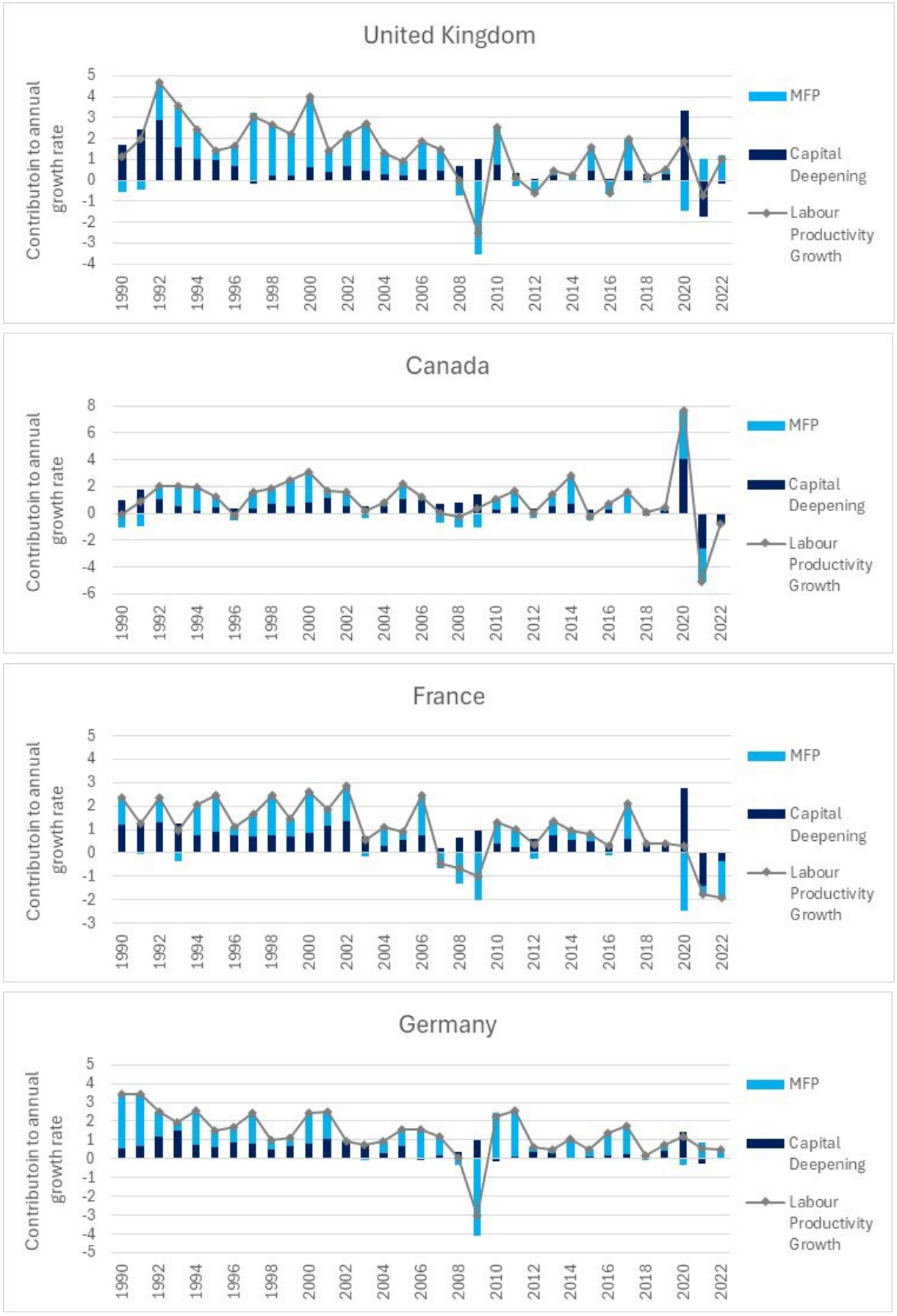


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