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OECD Compendium of Productivity Indicators 2026

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Foreword

Productivity growth is a key driver of economic development and rising living standards. Differences in productivity performance across countries and over time reflect the combined influence of structural, cyclical, domestic and international factors. Reliable and internationally comparable productivity indicators are therefore essential for analysing economic performance and informing policy design.

Since its launch in 2005, the OECD Compendium of Productivity Indicators has provided a comprehensive and internationally harmonised set of indicators on labour productivity, multifactor productivity and related indicators. Produced by the OECD Statistics and Data Directorate, this publication documents both short- and long-term productivity developments across OECD and accession candidate countries, while offering evidence on the contributions of labour and capital inputs.

Beyond aggregate trends, the Compendium sheds light on productivity patterns across industries. In addition, this edition examines trends in investment and productivity differences across firm sizes and regions within countries. It also includes a chapter on an augmented version of multifactor productivity incorporating natural capital as a production input and accounting for the negative externality of gas emissions.

This report was co-ordinated by Nhung Luu and completed under the supervision of Alexander Jaax and Annabelle Mourougane. Chapter 1 was drafted by Alexander Jaax and Nhung Luu. Chapter 2 was drafted by Tom Arend, with contributions from Rodrigo Pazos from the Directorate for Science, Technology and Innovation. Chapter 3 was drafted by Junho Bang and Kazuma Yabe, Chapter 4 by Tom Arend and Nhung Luu, and Chapter 5 by Peter Horvát. Chapter 5 also incorporates contributions from Andrew Green, Martin Reinhard, and Rudy Verlhac from the Directorate for Science, Technology and Innovation as well as from Carlo Menon and Wessel Vermeulen from the Centre for Entrepreneurship, SMEs, Regions and Cities. Chapter 6 was drafted by Miguel Cárdenas Rodríguez, Bopha Chhun, Nathalie Girouard, and Ivan Haščič from the Environment Directorate and Nhung Luu. The authors thank Monica Brezzi, Yann Dorville, Bram Edens, Steve MacFeely, and Gueram Sargsyan for valuable comments and contributions.

The report was formatted by Virginie Elgrably.

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Executive Summary

Labour productivity grew in most OECD countries in 2024 despite elevated uncertainty

Across all OECD countries, labour productivity at the total economy level grew by 1.2% in 2024, double the growth recorded in 2023. Despite geopolitical tensions, skill shortages, and elevated economic uncertainty, 29 OECD countries saw labour productivity gains in 2024, suggesting that a productivity-enhancing role of artificial intelligence (AI) may have offset some of the negative headwinds.

The OECD average investment rate, measured as economy-wide gross fixed capital formation as a share of GDP, declined modestly from 23.0% in 2023 to 22.6% in 2024, supported by robust spending on ICT assets, possibly reflecting firms' efforts to deploy AI. ICT investment rates have risen broadly since the pandemic, but unevenly across OECD countries, leading to wider cross-country gaps.

Virtually all OECD countries were more productive in 2024 than two decades ago, but the pace of improvement has roughly halved since the early 2000s. If pre-2007 trends had continued, labour productivity levels in 2024 would have been an estimated 10-20% higher in 2024.

In the United States, labour productivity rose by 2.2%, marking the second consecutive year of growth. By contrast, the European Union saw a modest increase of 0.2%, following a 0.9% decline in 2023. Consequently, the transatlantic productivity gap widened further, with labour productivity in the European Union reaching only around three-quarters of the US level when measured in constant 2020 Purchasing Power Parities. Similar patterns are observed across other OECD economies, with Japan and Korea slightly below two-thirds and Australia at just over four-fifths of the US level.

Poland, Bulgaria and Denmark emerged as the top performers across the OECD, with Denmark recording gains in manufacturing productivity driven by pharmaceuticals. Preliminary data and OECD nowcast estimates point to positive economy-wide labour productivity growth in 2025 across most OECD countries, with a marked acceleration in the European Union.

Multifactor productivity growth continued a downward trend seen since the 2000s

Growth in multifactor productivity (MFP) – capturing how efficiently labour and capital inputs are combined – remained weak or even declined at the total economy level in most OECD countries with data for 2024. Marking a continuation of a downward trend since the 2000s, average MFP growth across 21 countries with available data declined to around -0.3% in 2023-24, compared with roughly 0.8% in 2010-19 and 1.5% in 2000-07. Amid weak MFP growth, GDP growth in 2024 relied more on increased labour input than on efficiency gains compared with 2000-19.

Conventional MFP metrics disregard the environmental pressures caused by emissions of greenhouse gases and air pollutants, and the depletion of natural capital. Environmentally adjusted multifactor productivity (EAMFP) is designed to incorporate these environmental effects, and GDP can similarly be adjusted to provide a measure of output net of pollution. The efficiency gains captured by EAMFP are estimated to explain roughly half of pollution-adjusted GDP growth in 38 OECD countries over 1996-2018.

Aggregate productivity figures conceal differences across industries and firms

Over the period 2023-24, labour productivity continued to be driven primarily by productivity developments within industries, rather than by shifts in hours worked across industries. Manufacturing productivity weakened in several European economies, partly due to falling labour productivity in automotive production and energy-intensive industries and partly reflecting labour hoarding, as firms retained workers despite subdued production levels.

Industry-level differences in MFP growth across OECD countries have become more pronounced since 2000. This divergence is most visible in digital-intensive industries, possibly reflecting uneven cross-country diffusion of advanced technologies. Information and communication services and professional services – activities where AI adoption is particularly prevalent – experienced the strongest MFP growth across industries in 2024 on average across OECD countries with available data.

In 2024, across OECD and accession candidate countries, average labour productivity of small and medium-sized enterprises was only 65% of that of large firms. Since 2013, this gap has widened in most countries with available data. Yet, there is considerable variation among firms of similar sizes, with around 95% of productivity variance within a given industry occurring within size classes.

1 Productivity growth in a challenging global environment

Key findings

- Across all OECD countries, economy-wide labour productivity grew by 1.2% in 2024, twice the 2023 pace. Despite elevated economic uncertainty, 29 countries saw gains in 2024. Yet, only 11 recorded labour productivity growth in 2024 above their pre-pandemic average (2010-19).
- The United States outperformed most OECD countries, with labour productivity growth of 2.2% in 2024 while it was below 1% in over half of OECD countries. Italy (-1.4%), Japan (-1.3%), the United Kingdom (-0.7%) and Germany (-0.4%) recorded contractions, whereas Canada saw near-zero growth and France experienced a small increase (+0.4%).
- OECD economy-wide growth in multifactor productivity (MFP) – capturing how efficiently labour and capital inputs are combined – remained weak in 2024. Information and communication services as well as professional services experienced the strongest industry-level MFP growth.
- Recent productivity figures, notably strong labour productivity growth in the United States and MFP gains in selected services industries, may provide early, tentative signals consistent with a productivity enhancing role of AI.
- Early estimates based on preliminary data and nowcast estimates point to positive labour productivity growth across most OECD countries in 2025. Labour productivity growth strengthened in the European Union, accelerating from 0.2% in 2024 to 1.4% in 2025.

Introduction

Since its launch in 2005, the OECD Compendium of Productivity Indicators has served as a key reference for internationally comparable insights into labour and multifactor productivity across OECD countries and, where possible, accession candidate countries. The 2026 edition of the Compendium sheds light on the heterogeneity hidden behind aggregate productivity figures by drawing on more detailed industry-level and firm data than in previous editions. It decomposes productivity trends across countries and industries along multiple dimensions to identify the drivers of economic growth, including labour, capital inputs, and multifactor productivity.

The report places recent changes in perspective through comparisons with benchmarks derived from productivity patterns over the last 30 years. It also examines trends in investment and explores productivity differences across and within enterprise size classes, as well as across regions within countries. In line with recent editions – which presented examples of extensions of the measurement framework to address challenges such as cyclicality (OECD, 2025[1]) – this year's edition includes a chapter on environmentally adjusted multifactor productivity, an augmented version of multifactor productivity including natural capital as a production input and accounting for the negative externality of gas emissions.

Due to reporting lags in several key data sources, the most recent productivity statistics presented in most chapters refer to 2024. This introductory chapter nonetheless includes preliminary figures for 2025.

OECD labour productivity grew against backdrop of elevated uncertainty

Labour productivity for the total economy, which measures how efficiently each hour of work translates into GDP, grew by 1.2% in 2024, when averaged across OECD countries using total hours worked as weights (Figure 1.1). This marks an improvement compared with 2023 (+0.6%) and is only slightly below the average rate of 1.3% observed during 2010-19, which, however, was itself a period of relatively weak labour productivity performance.

This growth in labour productivity unfolded against a challenging global economic backdrop, marked by geopolitical tensions, disruptions to shipping in the Red Sea, and a sharp rise in trade policy uncertainty (OECD, 2025[2]). Headwinds to trade can directly affect productivity by weakening export performance, eroding economies of scale and leading to capacity underutilisation, thereby reducing labour productivity. Reduced trade openness can also weigh on productivity indirectly by slowing the diffusion of technological knowledge, by dampening firms' incentives to innovate, and by weakening the reallocation of labour and capital to the most productive firms (Shu and Steinwender, 2019[3]; Melitz and Redding, 2021[4]). At the same time, concerns over supply-chain concentration have spurred efforts to diversify sourcing (OECD, 2025[5]; OECD, 2026[6]), potentially entailing adjustment costs, duplication of production stages, and efficiency losses.

Reduced predictability in the trade policy environment has contributed to elevated uncertainty in OECD economies in recent years, weighing on firms' investment decisions (Boer and Rieth, 2024[7]; OECD, 2025[8]). Investment – a key determinant of productivity performance – is shaped by the macroeconomic environment, notably aggregate demand and borrowing costs. As inflation moderated in 2024, monetary conditions eased, while mild fiscal tightening was underway in many OECD countries.

Against this backdrop, the OECD average investment rate, measured as economy-wide gross fixed capital formation as a share of GDP, declined modestly from 23.0% in 2023 to 22.6% in 2024 (see Chapter 3), remaining above the 2010-19 average but below levels seen in the years before the global financial crisis (2000-07). The mild downward tendency in the investment rate was mitigated by robust spending on ICT assets, possibly reflecting firms' efforts to deploy artificial intelligence (AI).

Recent productivity figures may partly reflect emerging AI effects

While a growing body of literature provides micro-level evidence of the potential of AI to deliver productivity gains at the level of specific tasks (Cui et al., 2026[9]; Schwarcz et al., 2026[10]), recent discussions have highlighted the difficulty of detecting clear signs of AI-driven economy-wide productivity gains in official statistics (OECD, 2025[1]; International Labour Organization/International Labour Organization,, 2026[11]).

Key explanations for an apparent disconnect between micro insights and the aggregate picture include uneven AI adoption across industries and firms, as well as the need for complementary investments in training, managerial adjustments, and infrastructure to realise the potential of AI. Productivity as reflected in official statistics may stagnate or even fall during a transitionary period shaped by high adjustment costs, before gains eventually become visible in a pattern described as a J-curve (Brynjolfsson, Rock and Syverson, 2021[12]). Multifaceted measurement challenges, especially regarding investments in intangibles, may make it difficult for official statistics to fully capture the impact of AI (see Box 1.1).

While far from conclusive, and subject to substantial uncertainty, an optimistic reading of productivity developments in 2024 and preliminary estimates for 2025 (discussed further below) may, however, be interpreted as providing early, tentative signals consistent with a productivity-enhancing role of AI. Overall OECD labour productivity growth accelerated in 2024 compared with 2023 (1.2% versus 0.6%) despite geopolitical tensions and wars, skill shortages, and elevated economic uncertainty.

Labour productivity growth can be decomposed into capital deepening – i.e. changes in capital input per hour worked – and improvements in multifactor productivity (MFP), which reflects changes in output not accounted for by changes in capital and labour inputs. Recent labour productivity growth in the United States and other OECD countries may in part be driven by capital deepening associated with AI adoption. AI-induced improvements in economy-wide MFP depend on diffusion and complementary investments, including in skills. OECD economy-wide MFP growth continued to be slow in 2024, but information and communication services as well as professional services – which encompass activities such as legal services and management consulting – experienced the strongest MFP growth across industries in 2024 (see Chapter 4). AI adoption is particularly prevalent in these industries (Filippucci et al., 2025[13]; OECD/BCG/INSEAD, 2025[14]).

Yet, a nuanced view should also consider other factors that may have supported productivity growth in recent years, e.g. the acceleration of digitalisation during the Covid-19 pandemic (Criscuolo et al., 2023[15]; Dao, 2024[16]), unwinding of labour hoarding (Bodnár et al., 2025[17]), as well as increases in the tradability of many services (Benz, Jaax and Yotov, 2022[18]) and growth in digital trade (OECD, 2025[19]).

Box 1.1. Recent evidence on the link between AI and productivity and measurement challenges

The rapid acceleration of AI advances and adoption since the early 2020s raises two key questions for productivity statistics: first, whether any AI-related effects are already visible in measured productivity growth, and second, what measurement difficulties arise in capturing these effects within the current statistical framework.

Recent evidence on the link between AI and productivity

Most attempts to pin down the productivity effects of AI can be broadly subsumed into three categories. First, a rapidly growing body of literature adopts a micro perspective, often focused on individual workers, plants or firms, to explore how this new technology affects the efficiency of performing specific tasks. Contributions in this realm often find sizeable positive effects of AI on task-level productivity, e.g. regarding business problem-solving (Cruces et al., 2026[20]), mammography screenings (Gommers et al., 2026[21]), and customer support (Brynjolfsson, Li and Raymond, 2025[22]). Such micro studies also shed light on nuances and partially negative effects on productivity. For example, AI adoption may hamper skill acquisition (Shen and Tamkin, 2026[23]) and the most skilled and experienced workers might see small improvements in speed but also small reductions in quality.

A second group of studies takes an aggregate, forward-looking perspective, using modelling approaches to predict the potential economy-wide productivity effects of AI. Analyses in this vein typically start from existing estimates and assumptions about the effect of AI on individual tasks, incorporating them in general equilibrium models applied to different adoption scenarios (Misch et al., 2025[24]; Filippucci, Gal and Schief, 2026[25]). Acemoglu (2024[26]) predicts improvements in the average labour productivity growth rate by roughly 0.12 percentage points (p.p.) of the United States over ten years, whereas recent OECD work focussing on the G7 suggests gains in average annual labour productivity growth of 0.2-1.3 p.p. over a ten-year horizon (Filippucci et al., 2025[13]).

Thirdly, an emerging set of contributions focuses on ex-post empirical assessments beyond individual tasks or groups of workers. As AI adoption accelerates, this perspective draws on newly available surveys and official industry-level productivity data to study observed productivity effects, in contrast to approaches that model future impacts. For example, an analysis of survey data covering 12 000 firms in 27 EU countries indicates that AI adoption increases firm-level labour productivity in the short run by 4% (Aldasoro et al., 2026[27]). Comparing measures of AI adoption to industry-level labour productivity trends in the United States, Çakır Melek and Miller (2026[28]) identify patterns suggesting that AI use is linked to within-industry improvements in labour productivity since 2022, while noting that these patterns are not yet broad-based across industries. In a study relying on regressions using industry-level data for 31 countries, Bick et al. (2026[29]) find that industries with higher firm-level AI adoption experienced faster labour productivity growth in Europe and the United States over 2022-2024.

Measurement challenges

The central role of intangible capital in the investments required to adopt the new technology constitutes a key measurement challenge which may lead to an underestimate of productivity gains from a new technology such as AI during the transition phase (Brynjolfsson, Rock and Syverson, 2021[12]). Intangible investments, e.g. in training or adjustments of business processes and software, are imperfectly captured in firm-level balance sheets and national accounts. The 2025 System of National Accounts (SNA, 2025[30]) broadens the scope to include additional intangible assets and encourages provision of more detailed reporting, most notably regarding data, software, and AI. Yet, statistics according to SNA 2025 with sufficiently broad country coverage for comprehensive cross-country analyses will not be available before the early 2030s.

Further measurement challenges relate to cloud computing, which changes the boundary between investment and intermediate consumption (Ker, 2021[31]) and may lead to an underestimate of investment in AI. The difficulty of accurately capturing AI investment is further exacerbated by the lack of accurate deflators to adjust for quality changes of AI assets and insufficient information on retirement and depreciation profiles of AI assets (Bontadini et al., 2026[32]).

Beyond these hurdles concerning investment, further open questions relate to the fact that the value created by AI may in many cases not be directly observable in classic financial transactions. In order to assign a monetary value to AI output that is quasi-free for consumers or bundled with other digital services, Brynjolfsson et al. (2026[33]) conduct online choice experiments to elicit consumers' willingness to accept compensation for giving up access to AI services. Their results point to a substantial increase in AI-driven welfare gains between July 2025 and March 2026 in the United States.

Moreover, measures of AI adoption are not harmonised across countries, limiting comparability (Bick et al., 2026[29]). Even within a given country, different surveys can yield varying estimates of adoption, for example due to differences in how AI is defined (Allen, 2026[34]).

In addition, the expansion of AI is accompanied by growing energy use and emissions, particularly through data centres and computing infrastructure. However, these environmental costs are not yet incorporated into standard productivity measures. While significant efforts have been made to account for environmental externalities in productivity analysis, existing approaches each come with their own strengths and limitations (see Chapter 6). Moreover, environmental accounting practices remain predominantly national in scope, despite the fact that AI usage in one country can give rise to emissions elsewhere, reflecting the location of server and data centre infrastructure (Coyle and Poquiz, 2025[35]).

For recent discussions of AI-related measurement challenges and potential ways of addressing them, see Coyle and Poquiz (2025[35]), Fonteneau et al. (2025[36]) and Makridis and Brynjolfsson (2026[37]).

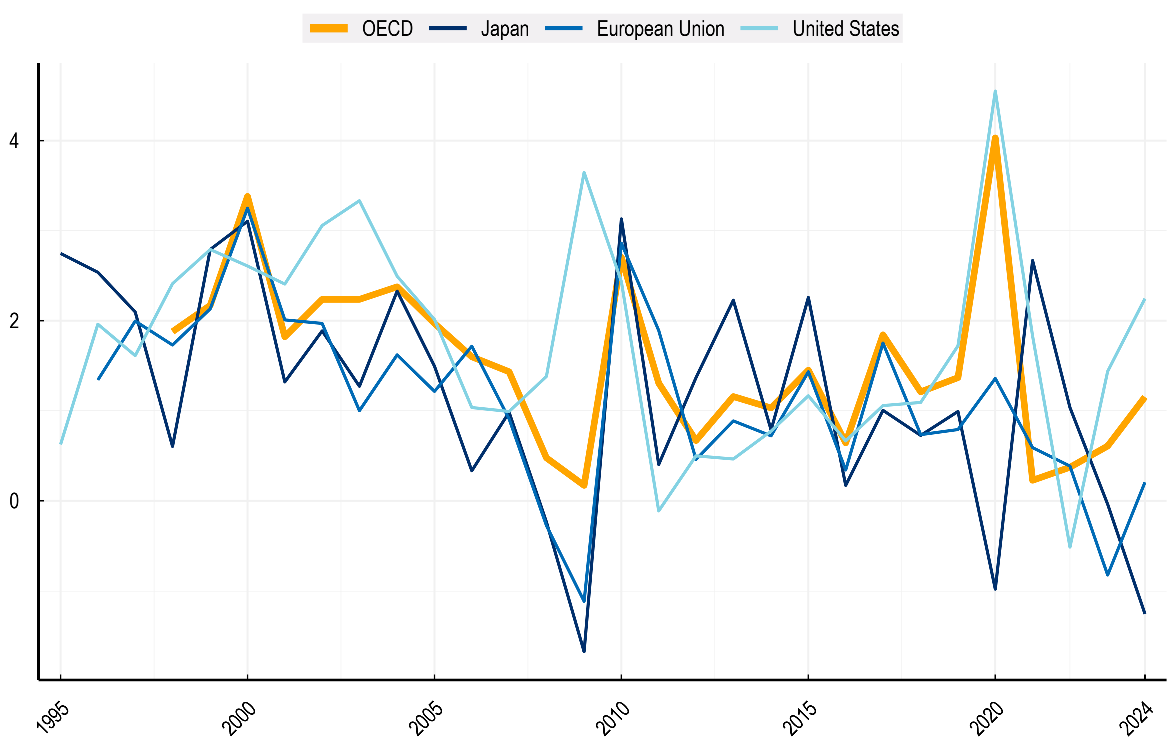
Productivity growth differed across countries in 2024

A 2.2% increase in labour productivity in 2024 marked the second consecutive year of growth in the United States (Figure 1.1). This gain in US labour productivity in 2024 is more than double the average growth observed between 2010 and 2019. These strong gains could point to emerging effects of AI: the United States has seen AI adoption rates rise sharply, with employment-weighted firm AI adoption reaching around 78% in November 2025 (Allen, 2026[34]). The US labour productivity growth rate in 2024 (+2.2%) reached a level close to the average (+2.3%) observed for this economy during the period before the global financial crisis (2000-07).