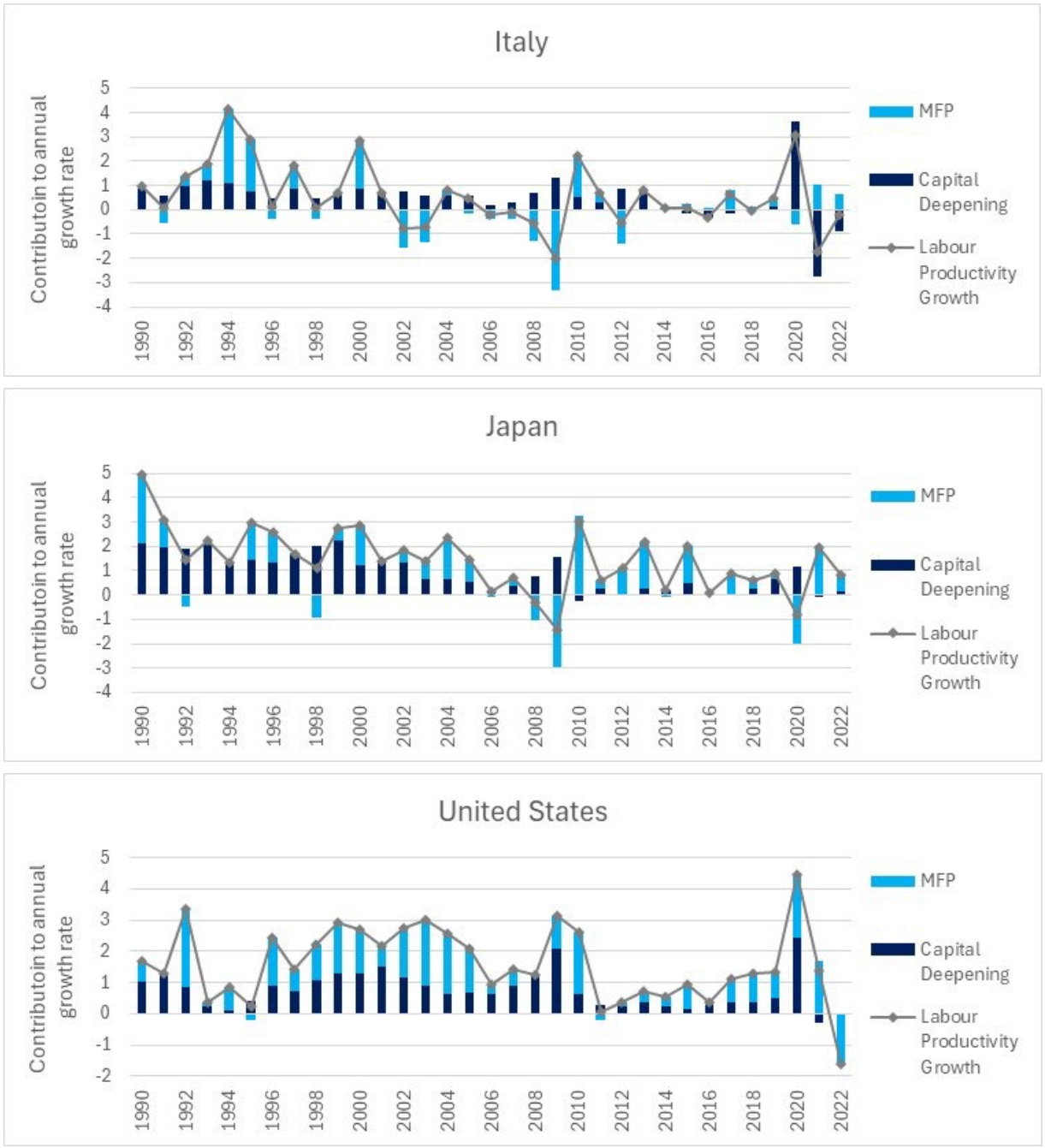
Figure 4, continued: Contribution of Capital Deepening and MFP to Labour Productivity Growth