In contrast, the European Union saw labour productivity grow by only 0.2% in 2024 – far below the average pace seen during 2010-19 (1.2%). The stronger increase in labour productivity in the United States compared with the European Union in 2024 has further widened the productivity gap across the two sides of the Atlantic (see Chapter 2). Measured in US Dollars in constant 2020 Purchasing Power Parities, labour productivity in the European Union reached only around three quarters of the US productivity level in 2024. Similar patterns are observed across other OECD economies, with Japan and Korea slightly below two thirds and Australia at just over four fifths of the US level.

Figure 1.1. Labour productivity developments since 1995

GDP per hour worked, total economy, per cent



Note: For the OECD and European Union aggregates, the series start in 1995 due to data limitations for some countries regarding earlier years.
Source: OECD Productivity database.

StatLink https://stat.link/rwcdpy

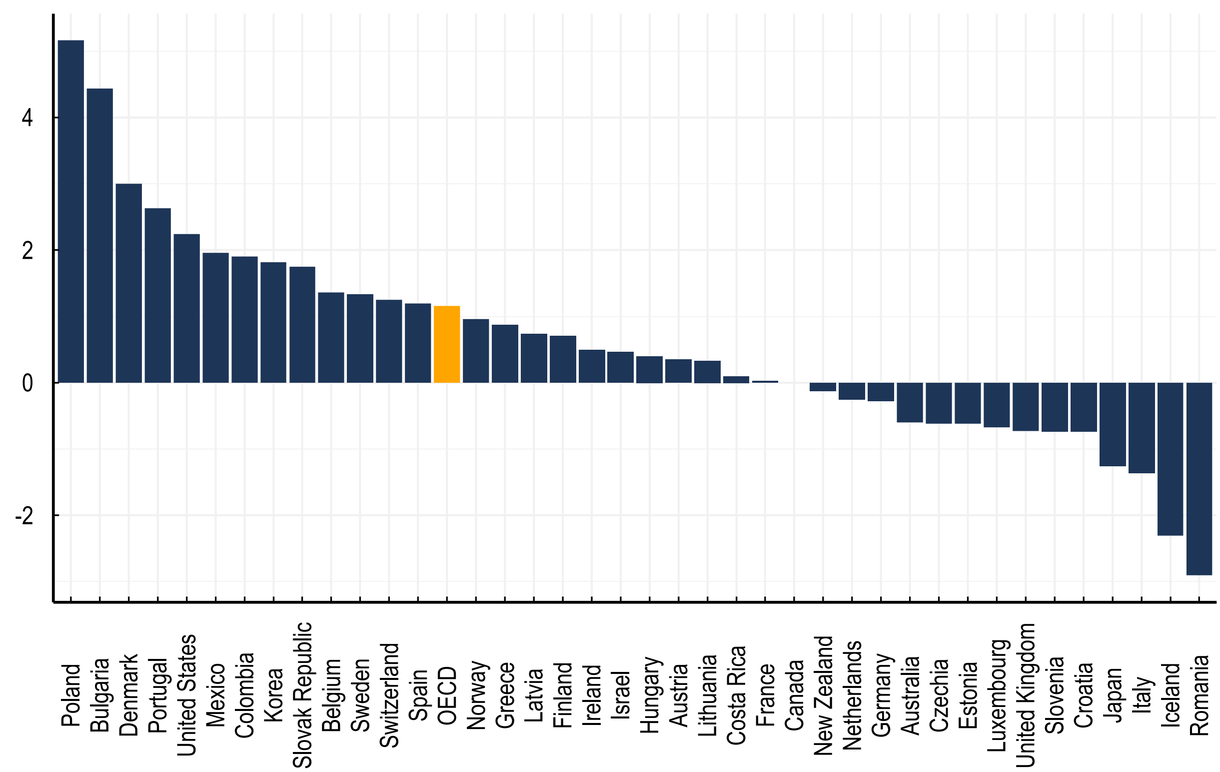
Over half of OECD countries saw gains in labour productivity in 2024, with the rest experiencing stagnation or declines. Twenty-nine countries experienced higher labour productivity growth in 2024 compared with 2023. However, only 11 countries recorded labour productivity growth in 2024 exceeding their pre-pandemic average (2010-19), even though this represents a relatively modest benchmark.

The labour productivity growth seen in the United States (+2.2%) in 2024 stood out among the G7 countries. Italy (-1.4%), Japan (-1.3%), Germany (-0.4%), and the United Kingdom (-0.7%) recorded contractions, whereas Canada saw near-zero growth and France experienced a small increase (+0.4%).

Considerable heterogeneity characterised labour productivity developments across EU countries in 2024. Poland (+5.1%), Bulgaria (+4.4%) and Denmark (+3%) emerged as the top performers across the OECD. Conversely, Croatia (-1.3%) and Romania (-2.9%) recorded sizeable declines (Figure 1.2). Diversity in outcomes was also visible beyond Europe: Australia recorded a decline (-0.7%), whereas Korea (+1.8%) and Mexico (+2%) registered improvements in labour productivity.

Figure 1.2. Labour productivity growth in 2024

GDP per hour worked, total economy, per cent



Source: OECD Productivity Database.

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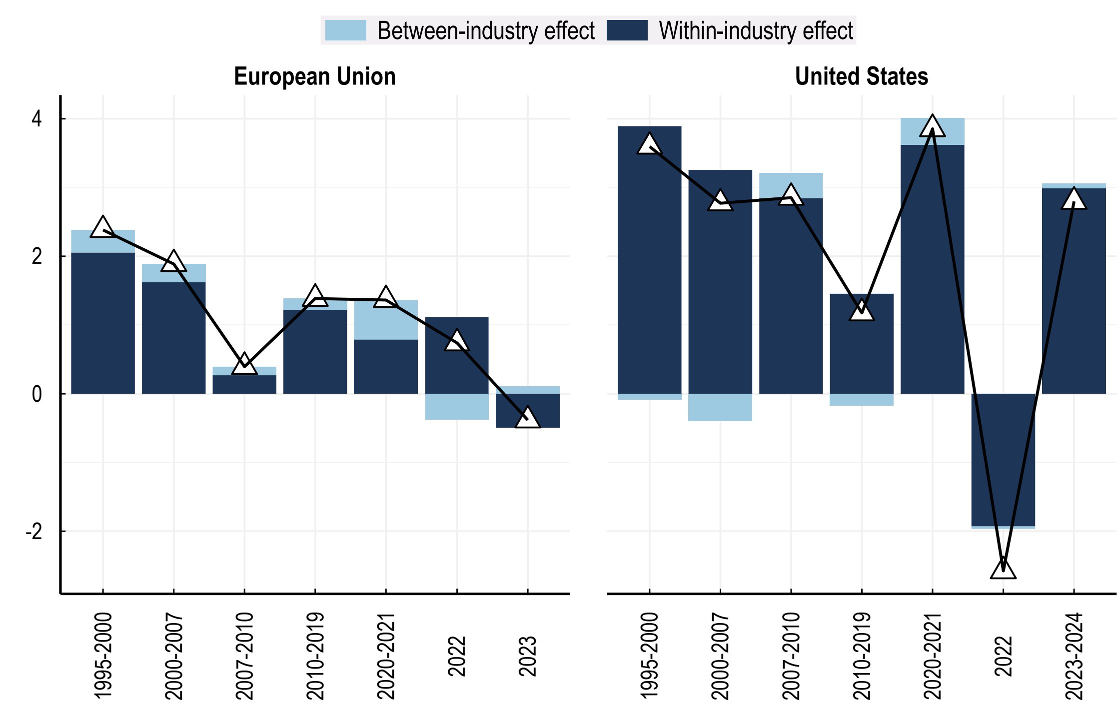
In 2024, labour productivity growth varied widely across industries in OECD countries, with mining and agriculture showing the largest cross-country dispersion. Overall productivity growth in manufacturing reflected the influence of key industries. Pharmaceutical productivity surged in Denmark in 2024, driven by GLP-1 therapies. This single industry pushed overall Danish manufacturing productivity growth well above the OECD median (see Chapter 4).

Aggregate labour productivity growth in 2024 was primarily driven by improvements within industries rather than by shifts in hours worked across industries (Figure 1.5). The within-industry effect, which captures productivity changes occurring inside industries, accounted for the majority of overall productivity growth. By contrast, the between-industry effect, reflecting changes in the distribution of total hours worked across industries, remained modest in most countries. Yet, the picture emerging from this analysis may partly reflect the chosen level of aggregation. Some reallocations of hours may go unobserved, as it can occur within industries across more detailed activities.

Figure 1.3. Contributions to labour productivity growth: European Union versus United States

In percentage points



Note: The between-industry effect refers to the reallocations of hours worked between industries with different productivity levels or productivity growth rates. The within-industry effect reflects labour productivity developments that are not the result of reallocation of hours worked between industries. It is measured by the labour productivity growth in each industry weighted by the industry share in total value added (Chapter 4). For the United States, these three effects do not fully sum to the labour productivity growth due to the use of Fisher volume indices for GVA. However, the residual is typically small, especially when averaged over several years (see the methodological note). The decomposition is based on data at the A38 industry level for most countries, while data at the A21 industry level are used for Germany, France, Japan, Korea, Latvia, Poland, Portugal, Romania, Spain, and Sweden.
Source: Authors' calculation based on OECD Productivity Database.

StatLink https://stat.link/b3afsq

Preliminary data suggest labour productivity grew in most OECD countries in 2025

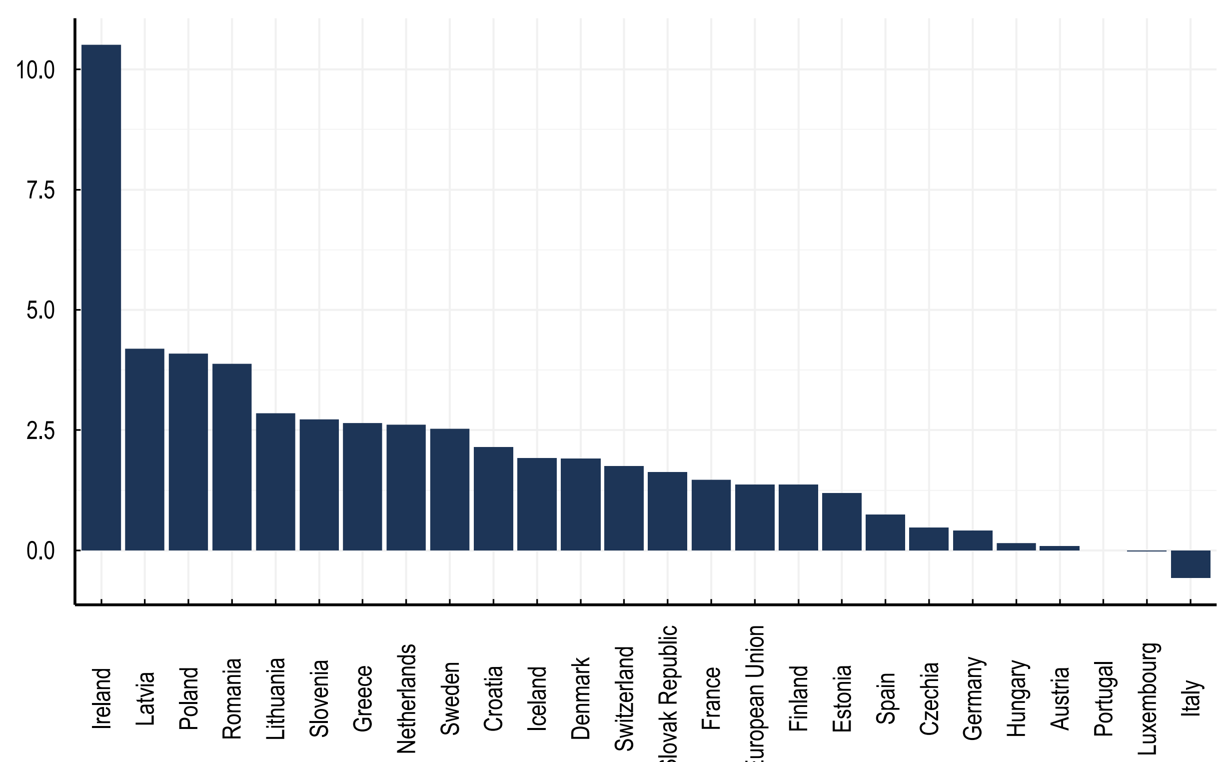
Early estimates based on Annual National Accounts data point to positive labour productivity growth across most OECD countries in 2025. On average, labour productivity growth strengthened in the European Union, accelerating from 0.2% in 2024 to 1.4% in 2025. Ireland, where the activities of multinational enterprises complicate the interpretation of conventional productivity measures (see Box 2.1 in Chapter 2), recorded the strongest increase, followed by Latvia and Poland (Figure 1.4, Panel A). By contrast, only a few countries – such as Italy, Luxembourg and Portugal – saw stagnant outcomes or a decline in labour productivity.

When data from Annual National Accounts is not available, estimates are derived using Quarterly National Accounts data or a nowcasting approach, as described in Dorville et al. (2025[38]). These estimates suggest a moderation in labour productivity growth at the total economy level in the United States, from 2.2% in 2024 to 1.7% in 2025 according to data from the U.S. Bureau of Economic Analysis (BEA) and the Bureau of Labor Statistics (BLS) data, close to the OECD nowcast estimate for that year. Nowcast estimates suggest that labour productivity growth in 2025 is likely to have been close to 1.3% in Japan and 1.8% in Korea (Figure 1.4, Panel B). However, preliminary estimates for 2025 are uncertain and should be interpreted with caution.

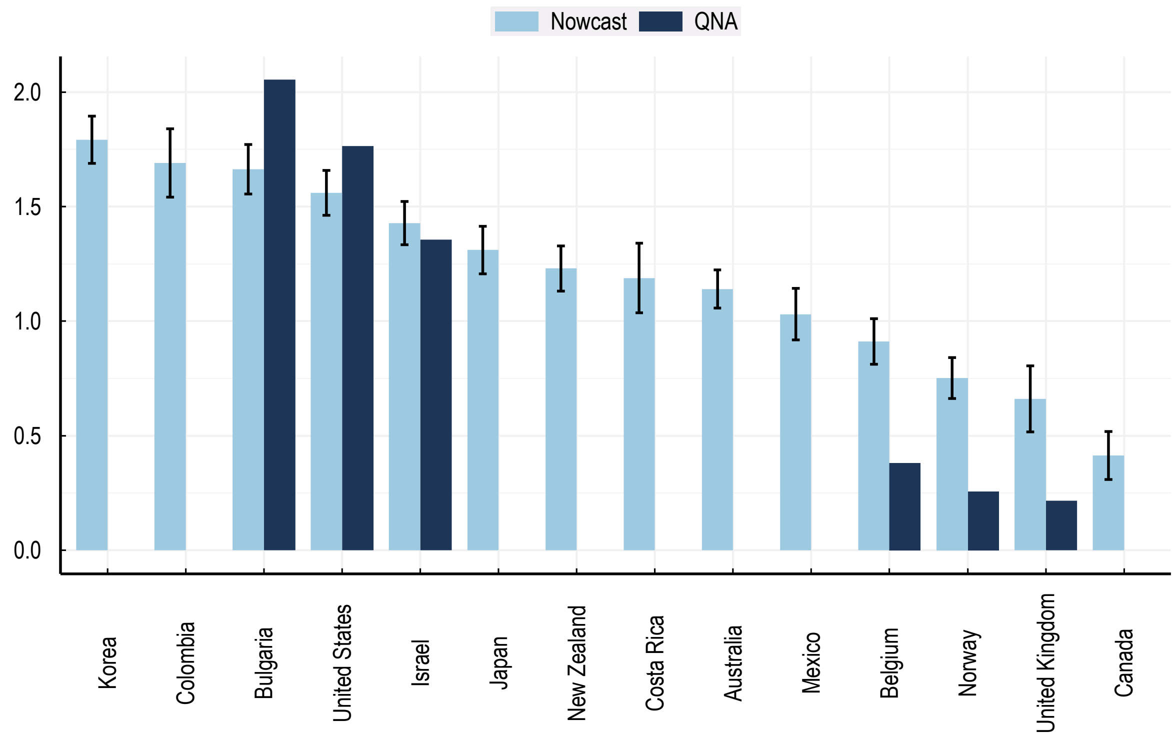
Figure 1.4. Preliminary data: Labour productivity developments in 2025

GDP per hour worked, per cent

Panel A: Estimates based on Annual National Accounts data



Panel B: Estimates based on quarterly national accounts data and nowcasting methods



Note: Labour productivity growth estimates for 2025 are based on OECD Annual National Accounts data. When these data are not available, estimates are derived using either OECD Quarterly National Accounts (QNA) data or nowcasting techniques as described in Dorville et al. (2025[38]) based on data up to April 2026. 95% confidence intervals are reported to reflect the uncertainty surrounding the nowcast estimates. For the United States, quarterly data are drawn from the US Bureau of Economic Analysis (BEA) and the Bureau of Labor Statistics (BLS).
Source: Authors' calculations based on OECD Annual National Accounts, OECD Quarterly National Accounts, BLS, BEA and OECD Productivity database as well as nowcasts relying on methods described in Dorville et al. (2025[38]).

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These preliminary signs of positive labour productivity growth in 2025 likely reflect two main supportive forces across many countries. First, macroeconomic policies and improved financial conditions together with gains in real labour incomes strengthened demand, cushioning the adverse effects of rising trade barriers and geopolitical tensions. Second, enthusiasm about AI sparked growth in investment and trade related to ICT equipment and software (OECD, 2025[2]). At the same time, employment and labour force participation remained stable in most countries, alongside still-tight labour markets (OECD, 2025[39]).

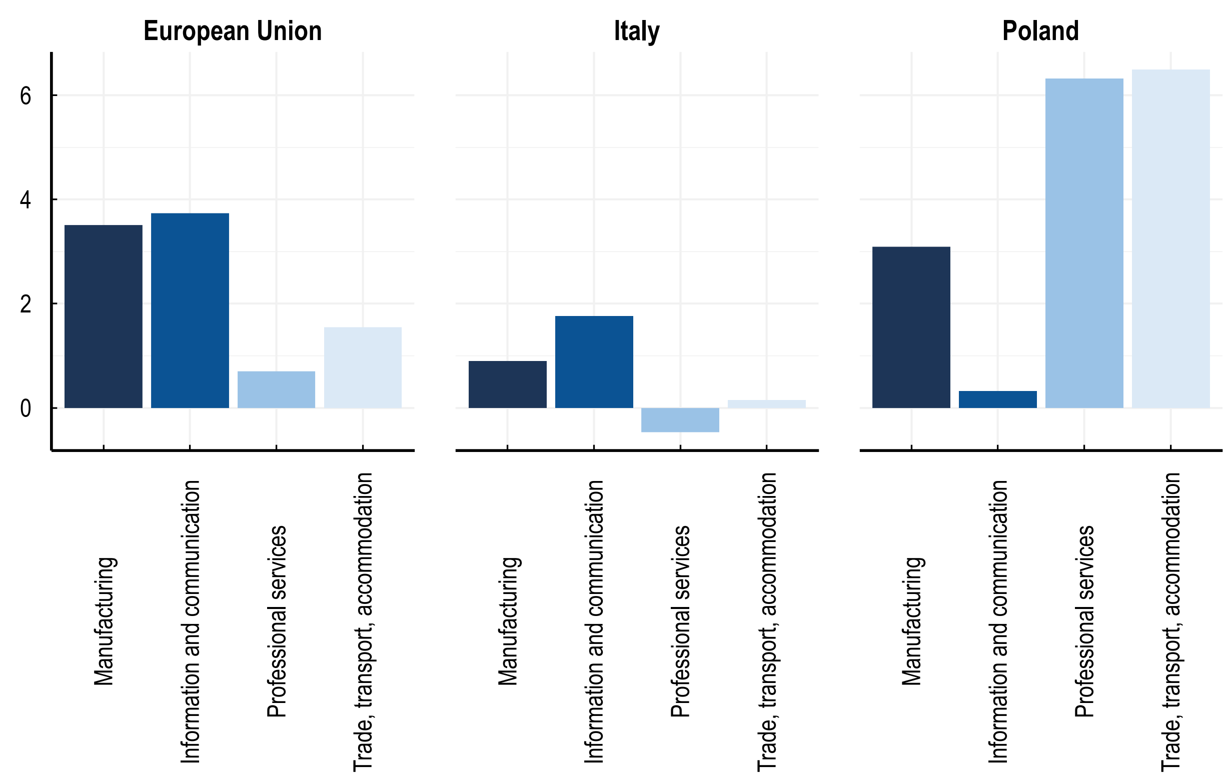
Early evidence suggests industry-level labour productivity developments varied across economies in 2025, likely reflecting country differences in firm dynamics, technology adoption, and business environment conditions. Given the debate about potential productivity gains from AI, the relatively strong productivity growth in information and communication services in the European Union (+3.7%) is noteworthy. Yet, the much lower growth recorded in this industry in the European Union in 2024 (+0.4%) suggests it is too early to view this as a sustained trend.

Figure 1.5 shows labour productivity growth across selected industries, highlighting the heterogeneity behind aggregate EU figures by contrasting them with Italy – which recorded one of the weakest performances – and Poland, one of the strongest performers in 2025. In Italy, growth in information and communication services appears to have been a key contributor to overall productivity performance in 2025. By contrast, labour productivity growth remained muted in manufacturing, where output declined broadly between 2023 and 2025 amid lower Chinese demand for luxury goods and reduced exports to the United States following tariff increases. Labour productivity growth was negative in professional services, an industry that in Italy is characterised by limited competitive pressures linked to high regulatory barriers to entry and expansion (OECD, 2026[40]).

A different picture emerges in the case of Poland, where sizeable gains were recorded in trade, transport and accommodation services. Amid unemployment rate below 3% and high vacancy rates, the difficulty of expanding employment may have incentivised firms in this industry to seek efficiency gains. Poland also experienced strong labour productivity growth in professional services (Figure 1.5), an industry whose contribution to total exports has been growing (OECD, 2025[41]).

Figure 1.5. Labour productivity growth in selected industries, 2025

Gross value added per hour worked, per cent



Note: Trade, transport, accommodation encompasses wholesale and retail trade, transportation, accommodation and food services. Professional services include professional and administrative service activities.
Source: Authors' calculation based on the OECD Annual National Accounts database.

StatLink https://stat.link/rqt3bs

Aggregate productivity figures conceal differences across firms of different sizes (see Chapter 5). In 2024, small and medium-sized enterprises (SMEs; defined as firms employing 1 to 249 employees) in the business sector operated at significantly lower labour productivity levels than large firms (with 250 or more persons employed). Across OECD and accession candidate countries, unweighted average SME productivity was only 65% of that of large firms, measured by turnover per person employed. The size-productivity gap varies substantially across countries. Whereas SMEs in Ireland on average achieved only 40% of the labour productivity of large firms, Swiss SMEs' average productivity was only 2% lower than that of large firms. Since 2013, this gap has widened in most countries (20 out of 32) and across most industries. Yet, there is considerable variation among firms of similar sizes, with around 95% of productivity variance within a given industry occurring within size classes, according to evidence from the OECD MultiProd project (see Chapter 5).

Labour productivity trends reflect the interplay of global and country-specific factors

Labour productivity outcomes ultimately reflect the joint influence of global factors and country-specific determinants, encompassing both long-standing structural features and cyclical developments. Key examples of well-established country-level determinants of productivity performance include skills, quality of institutions, macro-economic stability, and competition (OECD/APO, 2022[42]).

Weak investment is often considered as a key explanation for the prolonged slowdown in productivity growth observed across OECD countries in recent decades (André and Gal, 2024[43]). Germany, for example, has seen low investment in knowledge-based capital. Productivity growth in this country has also been hampered by the slow adoption of digital technologies, barriers to firm entry and exit, and a growing concentration of employment in larger and older incumbent firms in recent years (OECD, 2025[44]).

Furthermore, skill shortages constitute a major challenge for productivity growth, with recent OECD analysis indicating that addressing gaps in adult skills between OECD countries could lead to substantial improvements in average OECD labour productivity (OECD, 2024[45]). At the same time, demographic change heightens the need for life-long learning and greater labour mobility for workers of all ages (André, Gal and Schief, 2024[46]).

Differences in countries' exposure to changes in international competition and technological shifts also contribute to variation in productivity performance. For example, the transition to electric vehicles and growing competition from Chinese producers have challenged European automotive companies (EPRS, 2024[47]). In Italy, motor vehicle production volumes fell by about 40% between November 2023 and November 2025 (OECD, 2026[40]). Adjustment costs, e.g. through retraining of workers, may weigh on current productivity performance. However, in the medium term, restructuring could support productivity gains over time through capital deepening, innovation and the exit of less productive firms.

Diverse productivity outcomes in 2024 also reflect differences in countries' positions in the business cycle. Labour productivity tends to be procyclical, with labour hoarding – i.e. firms paying for more hours of work than would be strictly needed for current levels of output – playing a central role in explaining this pattern (Lewis and Villa, 2026[48]). Unemployment rates were at historically low levels in many OECD countries in 2024 (OECD, 2025[39]) and in several European countries, such as Austria and France, employment and hours worked held steady or even increased despite subdued economic growth (see Chapter 2). While retaining workers during periods of subdued activity can help firms respond quickly when demand recovers, it may temporarily reduce labour utilisation and contribute to weaker labour productivity growth.

Differences in business-cycle positions are evident in the experiences of Korea and Romania, which saw diverging labour productivity outcomes in 2024. In Korea, labour productivity grew by 1.9% in 2024, coinciding with an economic rebound. Following a period of weak economic growth linked to global overcapacity in semiconductor supply, GDP growth picked up in 2024, partly supported by a recovery in global demand for chips (OECD, 2024[49]). This contrasts with the case of Romania, where labour productivity declined by 2.9% in 2024. Amid weak investment in a context of elevated policy uncertainty and subdued export performance, GDP growth fell sharply from 2.3% in 2023 to 0.9% in 2024 (OECD, 2026[50]).

MFP growth remained weak in 2023 and 2024

Multifactor productivity (MFP) growth, the primary engine of long-term productivity gains, remained weak in 2023 and 2024, continuing the slowdown seen in advanced economies since the mid-2000s (André and Gal, 2024[43]; Fernald, Inklaar and Ruzic, 2025[51]). Unweighted average MFP growth across 21 countries with available data in the period of 2023-24 is estimated at around -0.3%, compared with 0.8% in the pre-COVID period (2010-19) and about 1.5% during the period of 2000-07 (see Chapter 4). Positive MFP growth suggests improvements in efficiency, allowing more output to be generated from a given combination of labour and capital inputs.

Roughly half of countries recorded positive growth, and the remainder saw a decline. The Slovak Republic continued to display the strongest MFP growth, averaging roughly 3% in the years 2023 and 2024 (see Chapter 4). The United States recorded average MFP growth of 1.4% over these two years. The largest declines in MFP were observed in Estonia and Luxembourg, where MFP fell by around 5% and 2.5%, respectively.

The long-run slowdown in MFP growth has been linked to several potential explanations, such as low investment after the global financial crisis, demographic change, slowing economic globalisation, reduced knowledge diffusion among firms, and growing market power of intangibles-rich firms (Adler et al., 2017[52]; Akcigit and Ates, 2021[53]; Berlingieri et al., 2024[54]; De Ridder, 2024[55]). However, regarding variation over short time horizons, it is also important to bear in mind that productivity measures, including MFP, often exhibit cyclical fluctuations. This pattern is consistent with the well-documented procyclical nature of MFP (Comin et al., 2025[56]).

A decomposition of drivers of GDP growth into contributions from labour, capital and MFP for 21 countries shows that, amid sluggish MFP growth, increases in labour inputs have gained importance. During 2000-19, contributions from labour, capital, and MFP were typically more evenly shared than in the most recent period. Labour input growth has since become the dominant positive contributor in many economies, while the contribution of MFP growth was negative in 14 out of 21 countries in 2024 (see Chapter 2). The broader implication is that the post-pandemic period has not restored the earlier, more balanced growth model. In many economies, output expansion has come to depend on adding hours rather than on raising the productivity of those hours. Addressing drivers of growth beyond increases in labour inputs, including training requirements linked to population aging (André, Gal and Schief, 2024[46]), will therefore be important going forward (OECD, 2026[57]).

Differences in MFP growth across OECD countries within specific industries have become more pronounced since the 2010s. This divergence is most visible in digital-intensive industries, possibly reflecting uneven cross-country diffusion of advanced technologies (see Chapter 4). Consistent with this interpretation, the analysis of investment in ICT assets and R&D shows greater cross-country dispersion in 2024 than during the 2010-19 period (see Chapter 3).

Moreover, large and persistent regional disparities in firm-level MFP performance, observed, for example, in Italy and Spain, are evident even within the same industry and firm size classes, underscoring the role of local factors beyond firm size and industrial composition (see Chapter 5).

Extending the measurement framework to incorporate environmental pollution casts productivity developments in a new light

Conventional MFP metrics disregard the environmental pressures caused by emissions of greenhouse gases and air pollutants, and the depletion of natural capital (e.g. energy resources). To address this limitation, efforts have sought to incorporate emissions and natural capital into a growth accounting framework and derive environmentally adjusted multifactor productivity (EAMFP; see Chapter 6). The latest OECD estimates of EAMFP at the total economy level by Cárdenas Rodríguez et al. (2023[58]) rely on an augmented framework that treats emissions as undesirable byproducts of economic activity and includes natural capital alongside labour and produced capital as factor inputs. GDP can similarly be adjusted to provide a measure of output net of pollution. The efficiency gains captured by EAMFP are estimated to explain roughly half of pollution-adjusted GDP growth in 38 OECD countries over 1996-2018.

Despite significant progress in recent years, EAMFP indicators continue to face important methodological and data challenges. Increasing the timeliness of inputs will help to shed light on more recent developments in EAMFP. Further methodological work is needed to broaden the coverage of natural capital and pollution emissions, and to strengthen the estimation of shadow prices for pollution.

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2 Labour productivity in OECD economies: Recent trends and shifting drivers of growth

Key findings

- Labour productivity growth remained subdued across most OECD countries in 2024, extending a slowdown observed since the mid-2000s. GDP per hour worked grew by 1.2 % in the OECD weighted average, but with a median of only 0.4 % across member countries, well below the 1.8% median recorded during 2001-07.
- The United States continued to outperform most OECD countries, with labour productivity growth reaching 2.2% in 2024 while it was below 1 % in over half of OECD countries.
- Whereas virtually all OECD countries were more productive in 2024 than two decades ago, the pace of improvement has roughly halved since the early 2000s. If pre-2007 trends had continued, productivity levels would be an estimated 10-20% higher today.
- Economic growth in 2024 relied on increases in labour inputs rather than improvements in efficiency. Employment expansion acted as the primary driver of GDP growth in 18 countries out of the 21 countries with growth-accounting data. Multi-factor productivity (MFP) – the efficiency with which labour and capital are combined – contributed negatively to GDP growth in 14 countries.

Introduction

Labour productivity lies at the heart of long-term improvements in material well-being. When productivity advances, countries can raise incomes without relying solely on longer working hours or larger workforces. When it stalls, those ambitions become harder to achieve.

This chapter examines labour productivity, measured as value added per hour worked, across OECD countries from two complementary perspectives. First, cross-country comparisons of productivity levels provide a snapshot of where countries stood in 2024 and how far they have moved in the most recent decade. Second, growth-accounting decompositions isolate the proximate sources of GDP growth and labour productivity growth, contrasting the most recent patterns with the 2000-19 average.

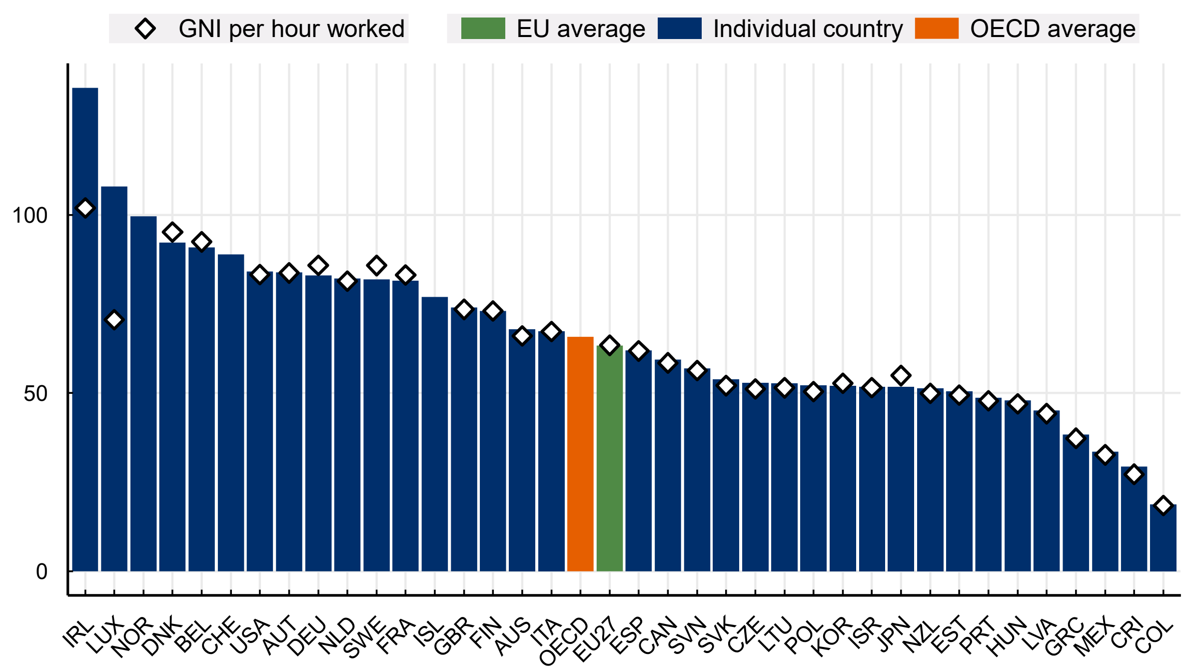
Labour productivity levels in 2024

Labour productivity levels between the least and the most productive OECD countries differed by roughly a factor of eight in 2024

A cross-country comparison of labour productivity levels reveals wide differences across the OECD (Figure 2.1). Measured in 2020 constant price Purchasing Power Parities (PPP) dollars, GDP per hour worked in 2024 ranged from USD 18.7 in Colombia to USD 135.7 in Ireland, with the United States at USD 84.1. Excluding Ireland and Luxembourg (whose headline figures are inflated by multinational activities), Norway (USD 99.7) and Denmark (USD 92.2) led the ranking. Between 2014 and 2024, virtually all countries saw their productivity levels rise.

Figure 2.1. Labour productivity levels across OECD countries in 2024 or latest available year

GDP per hour worked, USD 2020 PPP constant prices



Note: Bars show GDP per hour worked in constant 2020 USD PPPs for 2024. Countries are ordered by their 2024 GDP per hour level. Grey diamond markers show GNI per hour worked. OECD and EU-27 aggregates are total hours worked weighted averages.
Source: Authors' calculations based on OECD Productivity Database and OECD National Accounts.

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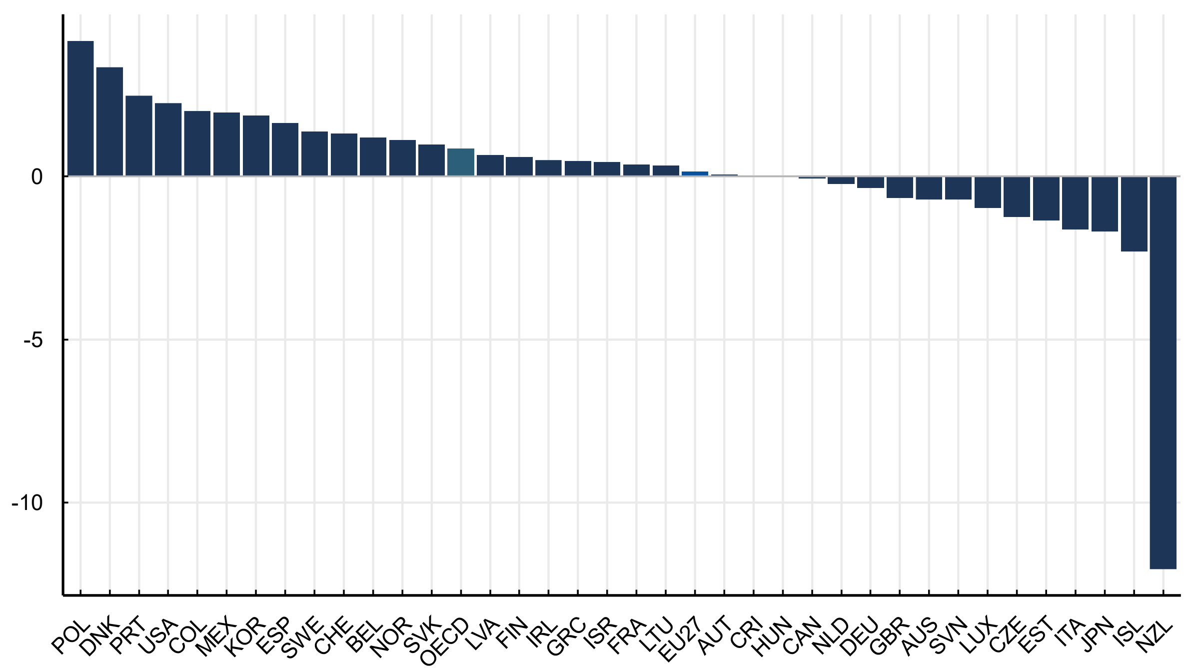
However, GDP per hour worked can overstate domestic productive capacity in economies where the activities of multinational enterprises create a large gap between GDP and Gross National Income (see Box 2.1). Ireland is the most prominent case: its GDP per hour worked ranks among the highest in the OECD, but the GNI-based measure, which strips out income repatriated abroad, is considerably lower. This caveat applies to varying degrees, to several other small open economies. GNI-adjusted figures therefore offer a useful complement for cross-country comparisons. Using GNI rather than GDP per hour worked also narrows the measured dispersion across OECD countries, reducing the gap between the highest and lowest productivity levels from a factor of around eight to around six.

Most OECD countries recorded single-digit labour productivity growth in 2024, with wide dispersion

Labour productivity growth remained modest across most OECD economies in 2024 (Figure 2.2). While the OECD aggregate - calculated as a weighted average using hours worked as weights – recorded growth of 1.3%, underlying country-level performance was in many cases much weaker: the median country posted growth of only 0.4%, and more than half of OECD countries recorded gains below 1%. The United States, at 2.2% in 2024, remained among the stronger performers, while a number of European economies clustered close to zero.

Figure 2.2. Labour productivity growth across OECD countries in 2024

Annual growth in GDP per hour worked, percentage



Note: Bars show the year-on-year growth rate of GDP per hour worked in 2024. Countries are ordered from highest to lowest growth. OECD and EU-27 aggregates are total hours worked weighted averages.
Source: OECD Productivity Database.

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Two features stand out. First, dispersion across countries remains sizeable even in a generally subdued year, indicating that national factors still shape short-run productivity outcomes. Second, observations cluster overwhelmingly in the low-single-digit range. This concentration motivates the longer-run perspective developed in the next section: to understand whether 2024 reflects temporary headwinds or a continuation of a deeper slowdown, the cross-section needs to be placed in the context of productivity growth in the early 2000s.

Box 2.1. Measurement challenges related to the activities of multinational enterprises

Conventional productivity measures referring to the total economy rely on GDP as the numerator for output. GDP captures the total gross value added produced within a country's borders (plus taxes less subsidies on products), regardless of who owns the factors of production. In most OECD economies, the distinction between domestic production and domestically owned production is minor. In a handful of countries, however, the activities of multinational enterprises (MNEs) create a large wedge between the two.

Ireland is the most prominent case. Many of the world's largest technology and pharmaceutical firms have established their European headquarters in Ireland. Key explanations for the strong presence of MNEs in Ireland include access to the EU single market, a favourable corporate tax environment, and a highly educated workforce. These firms book substantial revenues and profits in Ireland and, critically, hold large stocks of intellectual property (IP) on their Irish balance sheets. The associated depreciation of these IP assets inflates Irish GDP without a corresponding increase in domestic incomes or employment.

According to Ireland's Central Statistics Office (CSO), modified gross national income (GNI*) (as opposed to the traditional GNI) which adjusts for the factor income of re-domiciled companies, the depreciation on imported R&D services and traded IP, and the depreciation on aircraft held by leasing companies, stood at just 57% of GDP in 2024 (EUR 321 billion versus EUR 562 billion) (CSO, 2025[1]). Luxembourg, where the financial sector generates large cross-border income flows, displays a similar though less extreme pattern.

The practical consequence for productivity measurement is that GDP per hour worked can substantially overstate the productive capacity of the domestic economy in affected countries. Measured in 2020 constant price PPP dollars, Ireland's GDP per hour worked of USD 135.7 in 2024 ranks far above any other OECD country, but a GNI-based measure would place it considerably lower, closer to the levels observed in other high-income European economies (Figure 2.1). Profit shifting driven by differences in corporate tax regimes can inflate measured output and multifactor productivity in low-tax jurisdictions without any change in real production (Bricongne, Delpeuch and Lopez-Forero, 2023[2]).

GNI-based productivity measures offer a useful complement to GDP-based ones. GNI equals GDP minus primary income paid to the rest of the world (principally investment income repatriated by foreign-owned firms) and plus the primary income received from the rest of the world. It thus provides a closer approximation of the income accruing to domestic residents.