Source: OECD Productivity Indicators

Table 4: Average contribution Capital Deepening and MFP to Labour Productivity Growth*

	1990 to 1994	1995 to 1999	2000 to 2007	2008 to 2011	2012 to 2019	2020 to 2022
United Kingdom						
Capital Deepening	1.92	0.38	0.45	0.69	0.24	0.47
MFP	0.83	1.80	1.53	-0.67	0.23	0.25
LP Growth	2.75	2.18	1.99	0.03	0.47	0.71
Canada						
Capital Deepening	0.89	0.50	0.78	0.71	0.28	0.21
MFP	0.46	0.90	0.58	0.02	**0.58**	0.39
LP Growth	1.36	1.40	1.36	0.73	0.86	0.61
France						
Capital Deepening	1.16	0.77	0.73	0.57	0.51	0.32
MFP	0.64	1.05	0.76	-0.41	0.32	-1.45
LP Growth	1.79	1.81	1.49	0.15	0.83	-1.13
Germany						
Capital Deepening	0.93	0.69	0.59	0.34	0.24	0.40
MFP	1.85	0.86	0.89	0.12	0.59	0.34
LP Growth	2.78	1.55	1.48	0.45	0.83	0.74
Italy						
Capital Deepening	0.93	0.65	0.58	0.69	0.14	0.00
MFP	0.74	0.48	-0.20	-0.61	0.02	0.36
LP Growth	1.68	1.13	0.37	0.08	0.15	0.36
Japan						
Capital Deepening	1.91	1.73	0.79	0.58	0.25	0.43
MFP	0.71	0.49	0.74	-0.09	**0.75**	0.22
LP Growth	2.62	2.23	1.53	0.49	0.99	0.65
United states						
Capital Deepening	0.70	0.86	0.96	1.04	0.32	0.69
MFP	0.82	0.99	1.24	0.73	**0.51**	0.71
LP Growth	1.52	1.85	2.20	1.77	0.83	1.40

* Simple average of annual contributions during specified periods.
Source: OECD Productivity Indicators

3.17. Prior to the global financial crisis, the US also benefitted from non-ICT capital exerting a moderate impact on growth, although this influence waned during the post crisis period. In contrast, non-ICT capital deepening broadly made a negligible contribution to UK labour productivity growth during both the pre and post crisis period in the UK (note ICT disaggregated data is only available from 1996 onwards).

3.18. France also stands out in terms of capital deepening playing an important role in driving labour productivity. While the contribution of capital deepening in France did not reach the high levels experienced in the UK in the early 1990s, this factor made a more stable contribution throughout the entire period of analysis.

Multi Factor Productivity (MFP)

3.19. While the importance of capital deepening in the UK deteriorated sharply in the mid-1990s, prior to the financial crisis this was offset by efficiency gains in the form of MFP. MFP contributed around 1.8% to annual labour productivity growth during the period 1995 to 1999 and around 1.5% between 2000 and 2007 (Table 4). This compared favorably to other G7 countries, with the US also exhibiting strong MFP growth. This is partly attributed to positive spllover effects between ICT capital investment and knowledge based capital, e.g. the combined impact of advances in ICT technology and changes in business processes that have a productivity enhancing effect[42].

3.20. MFP exerted a negative impact on labour productivity during the global financial crisis. This temporary impact reflects the tendency of firms to underutilise, rather than dispose of, capital during recessionary periods as they await for more clarity about future economic conditions[43].

3.21. It is further evident that UK MFP has failed to realise the same positive impact on labour productivity in the aftermath of the global financial crisis compared to the pre-crisis period. While the UK MFP component has exhibited some variability, it generally contributed substantially less during the 2012 to 2019 period compared to pre 2008 (approximate annual average of 0.2% compared to 1.5%). The slowdown in MFP is not unique to the UK, as demonstrated by the decline in the role of this component in most of the other G7 countries. However, the OECD statistics suggest that the UK experienced a more marked reduction. For example, although the MFP component declined in the US, this component still added around 0.5% to US labour productivity during the period 2012 to 2019.