With GNI per hour worked series not routinely available on a harmonised basis for all OECD countries, GDP-based measures remain the standard in the OECD Productivity Database. Readers should bear these caveats in mind when interpreting cross-country comparisons, particularly for countries near the top of the GDP-per-hour ranking.

The OECD Compendium of Productivity Indicators (2025[3]) and the companion documentation on the revamped OECD Productivity Database (OECD, 2025[4]) discuss these measurement challenges in further detail.

Long-run labour productivity trends

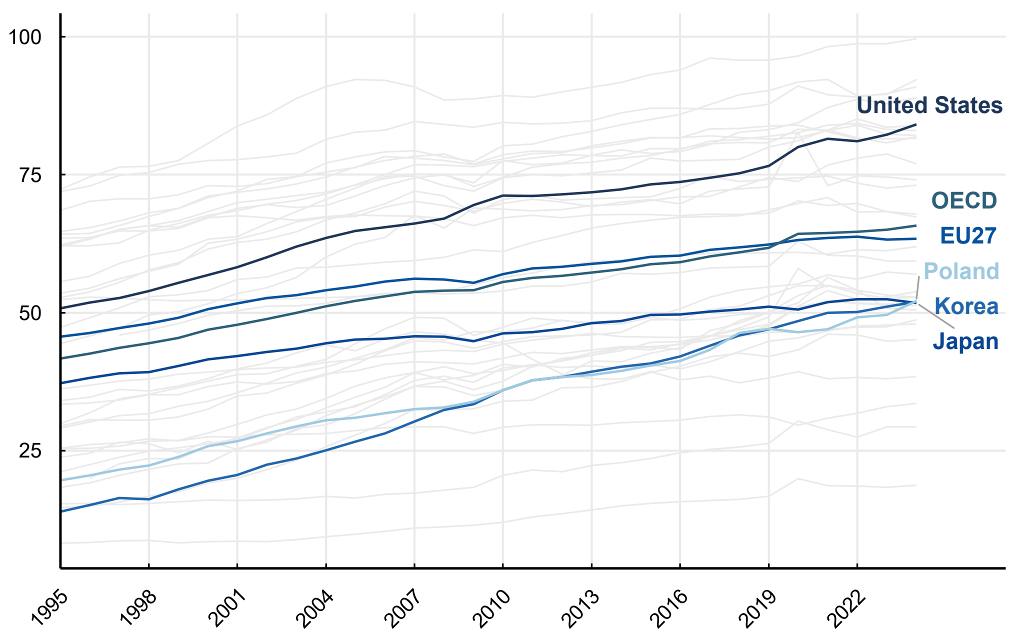
The pace of improvement has halved since the early 2000s, and the United States has pulled further ahead

The evolution of GDP per hour worked in constant price PPP from the late 1990s to 2024 reveals three key patterns (Figure 2.3).

First, the United States has steadily pulled further ahead of other major economies. Measured in 2020 constant PPP dollars, output per hour rose from USD 50.8 in 1995 to USD 84.1 in 2024, representing a compound annual growth of 1.8%. The EU-27 and Japan also advanced over the same period, but at a slower pace: 1.1% per year in both cases. Over three decades, even modest growth-rate differentials compound into a substantial gap. The EU-27 moved from roughly 90% of the US level in 2000 to 75% in 2024; Japan fell from 73% to 62%.

Figure 2.3. Labour productivity levels across OECD countries, 1995-2024

GDP per hour worked, USD 2020 PPP constant prices



Note: GDP per hour worked is expressed in constant 2020 USD PPPs. OECD and EU-27 series are total hours worked weighted averages. Ireland and Luxembourg are excluded from the line plot, as their GDP per hour worked is inflated by multinational profit shifting and cross-border income flows respectively (see Box 2.1).
Source: OECD Productivity Database.

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However, it is worth highlighting that cross-country productivity comparisons are sensitive to the choice of PPP benchmark year (Inklaar et al., 2022[5]; Bournot, Koechlin and Schreyer, 2011[6]). While the ranking of the United States above the EU-27 and Japan is robust across PPP vintages, the precise magnitude of the gap should be interpreted with caution. For a broader discussion, see Krugman (2026[7]) and Ackerman (2026[8]) on the distinction between current price and constant price PPP comparisons.

Second, the pace of gains has decelerated across the OECD. Median annual labour productivity growth across OECD countries was 2.0% during 2001-07, declined to 1.0% during 2008-19, and fell further to 0.8% during 2020-24. This median masks a pandemic-related spike in 2020 in countries where hours worked contracted more sharply than output, which temporarily inflated measured productivity. Different explanations for this deceleration have been explored in the literature and, while the jury is still out, there is broad agreement that the slowdown is not merely a statistical artefact. Syverson (2017[9]) provides an overview of the "productivity J-curve" debate, the idea that general-purpose technologies can initially depress measured productivity during periods of costly adoption and learning before eventually raising it. Cette et al. (2016[10]) examine the role of declining business dynamism. Gordon (2016[11]) and Bloom et al. (2020[12]) offer complementary perspectives on whether the slowdown reflects secular stagnation or delayed technology diffusion.

The cumulative effect of this deceleration is substantial. Based on OECD Productivity Database labour productivity levels, had the pre-2007 pace been sustained, GDP per hour worked in 2024 would have been approximately 10-12% higher across the major OECD economies – a gap of roughly USD 9-11 per hour worked at 2015 PPP prices. This underscores the extent to which the slowdown is a first-order constraint on living standards.

Third, behind the headline aggregates lies considerable diversity across countries. Korea nearly quadrupled its productivity level from USD 13.9 to USD 52.0 per hour worked, in constant 2020 PPPs, between 1995 and 2024. Boosted by the activities of multinational enterprises (see Box 2.1), Ireland saw an increase from USD 42.5 to USD 135.7 over this period. Poland's trajectory illustrates the broader post-transition catch-up pattern in Central and Eastern Europe (Timmer et al., 2010[13]): labour productivity rose from USD 19.6 to USD 52.1, narrowing the gap with mid-ranking Western European economies. At the other end, Colombia (USD 18.7) and Mexico (USD 33.6) remain well below the OECD average. The dispersion of country trajectories illustrates both the scope for convergence and the persistence of structural productivity gaps.

These longer-run productivity developments should also be seen in the context of broader structural changes in OECD economies, including shifts in the sectoral composition of value added and labour input. Box 2.2 illustrates how the OECD Structural Analysis Database (STAN) can help analyse these patterns.

Box 2.2. Structural Analysis Database (STAN)

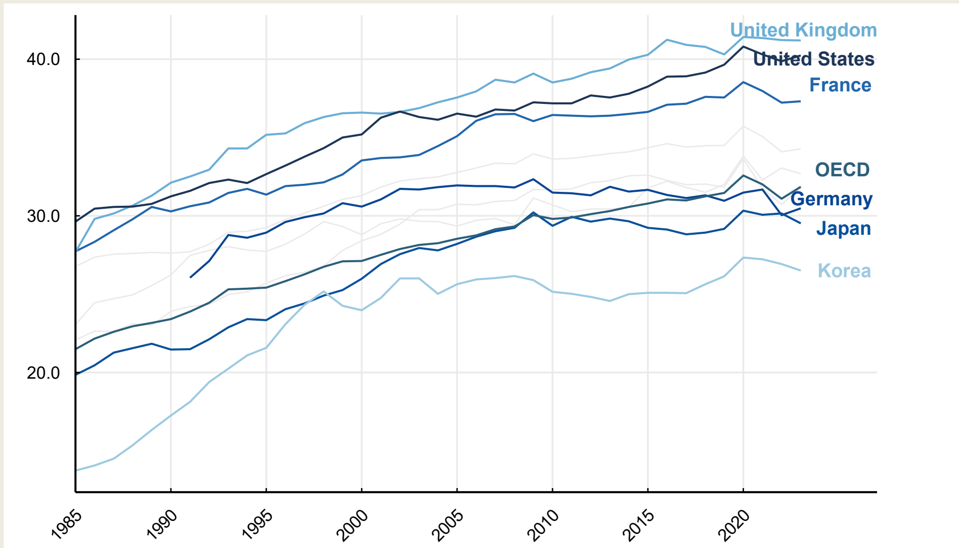
STAN is a harmonised industry-level database for long-run, cross-country analysis of productivity and structural change. It provides annual data from 1970 onwards for OECD countries on output, value added, labour input, investment and capital stock, based on annual national accounts.

Measuring structural change and comparing long-term trends

STAN supports analysis of long-term developments in key indicators such as labour productivity growth. It also allows for the analysis of shifts in the sectoral composition of value added and in the allocation of labour and capital across industries. One example is the rising share of information and communication and business services (ISIC Rev.4 I-M) in total value added (Figure 2.4). This reflects trends such as digitalisation, deeper global integration and the growing use of business services as production inputs. Across the OECD and the G7, these activities have followed a clear upward trend.

Figure 2.4. Information and communication as well as business services activities value added

Value added of ISIC Revision 4 industries I-M as a percentage of total economy value added



Note: The OECD aggregate is computed as unweighted average. Due to data limitations, the OECD group used includes the following countries: Austria, Belgium, Canada, Czechia, Denmark, Spain, Finland, France, the United Kingdom, Italy, Japan, South Korea, the Netherlands, Norway, New Zealand, Portugal, Sweden and the United States.
Source: OECD, Annual National Accounts Database, Structural Analysis (STAN) Database, http://oe.cd/stan; and national sources.

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Limitations and measurement challenges

Despite its value, STAN has important limitations. Extending series backwards often requires linking data across changes in industrial classifications, accounting standards, and benchmark revisions. In addition, while STAN mainly draws on countries' annual national accounts by activity, more detailed industry estimates rely on supplementary sources whose quality and availability vary. As a result, gaps remain where no reliable estimates are possible, and industry detail is not fully comparable across countries. Country notes and metadata should be consulted when making cross-country comparisons. For further methodological detail, see Horvát and Webb (2020[14]).

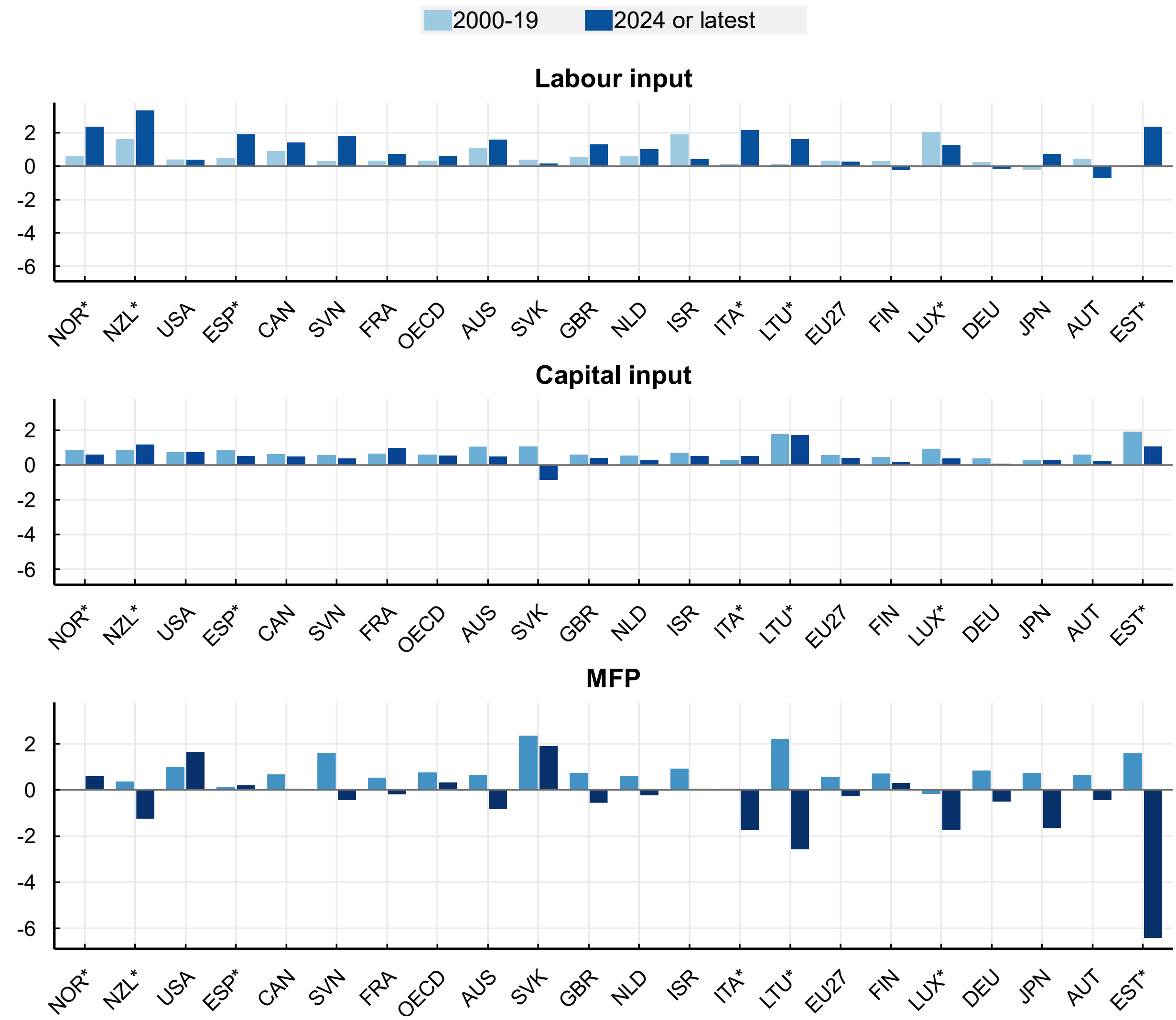
Labour productivity and GDP growth

Recent economic growth increasingly relied on additional labour inputs, rather than efficiency gains

Yet, labour productivity gains do not translate one-for-one into GDP growth: changes in employment, hours worked, and the working-age share of the population also shape the GDP trajectory. To understand what has been driving recent GDP growth and why it has not evolved in step with productivity, it is useful to turn to a structural decomposition.

Figure 2.5. Contributions to GDP growth

Percentage points, 2024* versus 2000-19 average



Note: Contributions from total hours worked, capital services, and multifactor productivity (MFP) to GDP growth. Countries are ordered by total GDP growth from highest (left) to lowest (right). Solid bars show 2024, or the latest available year where 2024 is unavailable; countries using pre-2024 latest data are marked with an asterisk. Faded bars show the 2000-19 average. OECD and EU-27 aggregates are total hours worked weighted averages.
Source: OECD Productivity Database.

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A standard growth-accounting framework decomposes real GDP growth into the contributions of three components: total hours worked (labour input); capital services, which measure the productive contribution of the capital stock weighted by asset type; and multifactor productivity (MFP), which captures the overall efficiency with which labour and capital are combined, including the effects of technological progress, organisational improvements, and resource reallocation across firms and sectors, but also measurement residuals and specification error. For readers less familiar with the framework, MFP can be thought of as the "residual" part of growth that cannot be attributed to simply using more labour or more capital (see also OECD/APO (2022[15]) for a discussion of this interpretation). Industry-level labour productivity and MFP developments are examined in Chapter 4.

Across the 21 countries with data in both periods, median GDP growth was 2% in the 2000-19 average and 1.2% in the latest year. More importantly, the composition of growth has shifted (Figure 2.5). During 2000-19, contributions from labour, capital, and MFP were typically more evenly shared than in the most recent period. While labour input growth was the primary driver of GDP growth in 18 out of 21 countries in 2024, MFP made a negative contribution in 14 countries.

This pattern carries clear economic implications. Expanding hours worked can support output in the near term, particularly during recoveries or in the context of tight labour markets. Economies that rely primarily on adding more inputs rather than using them more efficiently, however, face constraints as labour supply tightens, a concern of growing relevance in the context of population ageing, though one that can be partly offset through migration, rising labour force participation, and investment in human capital (OECD, 2024[16]).

The cross-country variation in the pattern of contributions is considerable. The United States retains positive contributions from all three components, around 1.1 p.p. for labour input and MFP and 0.7 p.p. for capital in 2023, the latest available year for this economy. Japan also performs comparatively well, with a strong MFP contribution of 1.1 p.p. By contrast, several European economies display a more fragile pattern: Estonia and Austria saw negative MFP sharply reduce GDP growth or pull it into contraction. One potential, yet only partial, explanation is offered by McGowan et al. (2017[17]), who show that weakening business dynamism and the persistence of low-productivity firms have contributed to MFP stagnation across OECD economies. Other factors, including weak investment in intangibles and slower diffusion of frontier technologies, have also been documented in the literature. Changes in work organisation, including the wider use of teleworking and hybrid work, may also affect productivity performance, with effects depending on job characteristics, management practices, digital tools and the extent to which remote work supports flexibility without weakening collaboration and knowledge diffusion (Criscuolo et al., 2021[18]).

The broader implication is that the post-pandemic period has not restored the earlier, more balanced growth model. In many economies, output expansion has come to depend on adding hours rather than on raising the productivity of those hours. Reactivating drivers of growth beyond labour inputs will therefore be important going forward (OECD, 2026[19]).

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3 Investment

Key findings

- The OECD average investment rate stood at 22.6% in 2024, down slightly from 23.0% in 2023. This level was below the pre-financial crisis average (2000-07), while remaining above the pre-pandemic average (2010-19).
- By industry, real estate investment as a share of GDP declined widely across OECD countries in 2024, contrasting with a slight increase on average in information and communication. Relative to 2010-19, investment as a share of GDP increased in the majority of countries in both industries.
- By asset type, dwellings and buildings were the main drag on investment rates in 2024, declining in most OECD countries. This weakness was partly offset by ICT assets, which – relative to 2010-19 – saw increases in more countries than any other asset type, rising in over three quarters of them.
- ICT and R&D investment rates have risen broadly since 2020, but unevenly across OECD countries, leading to wider cross-country gaps.

Introduction

Investment plays a central role in driving productivity growth by maintaining and upgrading the capital stock, accelerating the adoption of new technologies, and facilitating the diffusion of knowledge across firms and sectors. The composition of investment across industries and assets is constantly evolving. The concentration of investment in particular industries reflects and reinforces structural shifts in the economy, with implications for productivity dynamics at the aggregate level. Different asset types serve distinct economic functions, from expanding tangible productive capacity to building the intangible knowledge base that underpins innovation. As economies become more digitalised and knowledge-intensive, investment in ICT and R&D has taken on particular importance, a role further amplified by the rise of artificial intelligence and its growing demands on digital infrastructure (Gal et al., 2026[1]).

Recent investment dynamics have unfolded against a challenging macroeconomic backdrop. The recovery from COVID-19 pandemic coincided with a surge in inflation, driven by pent-up demand, supply bottlenecks, and rising energy prices. In response to elevated inflation, central banks raised policy interest rates between 2022 and 2023, in part normalising from historically low levels. As inflation gradually moderated through 2024, monetary conditions began to ease, while mild fiscal tightening was underway across many OECD countries. Changes in monetary and fiscal policy influence investment through their effects on financing conditions, expected demand and profits. Geopolitical tensions and broader global uncertainty have added further complexity to investment decisions throughout this period (OECD, 2024[2]; OECD, 2024[3]).

This chapter examines how investment has evolved across OECD and accession candidate countries in 2024, the latest year for which data are widely available. It begins with aggregate investment rates measured as Gross Fixed Capital Formation (GFCF) as a share of Gross Domestic Product (GDP) (Box 3.1), before turning to the composition of investment by industry and asset type.

Box 3.1. Measurement of investment and asset classification in the System of National Accounts

Investment rates are calculated as the ratio of GFCF to GDP, based on national accounts data. GFCF is generally compiled using a combination of census data, surveys, and administrative and business data.

The 2008 System of National Accounts (SNA, 2009[4]) recommends a minimum level of asset breakdown (Table 3.1). However, the SNA 2008 asset classification captures only a selection of all relevant asset types, particularly in the area of intangible assets.

The 2025 System of National Accounts (SNA, 2025[5]) expands the asset boundary to include additional intangible assets, most notably data and other components of intellectual property products (IPP). While there is not yet a standardised definition for investment in Artificial Intelligence (AI) as a separate asset category, AI investment is closely related to several existing asset types such as ICT equipment, computer software and databases, and research and development (R&D) (Fonteneau et al., 2025[6]). These changes aim to improve the measurement of investment in the context of an increasingly digital economy.