[42] Wölfl and Hajkova (2007) and Kroszner (2006).
[43] McGowan *et al.* (2015).

Figure 5: Contribution of ICT Capital Deepening, Non-ICT Capital Deepening and MFP to Labour Productivity Growth

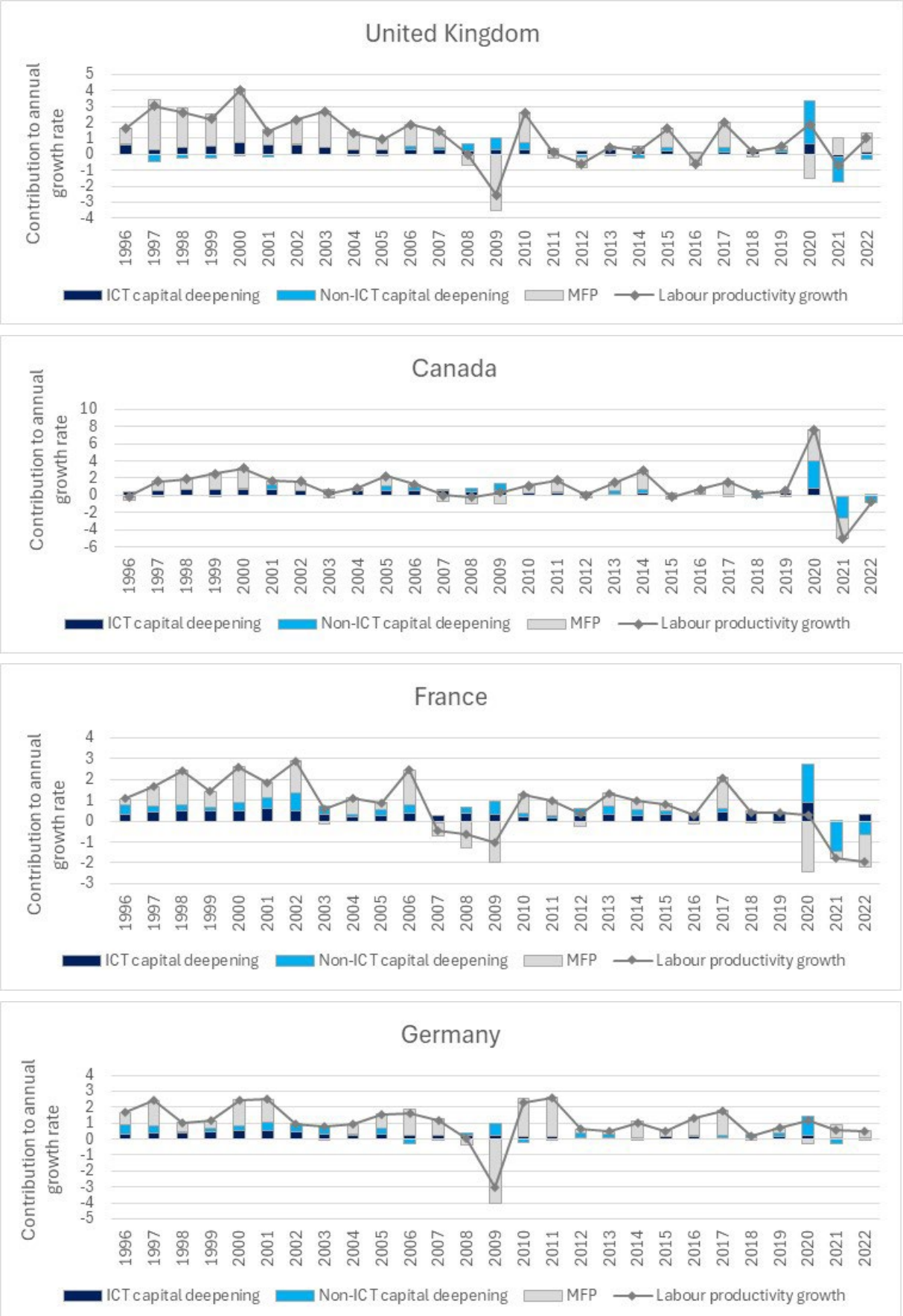