Table 3.1. Fixed capital asset breakdown: SNA 2008 and SNA 2025

Category	Code	SNA 2008	SNA 2025	ICT / Non-ICT
Tangible assets	N111	**Dwellings**	**Dwellings**	**Non-ICT**
	N112	**Other buildings and structures**	**Other buildings and structures**	
	N11M	**Machinery and equipment and weapons systems**	**Machinery and equipment and weapons systems**	
	N1131	Transport equipment	Transport equipment	
	N1132	ICT equipment	ICT equipment	**ICT**
	N11321	Computer hardware	Computer hardware	
	N11322	Telecommunications equipment	Telecommunications equipment	
	N110	Other machinery and equipment and weapons systems	Other machinery and equipment and weapons systems	**Non-ICT**
	N115	**Cultivated biological resources**	Moved under natural resources in SNA 2025	
Intangible assets	N117	**Intellectual property products**	**Intellectual property products**	
	N1171	Research and development (R&D)	Research and development (R&D)	
	N1172	Mineral exploration and evaluation	Mineral exploration and evaluation	
	N1173	Computer software and databases	Computer software, data and databases	**ICT**
			Computer software, including artificial intelligence systems (New)	
			Data and databases (New)	
	N1174	Entertainment, artistic and literary originals	Entertainment, artistic and literary originals	**Non-ICT**
	N1179	Other intellectual property products	Other intellectual property products	

Note: SNA 2025 based data with sufficient cross-country coverage are not expected to be available before around 2030. The SNA 2025 grouping shown here reflects a preliminary OECD elaboration and may be revised.
Source: OECD elaboration based on the 2008 and 2025 Systems of National Accounts.

Investment rates across OECD countries

The OECD average investment rate declined in 2024, falling back below its pre-financial crisis average (2000-07) while remaining above its pre-pandemic average (2010-19)

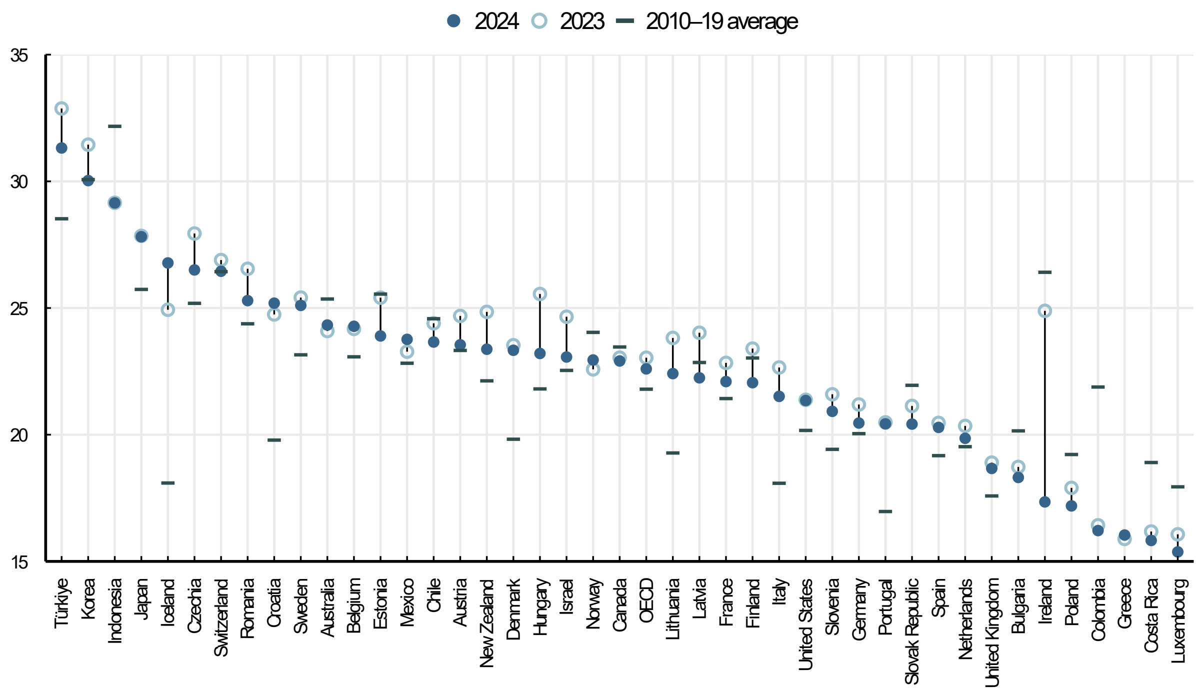
Investment rates declined in 2024 compared with 2023 in 35 out of 42 OECD and accession candidate countries for which data are available. In many cases the decline was modest, with investment rates falling by less than one percentage point in 21 countries. Consistent with this broad but moderate slowdown, the OECD average investment rate, calculated as a weighted average using current-year GDP PPP weights, decreased from 23.0% in 2023 to 22.6% in 2024. Despite this decline, investment rates in 2024 remained above their pre-pandemic average (2010-19) in 26 countries.

Investment rates varied significantly across regions and countries. In 2024, investment rates ranged from 31.3% of GDP in Türkiye to 15.4% in Luxembourg. Relatively high investment rates were sustained across the Asia-Pacific region, with Korea, Indonesia, Japan, Australia, and New Zealand all exceeding the OECD average of 22.6%. In Latin America, Mexico and Chile had marginally above-OECD average rates of around 23%, while Colombia and Costa Rica recorded lower rates of around 16%. In Europe, Iceland, Czechia, and Switzerland recorded the highest rates at around 26%, whereas Luxembourg, Greece, and Poland posted rates around ten percentage points lower.

Ireland stands out as a significant outlier, recording a sharp decline of 7.5 percentage points from 2023 to 2024. Assessing Irish investment data is complicated by the presence of multinational firms (see Chapter 2) whose large transactions – including volatile swings in onshored intellectual property assets – can heavily impact national accounts without reflecting underlying domestic investment conditions (Andersson et al., 2024[7]). The recorded decline should therefore be interpreted with caution (Figure 3.1).

Figure 3.1. Investment rates across OECD countries

GFCF as a percentage of GDP, total economy



Note: GFCF and GDP are measured at current prices. OECD figures are calculated as weighted averages using current-year GDP PPP weights.
Source: Authors' calculations based on OECD National Accounts.

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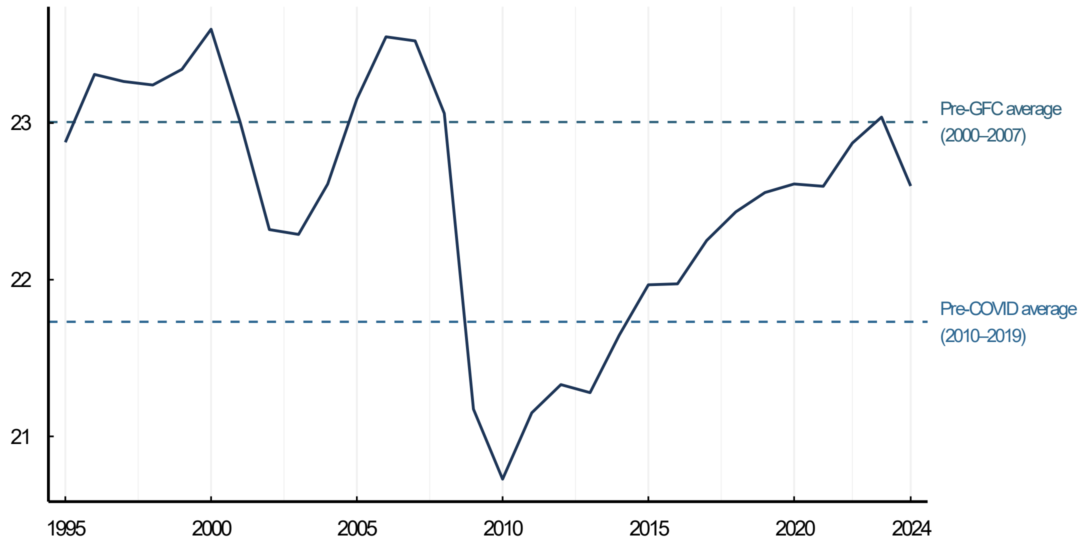
Over a longer horizon, comparison with the low benchmark of the 2010s makes the 2024 investment picture appear more favourable than it might otherwise seem. The investment rate peaked prior to the global financial crisis (GFC) and did not fully recover during the 2010s. Dlugosch et al. (2025[8]) suggest that weak investment in the 2010s reflected subdued aggregate demand, elevated uncertainty and structural factors, including the shift towards intangible assets, more cautious corporate financial behaviour, and declining business dynamism. The post-pandemic rebound in 2022-23 represented a catch-up towards the pre-GFC level. From this longer-term perspective, the decline in 2024 signals a partial unwinding of that rebound, with the investment rate still exceeding its pre-pandemic average but falling back below its pre-GFC level (Figure 3.2).

Figure 3.2. OECD weighted average investment rate

GFCF as a percentage of GDP, total economy



Note: GFCF and GDP are measured at current prices. Weighted averages are calculated using current-year GDP PPP weights. The pre-GFC average line shows the mean of annual OECD weighted averages over 2000-07; the pre-COVID average line shows the mean of annual OECD weighted averages over 2010-19.
Source: Authors' calculations based on OECD National Accounts.

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Industry contributions to changes in the aggregate investment rate

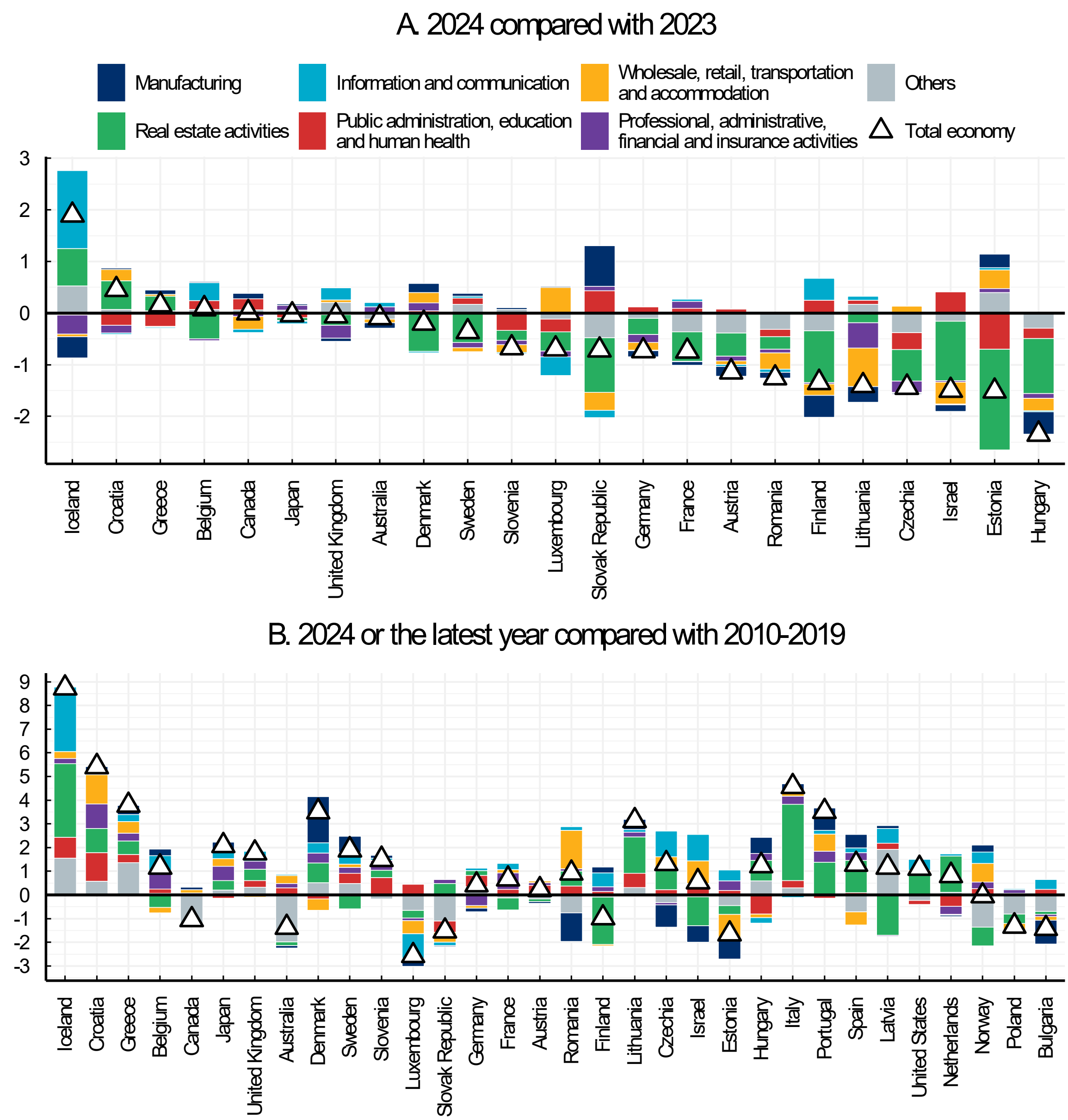
Real estate investment as a share of GDP declined widely across OECD countries in 2024, contrasting with a slight average increase in information and communication

Changes in the aggregate investment rate can be decomposed into industry contributions by examining movements in investment as a share of GDP across industries. Investment in real estate activities, relative to GDP, declined in 19 of the 23 countries in 2024 compared with 2023, with the largest falls observed in Estonia, Israel and Hungary. In other industries, changes were more limited and varied across countries, with no single industry driving a pronounced move in either direction. As a share of GDP, investment in information and communication increased slightly, on average, with the largest rises observed in Iceland, Finland and Belgium, and only modest declines in Luxembourg and the Slovak Republic. Investment in information and communication industry covers a range of assets, including but not limited to ICT assets (Figure 3.3, Panel A).

Compared with 2010-19, information and communication saw the broadest increases in investment as a share of GDP, rising in 27 of the 32 countries. Growth in investment relative to GDP was also seen in the majority of countries in professional, administrative, financial and insurance activities. In Austria, Germany and Luxembourg, public administration, education and human health recorded the largest increase relative to 2010-19. However, weaker contributions from other industries meant that total investment rates increased only modestly or remained below their 2010-19 averages (Figure 3.3, Panel B).

Figure 3.3. Industry contributions to changes in the investment rate

Percentage points



Note: GFCF and GDP are measured at current prices. Wholesale, retail, transportation and accommodation combines ISIC Rev.4 industries G-I; Public administration, education and human health combines O-Q; Professional, administrative, financial and insurance activities combines K, M and N; and Others combines A, B, D-F and R-U. Full industry names follow ISIC Rev.4. Countries for which data refers to 2023: Bulgaria, Italy, Latvia, Netherlands, Norway, Poland, Portugal, Spain and United States. Ireland is excluded, as GFCF in 2024 was significantly affected by substantial exports of intellectual property associated with multinational corporate restructuring (Central Statistics Office, 2024[9]).

Source: Authors' calculations based on OECD Productivity Database.

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Investment rate changes by asset type

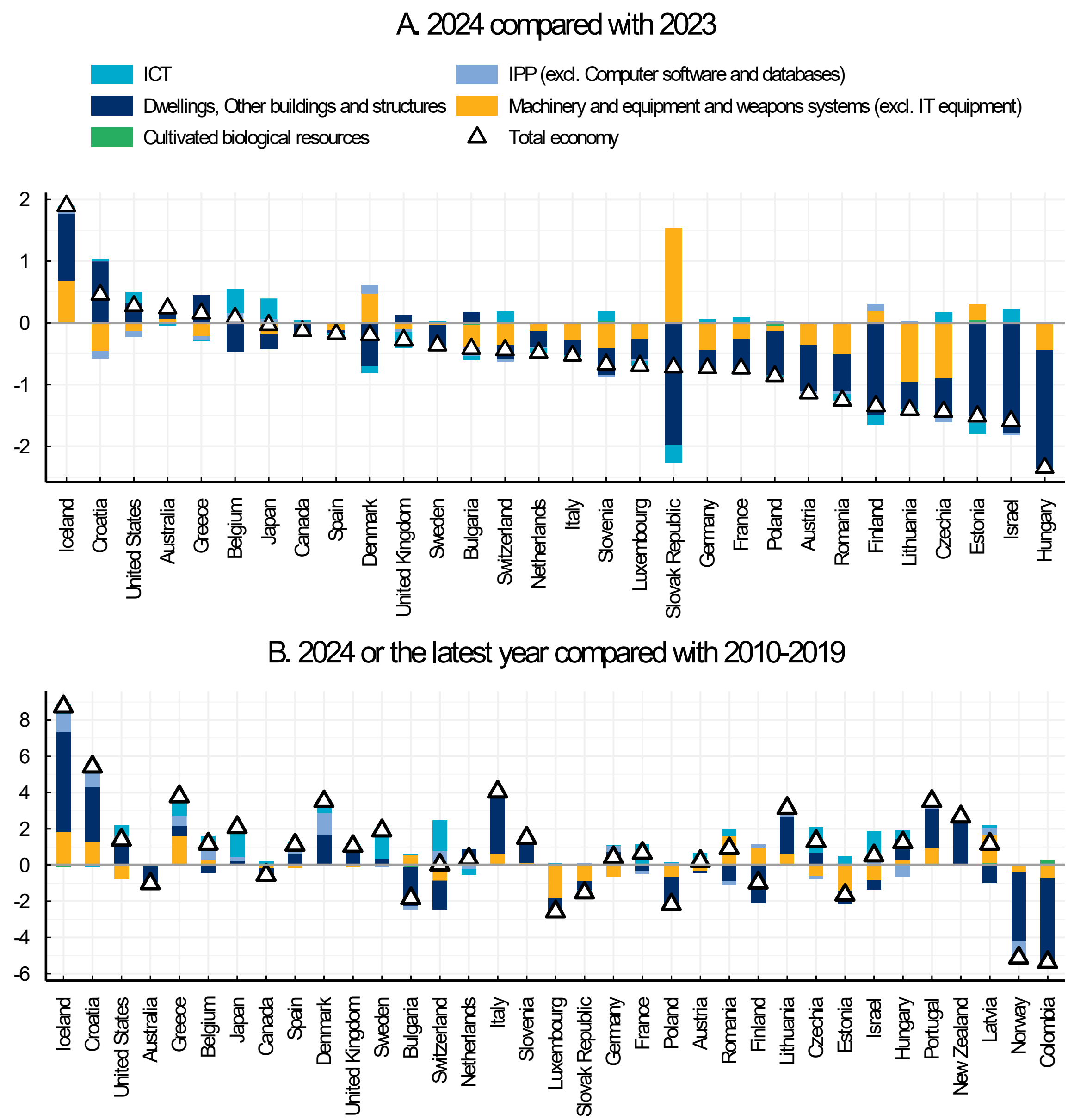
Dwellings and buildings drove down investment rates across OECD countries in 2024, partly offset by an increase in ICT assets

The decline in overall investment rates across OECD countries between 2023 and 2024 was primarily driven by a contraction in dwellings and buildings, which dragged down total investment rates in 23 out of 30 countries. This is consistent with the industry-level results discussed above, given the large share of dwellings in real estate investment. Machinery (excl. ICT equipment) also pushed investment rates lower in 21 countries, though its drag was generally smaller and more uneven. A notable exception was the Slovak Republic, where a large increase in machinery investment was recorded. The overall decline was partly offset by ICT investment, which increased relative to GDP in 15 out of 30 countries, including 11 where total investment rates fell. As an asset category, ICT investment can occur across industries and is not limited to investment by the information and communication service industry (Figure 3.4, Panel A).

Compared with 2010-19, investment rates for total economy increased in more than half of the countries in 2024. In many of these countries, ICT assets were the main driver of the increase, with ICT investment rates rising in 27 of the 35 countries. The largest increases in ICT investment rates were observed in Sweden, Switzerland and Japan. Investment rates for dwellings and buildings, as well as IPP (excl. computer software and databases), also increased in the majority of countries, although generally by less than ICT assets (Figure 3.4, Panel B).

Figure 3.4. Changes in investment rates by asset type

Percentage points



Note: GFCF and GDP are measured at current prices. Countries for which data refers to 2023: Colombia, Latvia, New Zealand and Portugal. Country for which data refers to 2022: Norway. Ireland is excluded, as GFCF in 2024 was significantly affected by substantial exports of intellectual property associated with multinational corporate restructuring (Central Statistics Office, 2024[9]).
Source: Authors' calculations based on OECD Productivity Database.

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ICT investment rates have risen broadly since the pandemic, but unevenly across OECD countries, leading to wider cross-country gaps

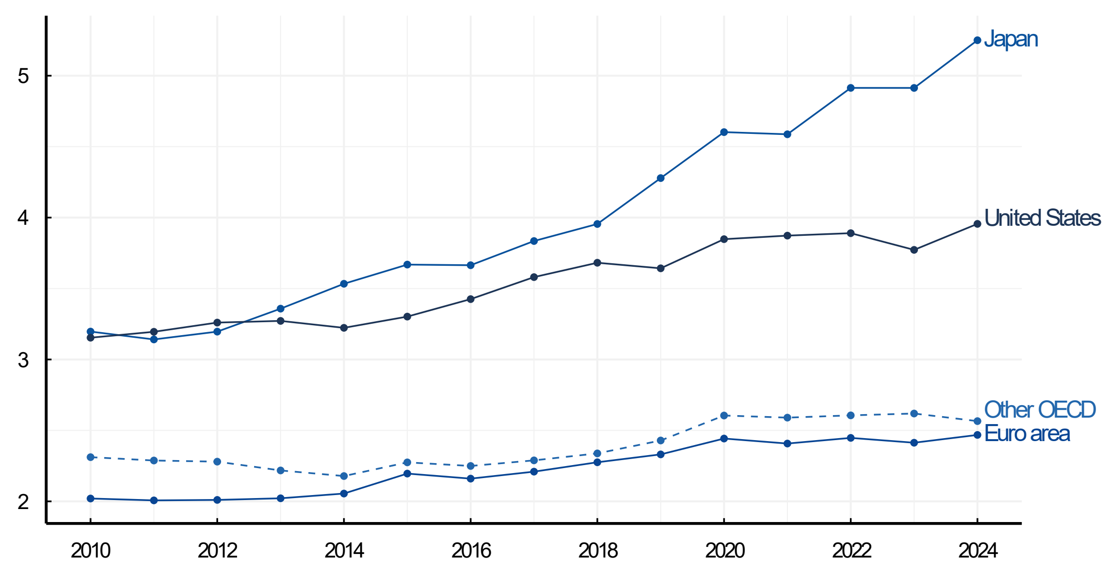
The broad increase in ICT investment partly reflects the 2020 rise across OECD economies, associated with the expansion of digital infrastructure and the shift to remote working at the onset of the COVID-19 pandemic. Thereafter, trajectories diverged markedly. Japan and the United States maintained strong investment momentum, with ICT investment rates continuing to increase beyond their 2020 levels. By contrast, ICT investment in the euro area and the rest of the OECD rose in 2020 but then largely plateaued, remaining at the 2020 level (Figure 3.5).

Within the euro area, ICT investment remained particularly low in Luxembourg, the Slovak Republic, Germany, Croatia and Ireland – all below 2% of GDP in 2024 (Figure 3.6). The relatively subdued ICT investment of the euro area is consistent with concerns about a “middle technology trap”, whereby Europe’s industrial structure remains concentrated in more mature sectors, limiting investment in emerging digital technologies (Draghi, 2024[10]).

This divergence was also reflected in a widening dispersion of ICT investment rates across OECD countries. Between 2010-19 and 2024, the average gap between countries in the top and bottom quartiles widened by around 60%, from 2.1 to 3.3 percentage points.

Figure 3.5. ICT investment rates, 2010-24

GFCF as a percentage of GDP, total economy



Note: GFCF and GDP are measured at current prices. Other OECD figures are computed as weighted averages of OECD economies excluding the United States, Japan and the euro area, using current-year GDP PPP weights. Japan’s 2020 benchmark year revision re-estimated software investment using the 2020 Input-Output tables and expanded coverage in the 2021 Economic Census, raising the 2020 estimate from JPY 11.1 trillion to JPY 19.1 trillion and thereby revising up measured ICT investment (Cabinet Office, 2025[11]).
Source: Authors’ calculations based on OECD Productivity Database and OECD National Accounts.

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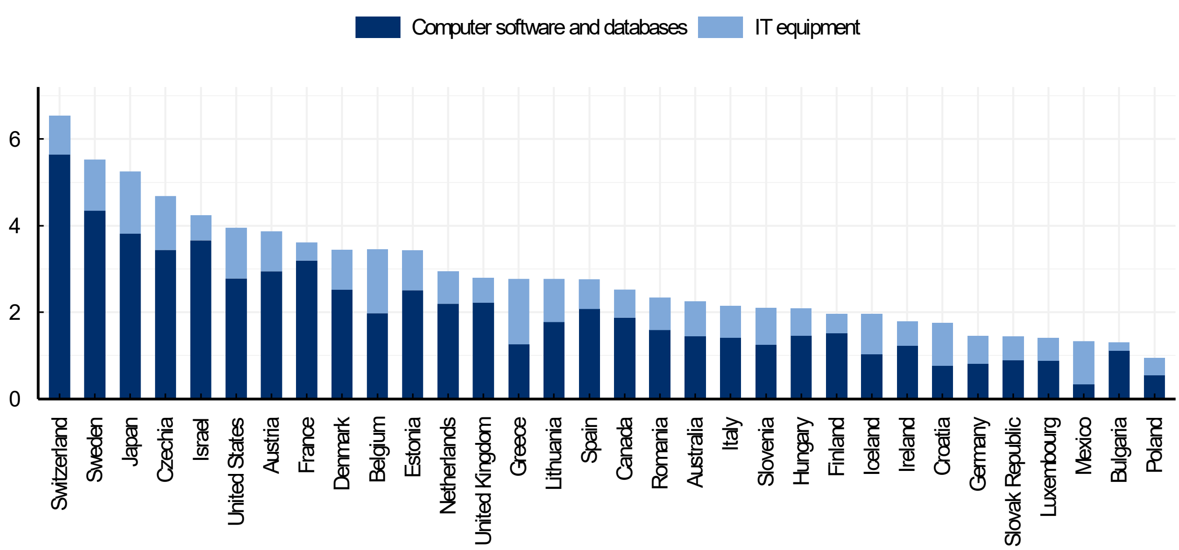
This wider dispersion was evident in 2024 ICT investment rates. Switzerland recorded the highest ICT investment rate, at 6.5% of GDP, followed by Sweden, Japan and Czechia at 5.5%, 5.3% and 4.7%, respectively. At the other end of the distribution, Poland remained below 1% of GDP, while Bulgaria and Mexico each recorded 1.3%.

Across ICT asset types, software and databases dominated in most countries, underlining the growing importance of intangible digital assets. Their share exceeded 80% of ICT investment in 2024 in France, Switzerland, Israel and Bulgaria. Greece, Croatia and Mexico were exceptions, where IT equipment accounted for a larger share (Figure 3.6).

Figure 3.6. ICT investment rates by asset type

GFCF as a percentage of GDP, total economy, 2024



Note: GFCF and GDP are measured at current prices.
Source: Authors' calculations based on OECD Productivity Database.

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R&D investment remained strong across OECD countries, with signs of growing disparities

Research and development (R&D) is one of the largest components of intangible investment, alongside software and databases. Although R&D is not classified as an ICT asset, it remains relevant for understanding AI-related investment and productivity developments (Rubinton and Patro, 2026[12]). More broadly, as digital transformation shifts business investment towards intangible assets, R&D investment provides an important lens through which to assess evolving investment patterns (André and Gal, 2024[13]; Dlugosch et al., 2025[8]).

While this section focusses on R&D investment as recorded in the SNA, it is useful to distinguish it from Gross Domestic Expenditure on R&D (GERD) under the Frascati Manual (OECD, 2015[14]). In the SNA, R&D is capitalised as an IPP asset, while GERD treats R&D as an activity and measures expenditure dedicated to R&D activities. The two measures can differ because of the treatment of capital inputs used in R&D, the recording of R&D undertaken in the course of software development, and cross-border transactions in R&D assets. In particular, R&D investment in the SNA includes domestically produced

R&D, plus imports and minus exports of R&D assets, whereas GERD measures R&D performed domestically (Ker and Galindo-Rueda, 2017[15]).

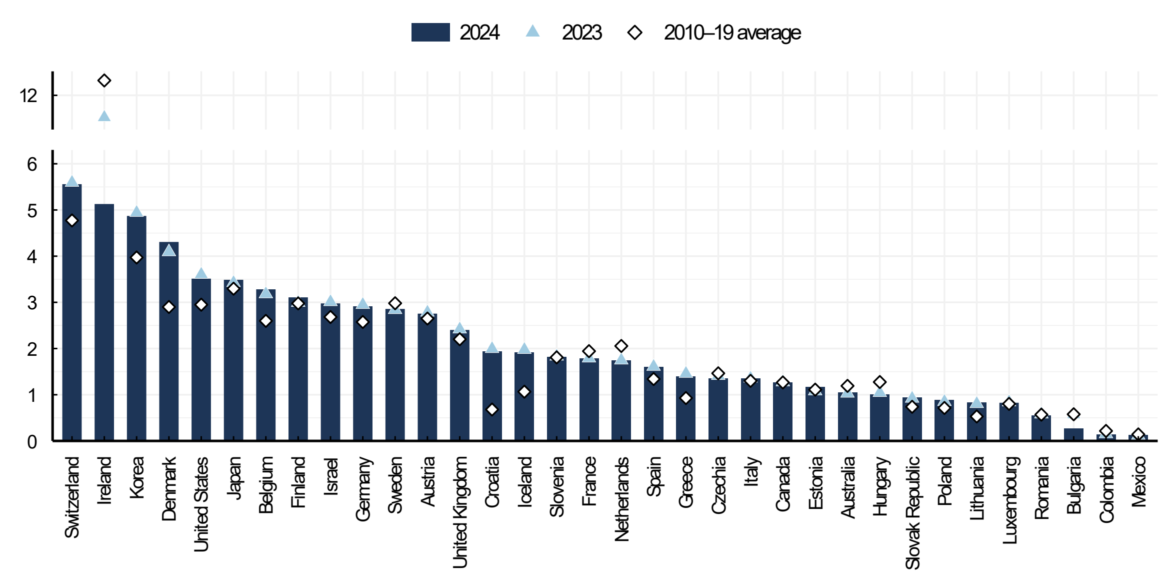
In 2024, Switzerland, Ireland, Korea and Denmark recorded some of the highest R&D investment rates, each above 4% of GDP. Compared with 2023, rates increased in 11 out of 34 countries. Among the remaining countries, declines were mostly modest, with decreases of less than 0.1 percentage points in 21 out of 23 countries. Ireland was a notable exception: although its R&D investment rate remained high compared with other countries, it fell sharply from 11.4% of GDP in 2023 to 5.1% in 2024, reflecting substantial exports of intellectual property associated with multinational corporate restructuring (Central Statistics Office, 2024[9]). By contrast, GERD in Ireland remained stable at 1.5% of GDP in 2023 and 1.4% in 2024, illustrating how R&D investment can diverge from expenditure on R&D performed domestically in countries with large cross-border transactions in R&D assets.

Despite the modest declines between 2023 and 2024, R&D investment rates remained above their 2010-19 averages in the majority of countries. The largest increases were recorded in Denmark, Croatia, Korea and Iceland, where rates in 2024 exceeded their 2010-19 averages by 1.4, 1.3, 0.9 and 0.8 percentage points, respectively (Figure 3.7).

As with ICT, compared with 2010-19, cross-country differences in R&D investment rates widened. Excluding Ireland, the average gap between the top and bottom quartiles rose by around one-quarter, from 2.6 percentage points in 2010-19 to 3.2 percentage points in 2024. Together, the widening gaps in ICT and R&D investment point to an increasingly uneven shift towards digital and knowledge-based capital across OECD countries.

Figure 3.7. R&D investment rates across OECD countries

GFCF as a percentage of GDP, total economy



Note: GFCF and GDP are measured at current prices.
Source: Authors' calculations based on OECD Productivity Database and OECD National Accounts.

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4 Productivity patterns across industries

Key findings

- In 2024, labour productivity growth varied widely across industries in OECD economies, with mining and agriculture showing the largest cross-country dispersion. Aggregate productivity growth in manufacturing reflected the influence of key industries, with Denmark recording outsized gains driven by pharmaceutical value-added growth.
- Between 2019 and 2024, information and communication services and professional and administrative services each gained around 0.8 percentage points in their share of total hours worked across 32 OECD countries. Manufacturing and agriculture each saw a decline of a similar magnitude, continuing a long-term structural shift toward knowledge-intensive services.
- Overall labour productivity growth in 2023-24 was mainly driven by labour productivity gains within industries. A smaller, though positive, contribution came from shifts in the composition of total hours worked across industries.
- Within industry labour productivity gains in 2023-24 largely reflected Multifactor Productivity (MFP) growth, capturing improvements in the overall efficiency with which labour and capital inputs are combined in the production process. Considerable cross country variation in MFP performance translated into differing labour productivity outcomes.
- MFP growth in services generally exceeded the total economy average in 2023-24, whereas weaker performance in goods-producing industries weighed on overall productivity outcomes.
- MFP growth has continued the downward trend observed since the 2000s, alongside increasing dispersion across countries. These differences in MFP growth are most pronounced in digital-intensive industries, possibly reflecting uneven cross-country adoption of advanced technologies.

Introduction

Aggregate labour productivity growth is shaped both by the performance in individual industries and by the reallocation of resources between them. Since the mid-2000s, productivity growth has slowed in most OECD economies, but the slowdown has been unevenly distributed across industries. Understanding how productivity evolves at the industry level is therefore essential for designing policies that promote innovation, technology adoption and resource reallocation.

This chapter examines recent productivity patterns using data from the OECD Productivity Database, primarily using the 21-industry breakdown available for a broad set of countries and, where possible, a more detailed 38-industry breakdown. This allows the chapter to examine not only broad differences across industries, but also the role of specific industries, such as pharmaceuticals, in shaping aggregate outcomes. The most recent year with sufficiently broad coverage for industry-level productivity analysis is 2024.

This chapter is organised in three parts. The first examines recent labour productivity developments across industries, highlighting cross-country dispersion in 2024, the key role of specific activities, and measurement issues in services. The second part decomposes aggregate labour productivity growth into two components: productivity changes within industries and effects of shifts in the composition of total hours worked across industries. The final section turns to industry-level Multifactor Productivity (MFP). MFP captures the component of labour productivity growth that is not explained by capital deepening, that is, by increases in the amount of capital available per hour worked. The discussion explores differences in MFP growth across industries and the contribution of MFP to overall labour productivity growth.

Industry-level labour productivity developments

From mining to services: A tale of divergent productivity distributions

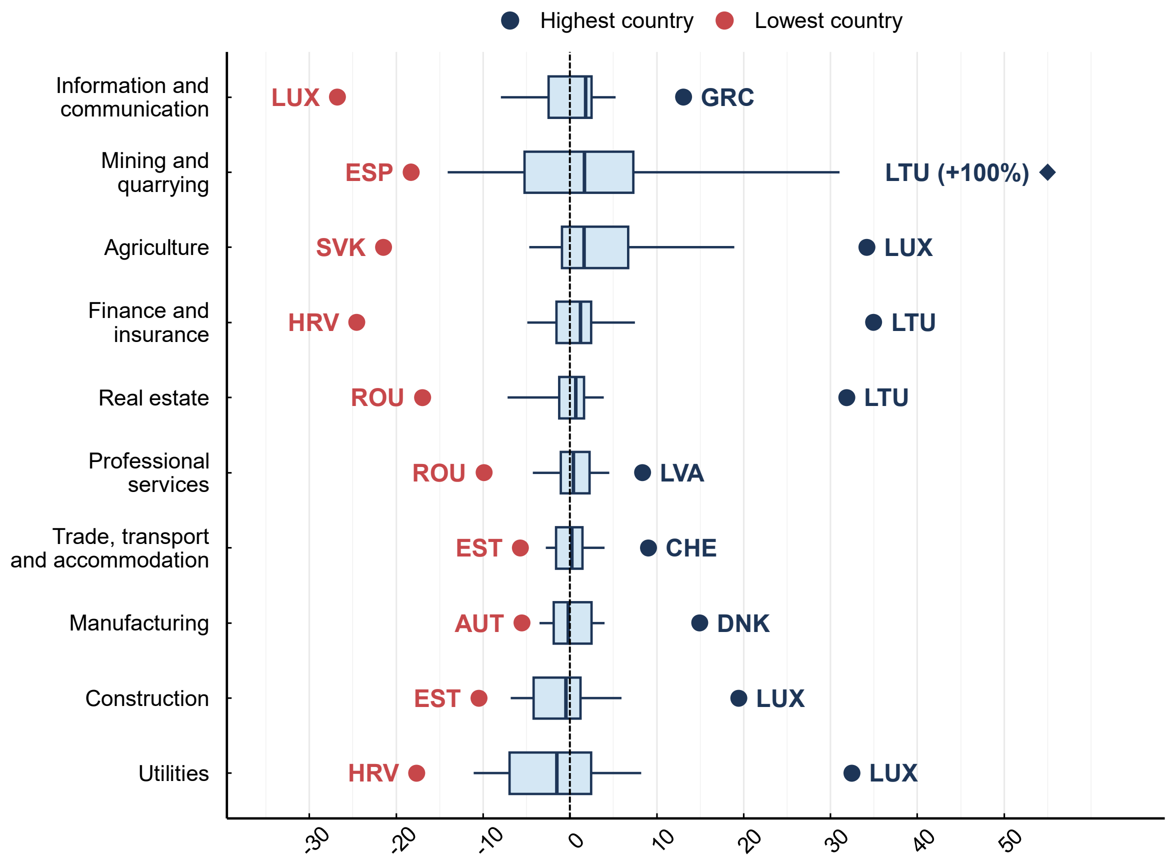
Labour productivity growth varied substantially across industries and countries in 2024 (Figure 4.1). Labour productivity growth was most similar across countries in trade, transport and accommodation and in professional services. One possible explanation is that these are relatively large and diversified industries, which may mechanically reduce the likelihood of extreme annual productivity movements. In professional services, firms' continued need for services that support core business operations may also help stabilise activity over short horizons (Ariu, 2016[1]).

Manufacturing occupied an intermediate position, with most countries recording modest growth, while Denmark stood out as a positive outlier linked to pharmaceuticals (discussed below). Dispersion was higher in information and communication services, possibly reflecting differences in the composition of investment (see Chapter 3) and regulatory frameworks (Bourlès et al., 2013[2]) and country-specific labour market adjustment patterns, including labour hoarding in Luxembourg (STATEC, 2025[3]).

Mining and quarrying and agriculture showed the widest dispersion. Regarding mining and quarrying, Hungary and Slovenia posted extreme gains while Spain, where this industry accounts for a small share of the economy, recorded a sharp contraction. In the case of Agriculture, Luxembourg and Estonia saw improvements in labour productivity. In contrast, labour productivity in this industry declined in France in 2024, reflecting exceptionally poor harvests driven by adverse weather (INSEE, 2025[4]).

Figure 4.1. Cross-country dispersion of labour productivity growth by industry, 2024

Annual percentage change in Gross Value Added (GVA) per hour worked



Note: The figure displays the interquartile range and median of labour productivity growth (GVA per hour worked) across available OECD countries for each industry. Each box represents the 25th to 75th percentile range; the line inside the box marks the median. Whiskers extend to the 10th and 90th percentiles. For each industry, the country with the highest and lowest labour productivity growth is labelled. The x-axis is truncated at −35% to +55% for readability; where a country's value falls outside this range, the dot is pinned to the axis edge and the actual value shown in brackets. Coverage: 25 OECD countries (plus Bulgaria, Croatia and Romania). OECD countries not included due to data unavailability: Australia, Chile, Colombia, Costa Rica, Iceland, Israel, Japan, Korea, New Zealand, Switzerland, Türkiye, United Kingdom, United States. Industry groupings follow ISIC Rev. 4. "Trade, transport and accommodation" covers wholesale and retail trade (G), transportation and storage (H), accommodation and food services (I), arts, entertainment and recreation (R), and other service activities (S). "Professional services" covers professional, scientific and technical activities (M) and administrative and support services (N). "Utilities" covers electricity, gas and water supply (D and E).
Source: OECD Productivity Database.

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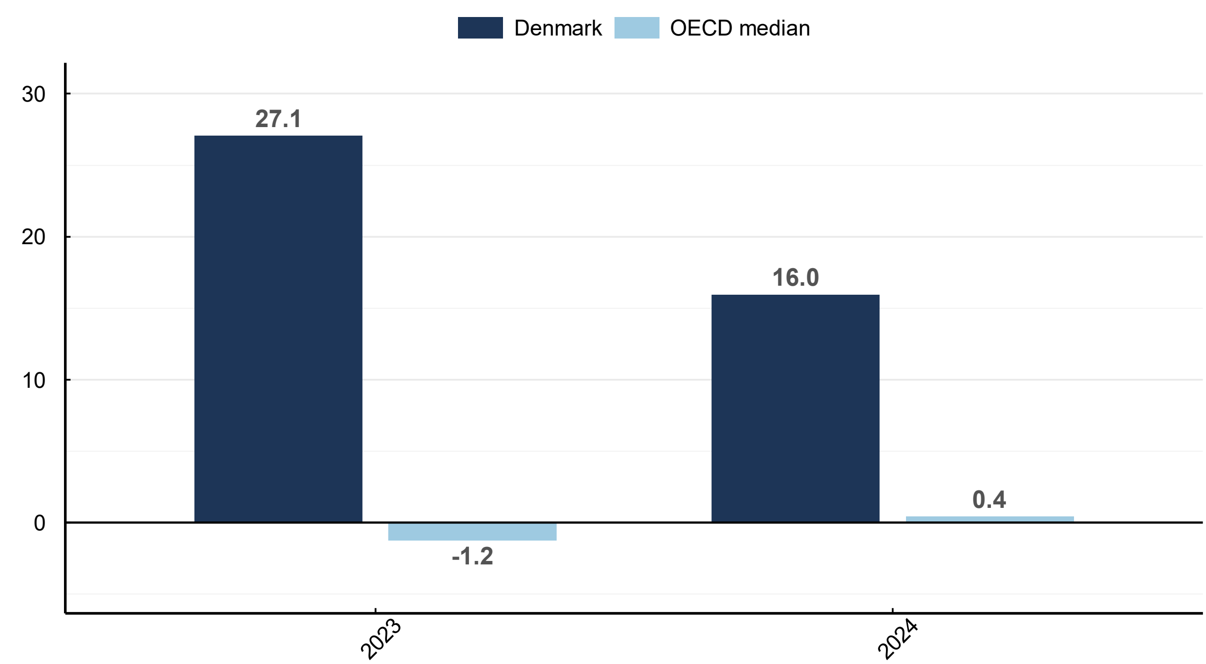
Pharmaceutical value added in Denmark and Ireland drove outsized manufacturing productivity gains

Pharmaceutical productivity surged in Denmark in 2023 and 2024, driven by GLP-1 therapies (Figure 4.2). This single industry pushed overall Danish manufacturing productivity growth well above the OECD median. Disregarding pharmaceuticals would bring Denmark's manufacturing labour productivity growth rate closer to the European Union mean, underscoring the importance of considering the role of individual industries in shaping aggregate productivity dynamics.