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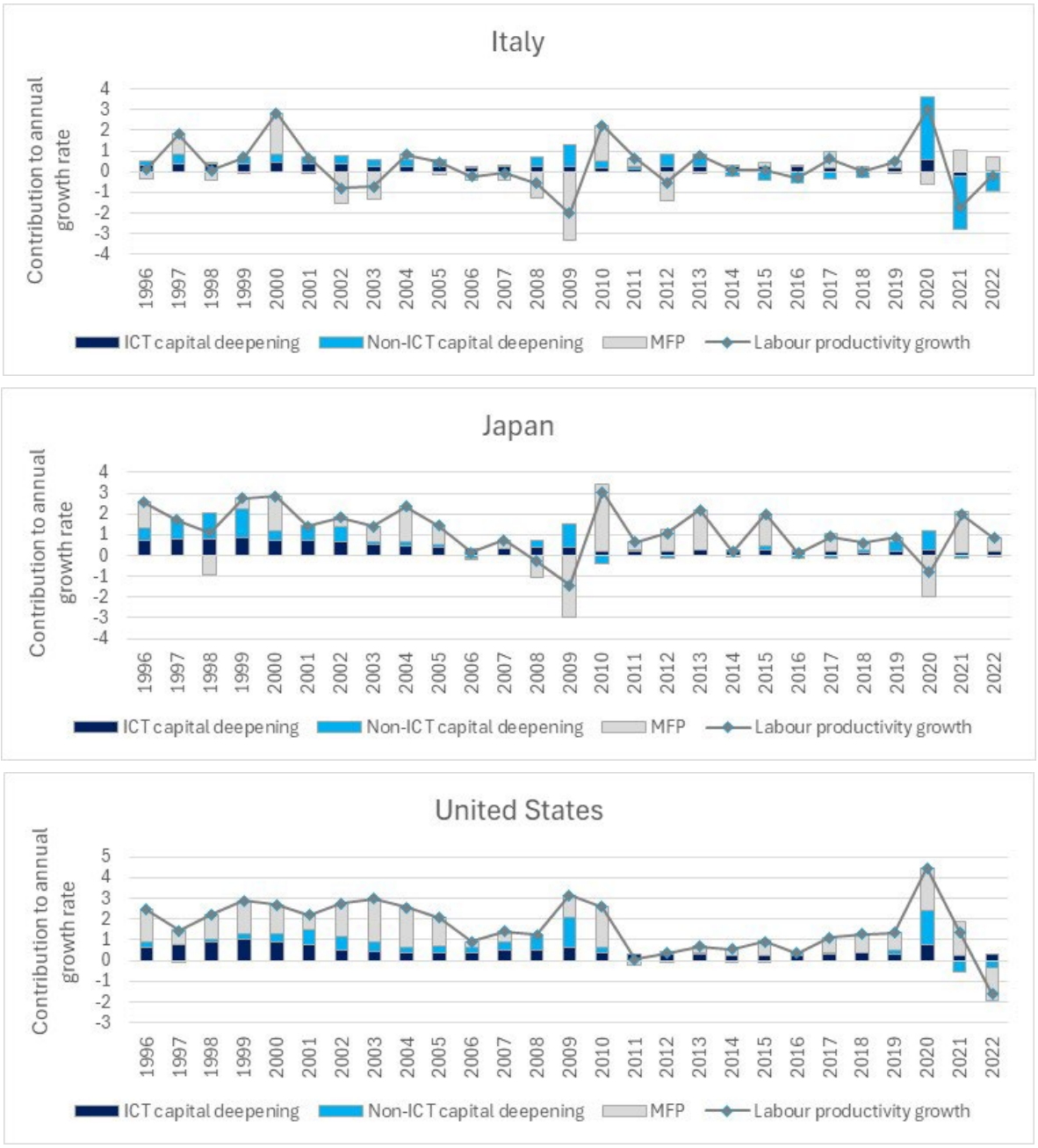
Figure 5, continued: Contribution of ICT Capital Deepening, Non-ICT Capital Deepening and MFP to Labour Productivity Growth



3.23. The slowdown in UK MFP may reflect the complementary effects arising from lower levels of capital investment intensity in the UK, particularly intangible assets linked to knowledge and learning. Lower capital investment in the UK may have a knock-on impact on MFP due to knowledge spillover effects. It is difficult to fully gauge this impact due to the omission of knowledge based assets within the definition of capital within the official statistics. However, sector analysis by Goodridge and Haskel (2022) indicates that that the slowdown in MFP growth in the UK is more far-reaching in intangible intensive-industries such as Scientific Research and Development, suggesting that limited knowledge based capital diffusion has negatively influenced MFP growth in the UK. This is partly attributed to challenges in accessing finance for intangible assets following the financial crisis. As noted in Section 2.2., intangible assets are generally perceived as riskier compared to tangible assets and it is likely that the financial crisis exacerbated the difficulties of raising finance for these types of assets.

3.24. The lower levels of capital investment in the UK, particularly in intangibles with knock-on implications on innovation, suggests that the UK has scope to catch-up and can benefit by the diffusion of technology developments from elsewhere[44]. In addition, there are grounds for optimism that the benefits of the new technologies, including those associated with the New Digital Economy, are still emerging and these opportunities need to be fully exploited to achieve notable productivity growth.

Summary

3.25. In contrast to the pre-global financial crisis era, recent GDP growth in the UK has been fuelled more by favourable labour market conditions than by gains in labour productivity. However, the viability of the reliance on employment growth is questionable in the long-term, making it imperative to revive productivity. Growth accounting helps disentangle the drivers of productivity, revealing a marked decline in capital deepening in the UK. While the dataset may understate the full extent of capital deepening due to the omission of broader intangibles, the persistently weak productivity figures suggest that even expanded investment in these areas has been inadequate. It is also evident the contribution of the MFP component has fallen. This is particularly concerning as this component was previously the main driver productivity in the UK and is regarded as a crucial driver of economic growth in mature economies in which productivity is increasingly led by innovation[45]. This MFP slowdown likely stems from a drop in intangible investment tied to knowledge and learning, weakening the diffusion of ideas, absorptive capacity and spillovers[46].

[44] Smith (2022).
[45] Diaz del Hoyo *et al.* (2017).
[46] Goodridge and Haskel (2022).

4.1. The growth accounting dataset confirms the modest contribution of capital deepening to aggregate labour productivity in the UK in recent years, underlining the need to boost capital investment. Recent micro-level analysis, identified a range of factors that have impeded investment at the firm level in Northern Ireland and makes a number of recommendations to support businesses investment[47]. This includes the provision of policy support to improve the awareness and understanding of the range of finance options available and promoting a stronger culture of investment by increasing awareness as to how to leverage innovation interventions, particularly those that provide a means to recruit skilled talent and support industry-academic linkages.

4.2. At a macro-level, it is also clear that economic and policy uncertainty impedes investment. Due to the fixed nature of costs, capital investment decisions are costly to reverse and consequently businesses may postpone investment decisions until there is greater level of clarity[48]. The global financial crisis had an acute and long-lasting impact on capital investment, reflecting weak demand and heightened uncertainty about financial factors. The UK economy experienced additional uncertainty following the Brexit referendum due to prolonged nature of the negotiations with the EU about future trade arrangements. The 2020 EU-UK Trade and Cooperation Agreement and 2023 Windsor Framework provided clarity on EU-UK trade arrangements, although uncertainty remains about long-term regulatory alignment[49].

4.3. By providing a clear and credible growth plan, the agreement and implementation of City and Growth Deals in Northern Ireland is also an important development in terms of providing greater clarity. In addition to the provision of concrete government funding for infrastructure investment, these City Deals are also valuable in terms of drawing in additional private investment by providing businesses with confidence and institutional support.