Yet it is worth noting that this industry is particularly sensitive to measurement choices due to the central role of large pharmaceutical MNEs in organising production across borders. Depending on how national statistical offices classify these global production arrangements, value added can be attributed differently across industries and countries (Kuchler et al., 2025[5]; Office for National Statistics (ONS), 2025[6]).

Figure 4.2. Pharmaceutical labour productivity growth (ISIC C21), 2023 and 2024

Annual percentage change in real GVA per hour worked



Note: Labour productivity is measured as gross value added per hour worked at constant prices. The pharmaceutical industry corresponds to ISIC Rev. 4 Division 21 (Manufacture of basic pharmaceutical products and pharmaceutical preparations). The OECD median is computed across 24 countries with available data.
Source: OECD Productivity Database.

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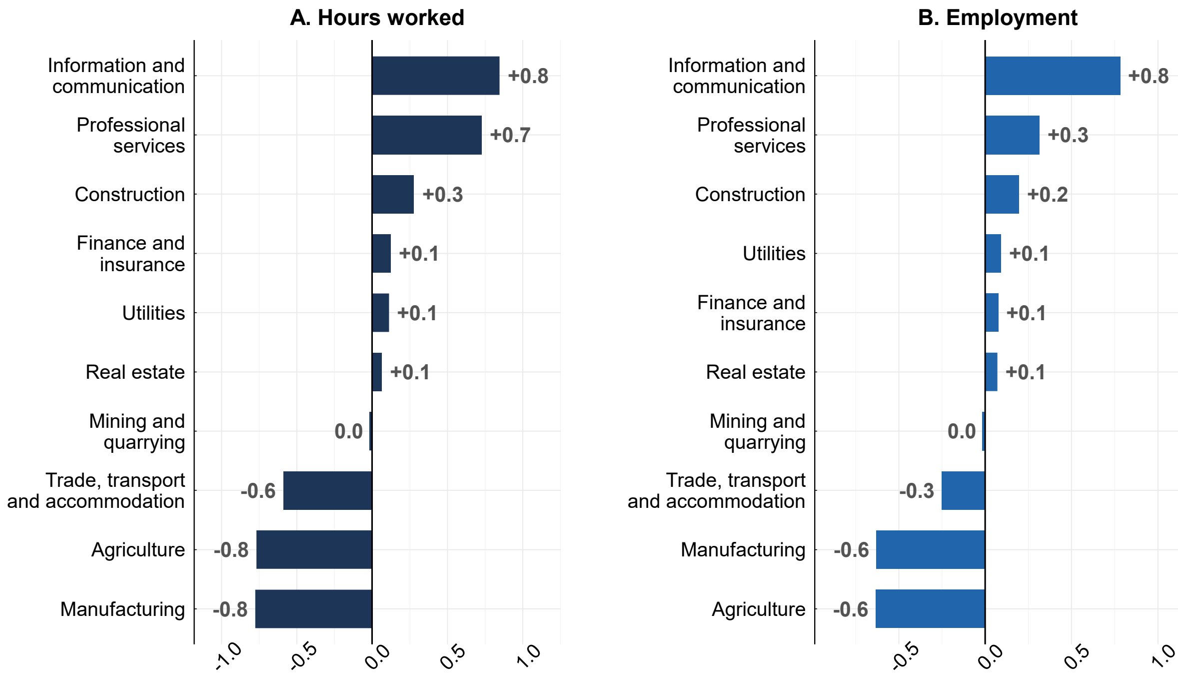
Hours worked continued to shift toward knowledge-intensive services at the expense of manufacturing and agriculture

Beyond year-to-year productivity changes within industries, the distribution of hours worked across industries has also shifted notably over the past five years, reflecting broader structural changes (Figure 4.3).

Figure 4.3. Change in industry shares, OECD average, 2019 to 2024

Percentage point change in share of total hours worked (panel A) and in share of total employment (panel B)



Note: Industry shares are computed as each industry's share of total hours worked in the economy. Industries are classified according to ISIC Rev. 4 at the A10 level. Coverage: 29 OECD countries (plus Bulgaria, Croatia and Romania). OECD countries not included: Colombia, Costa Rica, Iceland, Japan, Korea, New Zealand, Switzerland, Türkiye, United Kingdom. Industry groupings follow ISIC Rev. 4. "Trade, transport and accommodation" covers wholesale and retail trade (G), transportation and storage (H), accommodation and food services (I), arts, entertainment and recreation (R), and other service activities (S). "Professional services" covers professional, scientific and technical activities (M) and administrative and support services (N). "Utilities" covers electricity, gas and water supply (D and E).
Source: OECD National Accounts; OECD Productivity Database.

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On average across 32 OECD countries with available data, professional services and information and communication services have expanded their share of total hours worked, while manufacturing and agriculture have continued a long-term decline in their shares, as documented in earlier editions of the Compendium (OECD, 2024[7]; OECD, 2025[8]). These structural shifts shape the between-industry component of aggregate labour productivity growth, which captures productivity effects from the reallocation of labour inputs across industries with differing productivity performance.

Across industries, changes in hours worked and employment generally moved in the same direction over 2019-2024, although the magnitude of these changes was not always the same (Figure 4.3). In the case of trade, transport and accommodation, the employment share fell by around 0.2 percentage points while the hours-worked share fell by nearly 0.6 percentage points. This points to an industry-wide decline of approximately 29 hours per worker per year, the largest of any industry. This pattern is consistent with the post-pandemic expansion of part-time and flexible contracts in hospitality and retail, as well as the growing role of platform-based work in transport and delivery (OECD, 2024[7]).

In contrast, professional services as well as information and communication recorded larger gains in their share of hours worked than in their employment share, reflecting labour shortages that led firms to extend the working time of existing staff rather than hire proportionally (OECD, 2024[9]).

As the economic weight of services continues to increase across OECD countries, service-sector labour productivity needs to be interpreted with care. Productivity measures in services are particularly sensitive to measurement challenges, including changes in quality, digital delivery models and the measurement of labour inputs (Box 4.1).

Box 4.1. Measuring labour productivity in services: Why sectoral context matters

Labour productivity is commonly measured as real gross value added per hour worked. While simple in principle, the indicator must be interpreted with sector-specific measurement challenges in mind. In services, the link between production, prices, and real value added is often less direct: many services are intangible, customised, and difficult to quality-adjust, and a growing share is also highly exposed to digitalisation and rapid technological change (OECD, 2001[10]).

Prices of non-market services are not observed, and output is typically proxied by inputs, which by construction limits measured productivity growth. Regarding health, education, care and personal services, measurement is particularly challenging because service quality is difficult to define, especially when preventive measures or complementary innovations (such as pharmaceuticals) influence outcomes independently of the service itself.

In the case of market services, value is increasingly generated through quality improvements, faster logistics, better advice, more convenient platforms, and more effective business support, which may not be fully captured in measured real value added. Financial services pose a further problem: a substantial share of output is measured indirectly through implicit financial services on loans and deposits. As a result, measured value added can be sensitive to interest-rate movements and may display counterintuitive cyclical patterns.

Digitalisation is reshaping how services are produced, delivered and priced, with direct implications for measurement. A growing concern is the treatment of quasi-free or zero-price digital services such as search, social media and communication platforms, which deliver welfare to users but generate revenue indirectly and are therefore imperfectly reflected in GDP (Byrne, 2022[11]; Coyle and Nguyen, 2023[12]). Cloud computing changes the boundary between investment and intermediate consumption (OECD, 2019[13]). Moreover, platform-mediated and occasional self-employment is difficult to capture in conventional statistics (OECD/ILO/European Union, 2023[14]) and constructing appropriate deflators for fast-changing services such as telecommunications remains a challenge (Abdirahman et al., 2022[15]). Together, these issues mean that measured productivity in digitally intensive services may understate true gains.

Industry contributions to aggregate labour productivity growth

This section explores the contributions of different industries to overall labour productivity growth. Overall labour productivity growth in this section refers to the total economy, excluding real estate, public administration and defence, education, and health activities. While the previous section focusses solely on within-industry productivity developments, this section complements it by considering the role of labour reallocation across industries. Further details on the decomposition of industry-level labour productivity growth are provided in the methodology document.[1]

Industry-level labour productivity growth can be decomposed into within-industry and between-industry contributions. The within-industry component captures productivity developments occurring inside individual industries, such as technological progress, efficiency gains, or the exit of less productive firms. In contrast, the between-industry component captures changes in the distribution of total hours worked across different industries with varying productivity levels and growth rates. Aggregate productivity growth can weaken when a rising share of total hours worked concentrates in relatively low-productivity industries such as accommodation and food services. Such a shift can stem from both movements of workers into these activities and changes in hours worked by workers who stay within the same industry. Likewise, a rising share of hours worked in industries experiencing weak or negative productivity growth will weigh on overall performance.

Within-industry effects, rather than structural shifts across industries, have been the primary driver of productivity growth in the period following the COVID-19 pandemic (OECD, 2025[8]). This section examines the relative importance of these channels in explaining recent productivity performance across countries. The analysis covers the period from 1995 up to 2024 for countries where sufficiently granular data are available, and up to 2023 for the remaining countries.

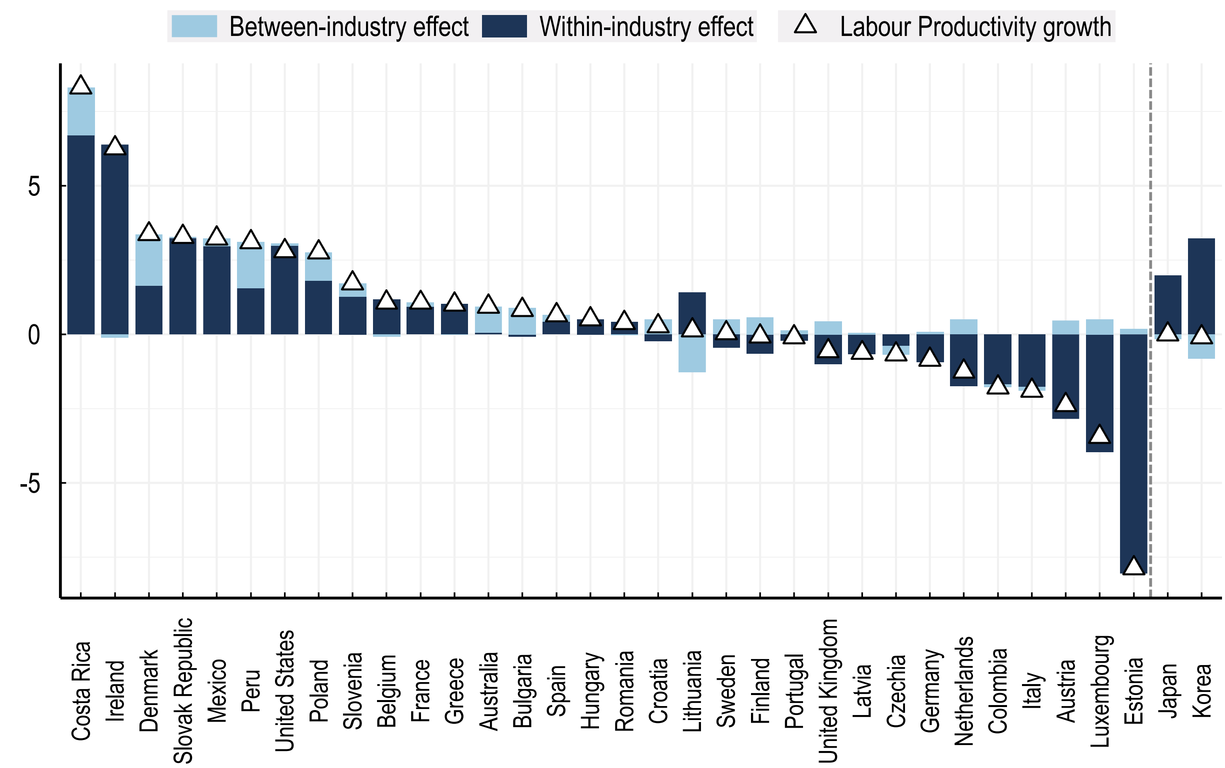
Productivity growth continues to be driven by within-industry improvements

Over the period 2023-24, the within-industry effect, which captures improvements in productivity within industries, acted as the main driver of aggregate labour productivity growth – in line with the pattern observed in recent years. This pattern is visible in most countries, with the exception of Australia, Bulgaria, and Croatia, where the between-industry effect plays a more prominent role in shaping aggregate productivity outcomes (Figure 4.4).

Costa Rica, Ireland and the Slovak Republic saw strong gains in within-industry performance over 2023-24, contributing to significant increases in overall labour productivity. On the contrary, declines in within-industry productivity were most pronounced in Estonia, Luxembourg, and Austria, weighing on aggregate productivity performance. This considerable heterogeneity across countries highlights the importance of examining the industry composition of productivity developments, which is explored in the next section.

Figure 4.4. Decomposition of aggregate labour productivity growth, 2023-24

Percentage points



Note: Labour productivity growth is measured based on hours worked for the total economy, excluding real estate, public administration and defence, education, and health activities. The decomposition is conducted at the A38 industry level for most countries, with the exception of Australia, Germany, Spain, France, Latvia, Poland, Portugal, Romania, and Sweden, for which it is performed at the more aggregated A21 level. Figures for Japan and Korea correspond to employment-based labour productivity due to the lack of industry-level hours worked data. Data refer to 2023-24 average for most countries, except for Australia, Colombia, Costa Rica, Japan, Peru, and the United Kingdom where data refers to 2023 and Korea to 2022.
Source: Authors' calculations based on OECD Productivity Database.

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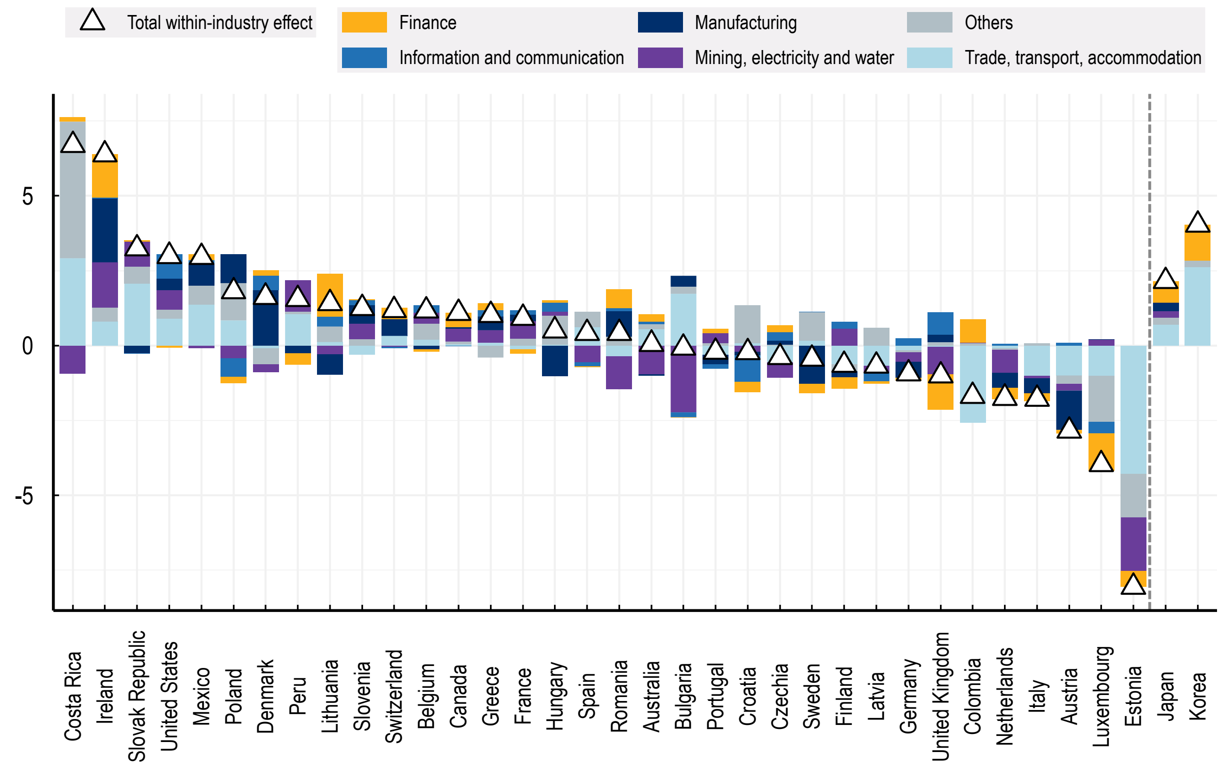
Uneven contributions of the within-industry effect across countries

A decomposition of the within-industry effect over the 2023-24 period reveals substantial cross-country diversity in the set of industries driving labour productivity growth, with no clear common pattern. Notably, industries that underpinned productivity gains in some countries contributed negatively in others. These differences likely reflected differences in countries' industrial composition, firm dynamics, broader business environment conditions, as well as countries' positions in the business cycle (Figure 4.5).

Figure 4.5. Industry contributions to the within-industry effect, 2023-24

Percentage points



Note: The category "Finance" encompasses finance and insurance services, corresponding to section K of ISIC Rev 4. "Trade, transport, accommodation" covers wholesale and retail trade (Section G), transportation (Section H), as well as accommodation and food services (Section I). Manufacturing corresponds to section C, while information and communication correspond to section J of ISIC Rev. 4. "Others" refers to all remaining industries. Figures are employment-based for Japan and Korea and hours worked-based for other countries. Data for most countries are reported as the 2023-24 average. In the absence of 2024 data, figures correspond to 2023 for Australia, Colombia, Costa Rica, Japan, Peru and the United Kingdom, and to 2022 for Korea.
Source: Authors' calculations based on OECD Productivity Database.

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Manufacturing

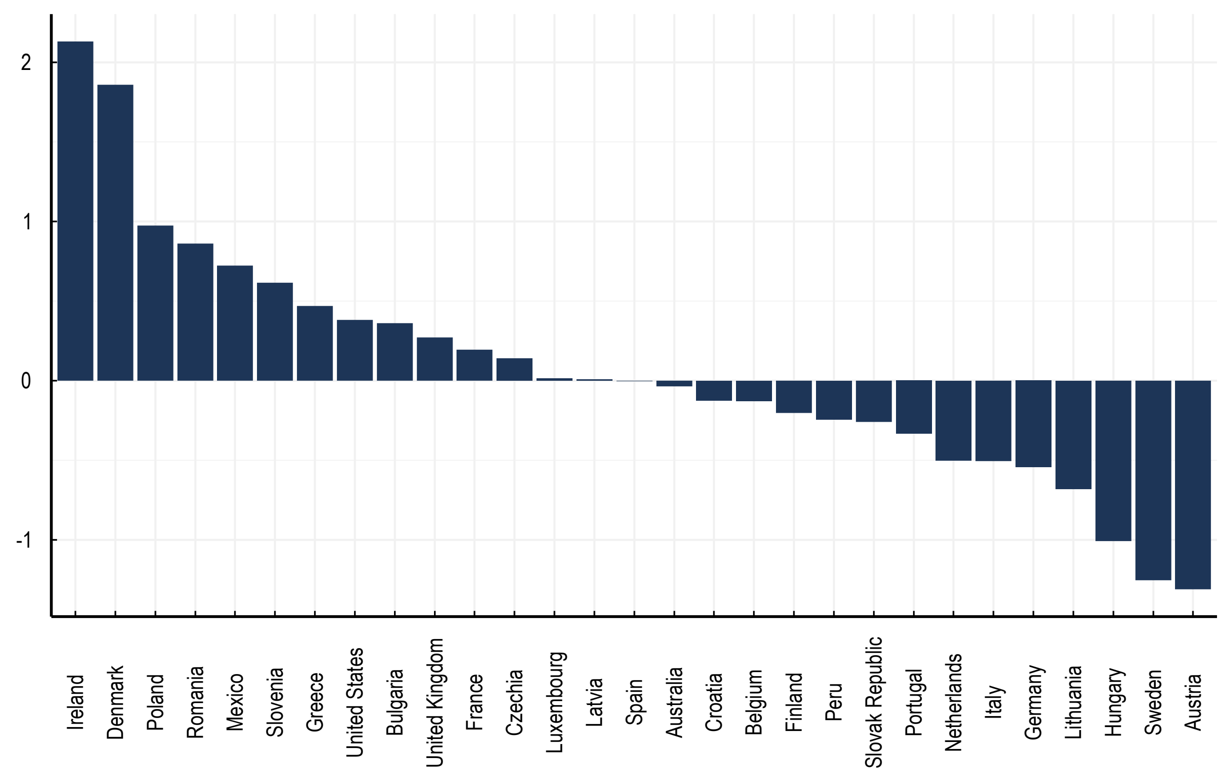
The within-industry effect of manufacturing played an important role in driving overall productivity growth over the 2023-24 period in a number of countries (Figure 4.6). Denmark stands out, with a contribution about twice as large as in other countries, mainly driven by strong performance in the pharmaceutical industry (Figure 4.2). In OECD economies, these activities are typically associated with high productivity, as they create significant value added for domestic firms while relying on production located abroad and limited domestic labour input (Kuchler et al., 2025[5]; Ishi, 2024[16]).