4.4. As a measure of the rate of change in the capital stock relative to number of hours worked, capital deepening is dependent upon the labour growth rate, as well as the investment growth rate. The UK labour market performed strongly during the post financial crisis period, with the number of hours worked displaying an annual growth rate of 1.5% per annum between 2012 and 2019. Of the other G7 countries this growth rate was only matched in the US. The strong labour market thus contributed to low capital deepening and based on the growth accounting framework hindered labour productivity growth. It is argued that the flexible nature of the UK labour market, combined with low wages, enabled businesses to substitute capital with labour[50]. While this is beneficial in terms of raising employment levels, it may have contributed to the weak productivity growth pathway in the UK. Going forward, changing demographics and tighter migration mean that the pool of available workers is anticipated to slow down. It is therefore anticipated that businesses will invest in more capital in the future, raising capital-labour ratios. The productivity enhancing impact of

[47] Bonner *et al.* (2025).
[48] McGowan *et al.* (2015).
[49] Low and Caswell (2025).
[50] Chadha and Samiri (2022).

raising the capital-labour ratio is expected to be greater in economies with comparatively low levels of capital stock such as the UK[51].

4.5. The deterioration in UK MFP highlights the need to boost innovation and the diffusion of ideas and knowledge. R&D plays an important role in the development of innovations. At 2.9%, OECD's estimates for 2021 indicate that the UK's gross domestic expenditure on R&D as a share of GDP is inferior compared to leading countries such as Korea (4.9%), US (3.5%) and Germany (3.1%)[52]. At the firm-level, the micro level analysis cited above recommends measures to reduce investment risk aversion in Northern Ireland, including increased availability/accessibility of R&D grants and the re-introduction of a productivity grant[53].

4.6. Moreover, OECD estimates for UK government-funded R&D lags behind the OECD average (0.57% of GDP compared to 0.63%) and further behind leading countries, including Korea (1.12%) and Germany (0.94%). This differential is a concern as publicly funded R&D is beneficial in terms of stimulating privately funded R&D, with recent research evidence indicating that for every £1 spent by the Government on R&D, an additional £3.09 to £4.02 is spent by businesses investing in UK R&D[54].

4.7. In addition to supporting domestic innovation, local businesses can benefit from absorbing new technological developments from overseas businesses at the technology frontier. The diffusion of innovations and best practices from foreign firms can be facilitated by promoting stronger global connections, bolstering the case for increased participation in global supply chains, attracting multinationals and encouraging FDI. The diffusion of technology is also affected by the competitive environment, with increased competition from international firms creating an incentive for local firms to adopt innovative technologies.

4.8. As technologies advance over time and become increasingly complex there is an increased need for complementary investment in intangibles related to knowledge and learning. This includes intangibles not currently included within the System of National accounts such as market research, firm-specific training and business processes. It is argued that policy frameworks should adapt to encourage greater diffusion and investment in these wider knowledge based intangibles such as the development of extension services that go beyond just technology[55]. In addition, the growing importance of these wider intangibles implies that in addition to the core STEM subjects it is beneficial to promote subjects linked to marketing, human resource management, logistics and design, as well as encourage closer collaboration projects between firms and universities in these areas.

4.9. While regional data is available on capital investment (GFCF by asset type), estimates are currently unavailable for capital stocks for Northern Ireland. At the time of writing, the ONS are working on producing a dataset of regional capital stocks based on combining GFCF data with deflators for different assets, taking account of the depreciation profile of individual assets. The availability of regional capital stock data

[51] Smith (2022).
[52] Institute for Manufacturing (2024).
[53] Bonner *et al.*(2025).
[54] National Centre for Universities and Business (2024).
[55] OECD (2013).

will facilitate the application of growth accounting to Northern Ireland. In addition to providing a means to identify the contribution of specific components to labour productivity growth, the growth accounting methodology will help inform the plausibility of forecasts of labour productivity and allow scenario analysis to be undertaken on the knock-on impact of changes to capital investment.

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