By contrast, manufacturing made negative contributions to labour productivity growth in several European Union countries, with the largest declines observed in Austria and Germany. This weakening likely reflects both structural and cyclical factors, including the shifts in consumer preferences, lingering energy cost pressures, and subdued demand over 2023-24 (Reinstaller and Sellner, 2024[17]; Weyerstraß et al., 2025[18]). In particular, demand for traditional manufacturing products – especially in automotive-related activities – has softened amid changing global demand patterns and the transition towards electric vehicles, weighing on production in countries such as Germany, where these industries play a central role.

At the same time, persistently high energy prices have continued to strain manufacturing across Europe. Over 2023-24, electricity prices remained about twice their pre-COVID-19 levels and significantly higher than in the United States, increasing production costs for energy-intensive industries, undermining competitiveness, and reducing households' purchasing power, thereby further dampening demand (Heussaff, 2024[19]; OECD, 2025[20]).

Figure 4.6. Within-industry effect of manufacturing, 2023-24

Percentage points



Note: Manufacturing corresponds to section C of ISIC Rev 4. Data refer to 2023 for Australia, Colombia, Costa Rica, Peru, and the United Kingdom.
Source: OECD Productivity Database.

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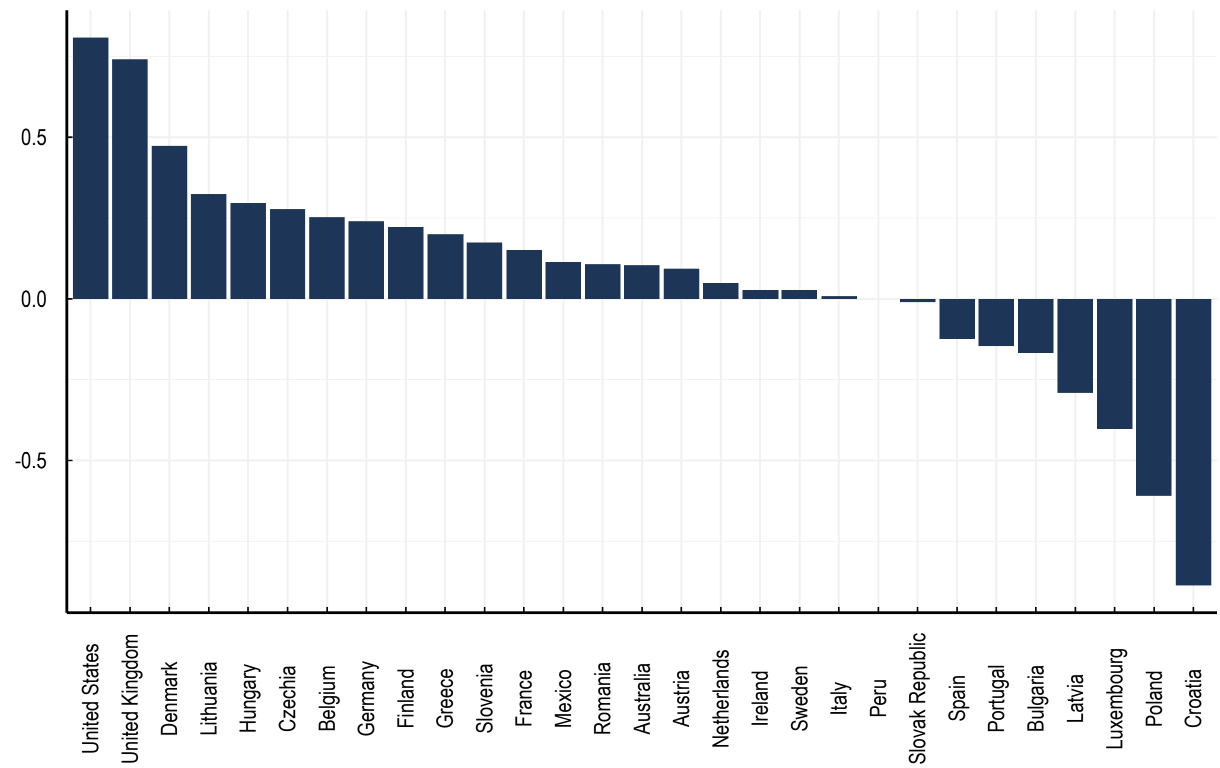
Information and communication services

Over the 2023-24 period, the contribution of information and communication services to overall labour productivity growth was mixed, with more than half of OECD countries recording positive contributions while the remaining countries experienced negative impacts. Information and communication services contributed most strongly to aggregate labour productivity growth in the United States and the United Kingdom, adding around 0.7 percentage points. For the European Union, the average contribution of this industry remained broadly flat, reflecting offsetting developments across member states. For example, Denmark recorded a positive contribution of around 0.5 percentage points, whereas the impact was negative in Croatia and Poland, at approximately 0.7 percentage points (Figure 4.7).

Figure 4.7. Within-industry effect of information and communication, 2023-24

Percentage points



Note: Information and communication correspond to section J of ISIC Rev 4. Data refer to 2023 for Australia, Colombia, Costa Rica, Peru, and the United Kingdom.
Source: OECD Productivity Database.

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The recent acceleration in AI invites comparisons with the dot-com boom of the late 1990s and raises the question whether it is already translating into labour productivity gains, particularly in the Information and Communication Technology (ICT) industries, which encompass both information and communication services and ICT manufacturing. The positive productivity developments within information and communication services over the period 2023-24 might offer early, albeit tentative, indications of AI's productivity-enhancing potential. Yet, the scale of these productivity gains during the 2023-24 period remained within historical ranges and stayed below the peaks recorded during the dot-com period (1995-2000). According to the OECD Productivity database, labour productivity growth in these services averaged 1.6% across the OECD over 2023-24, compared with 4.6% during 1995-2000.

Nevertheless, recent labour productivity performance in information and communication services outpaced pre-COVID trends in around half of OECD countries. For example, in Germany, labour growth in the information and communication services reached 3.5% in 2023-2024, compared with 3.2% in the 2010-2019, while in the United Kingdom it stood at 7.8%, higher than the 6% recorded over the previous period. An optimistic reading of the recent productivity performance in this industry across many OECD countries, together with rising investment in ICT assets (see Chapter 3), provides encouraging signs that the adoption of new digital technologies may be supporting productivity improvements.

The negative development of labour productivity growth in information and communication services in a few countries, such as Croatia, Poland, and Luxembourg during the 2023-24 period, resulted from stronger growth in hours worked than in output. This increase in hours worked was accompanied by strong employment growth in these activities, suggesting that labour input grew primarily through the hiring of additional workers rather than longer working hours per employee (Figure 4.3). The negative labour productivity growth in information and communication in these countries, despite strong employment growth, may be linked to constraints in the supply of high-skilled labour. This, in turn, tends to limit firms' ability to fully utilise new hires and capitalise on digital technologies (OECD, 2025[21]; MPF, 2024[22]). At the same time, investment in ICT assets has remained subdued in these countries over the last few years (see Chapter 3). The combination of rising employment and weak investment has led to limited capital deepening, further weighing on ICT labour productivity growth in these countries.

In contrast, productivity gains in information and communication services were sizable in the United Kingdom over the same period. This reflected strong growth in the value added produced by this industry, which has outpaced overall economic growth in the same period (OECD, 2024[7]). This performance appears to be supported by the role of digital activities in the economy, along with the continued uptake of digital technologies across firms (El-Rayyes et al., 2024[23]; Benz, Jaax and van Lieshout, 2024[24]).

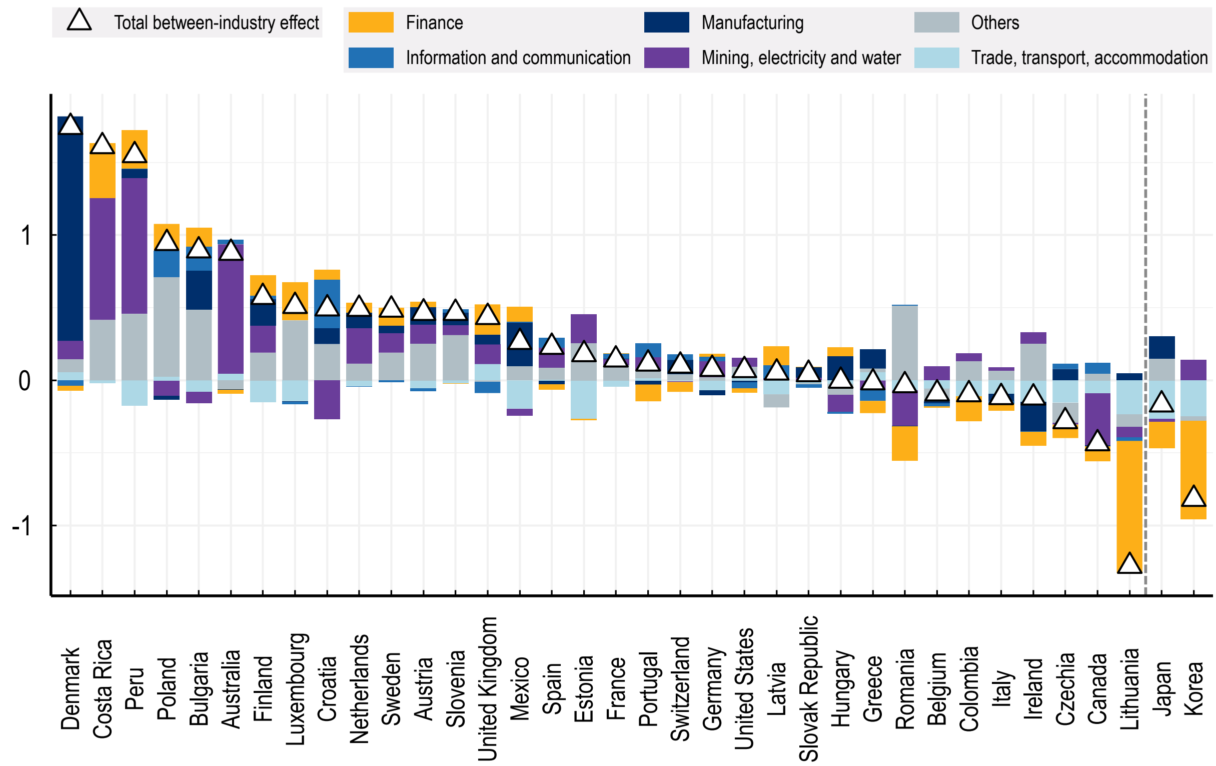
The between-industry effect was mainly positive but modest

Over the period 2023-24, estimates indicate a positive, yet limited contribution of the between-industry component – defined as productivity effects from labour reallocation across industries – to overall labour productivity growth in around three quarters of OECD countries, generally ranging between -1 and 1 percentage point (Figure 4.8). Denmark, Costa Rica and Peru stood out as exceptions, recording a comparatively strong positive effect of about 1.6 percentage points, while Lithuania experienced a pronounced negative contribution of around -2.3 percentage points.

The modest between-industry effect is expected under normal economic conditions and is consistent with patterns observed in recent years (OECD, 2025[8]; OECD, 2026[25]).

Figure 4.8. Industry contribution to the between-industry effect, 2023-24

Percentage points



Note: The category “Finance” encompasses finance and insurance services, corresponding to section K of ISIC Rev 4. “Trade, transport, accommodation” covers wholesale and retail trade (Section G), transportation (Section H), as well as accommodation and food services (Section I). Manufacturing corresponds to section C, while information and communication correspond to section J of ISIC Rev. 4. “Others” refers to all remaining industries. Figures for Japan and Korea are computed based on employment based while it is hours worked based for other countries. Data for most countries are reported as the 2023-2024 average. In the absence of 2024 data, figures correspond to 2023 for Australia, Colombia, Costa Rica, Japan, Peru and the United Kingdom, and to 2022 for Korea.
Source: Authors’ calculation based on OECD Productivity Database.

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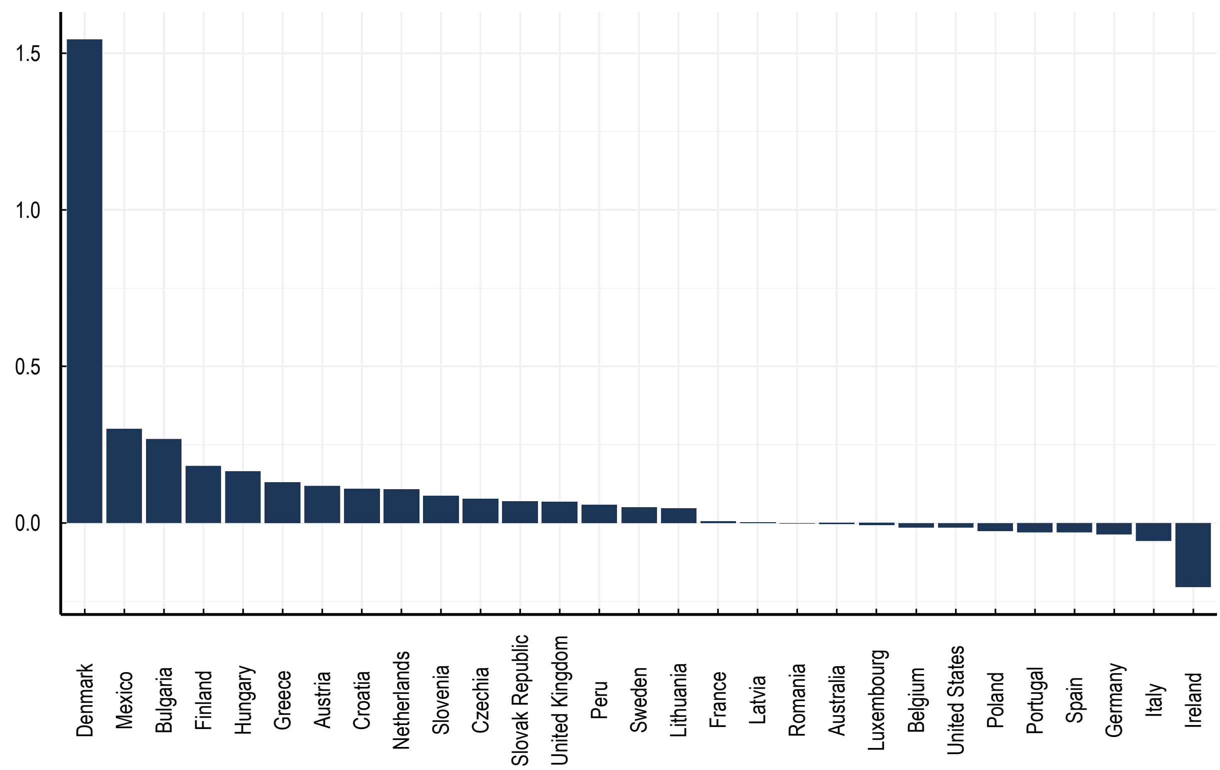
Manufacturing

In most countries, manufacturing recorded a positive between-industry effect over the same period. However, the overall impact was generally modest. Denmark stands out as a notable exception, with the contribution of manufacturing to the between-industry effect more than three times larger than that of the next highest country. This reflects a strong increase in manufacturing hours in Denmark, particularly in pharmaceuticals, where hours worked rose by about 17% in 2024 (Figure 4.9).

Figure 4.9. Between-industry effect in manufacturing, 2023-24

Percentage points



Note: Manufacturing corresponds to section C of ISIC Rev 4. Data refer to 2023 for Australia, Colombia, Costa Rica, Peru, and the United Kingdom.
Source: OECD Productivity Database.

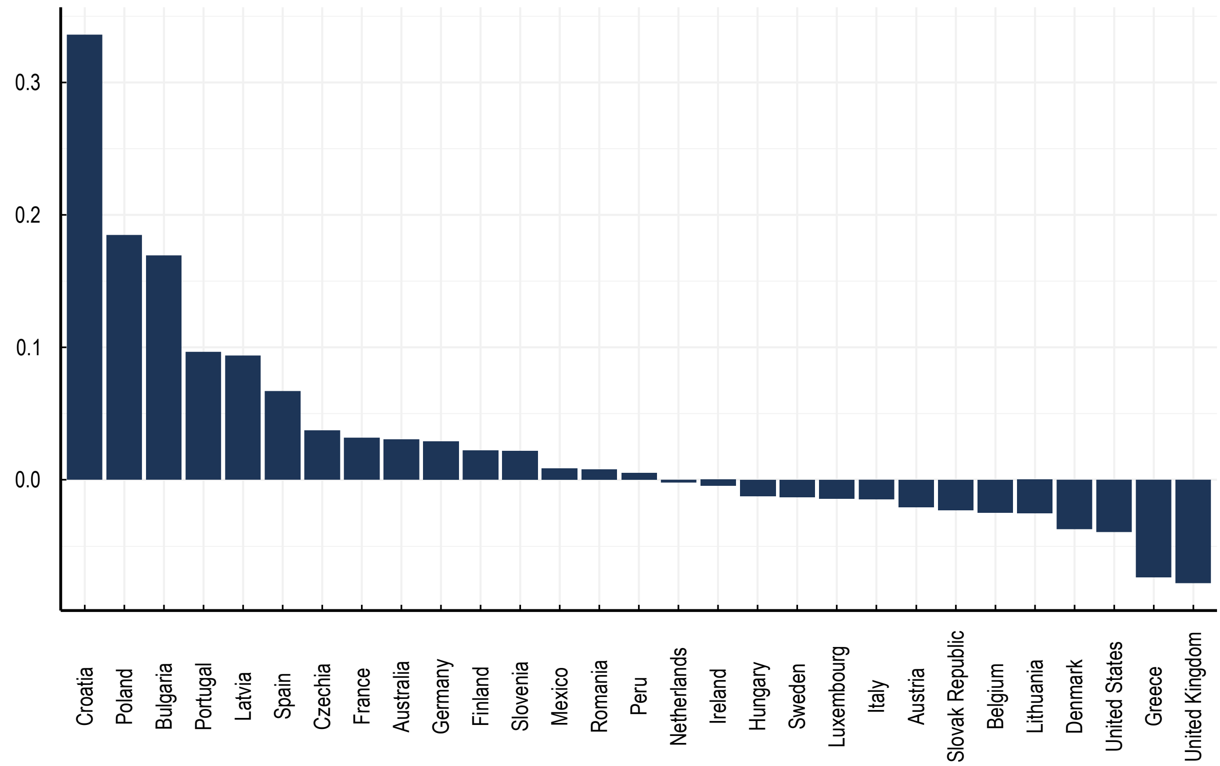
StatLink https://stat.link/5xqy8w

Information and communication services

Over the period 2023-24, information and communication services generated a positive between-industry effect in more than half of the countries with available data, driven by a relative increase in the share of hours worked in these highly productive activities (Figure 4.10). In contrast, in countries that observed negative contributions, this resulted from a reduction in hours worked in this industry relative to the total economy. The strongest positive effect was recorded in Croatia, whereas the United Kingdom and Greece saw the largest negative contributions.

Figure 4.10. Between-industry effect in information and communication, 2023-24

Percentage points



Note: Information and communication correspond to section J of ISIC Rev 4. Data refer to 2023 for Australia, Colombia, Costa Rica, Peru, and the United Kingdom.
Source: OECD Productivity Database.

StatLink https://stat.link/3rhaqp

In Croatia, hours worked in these services rose by around 20% over the same period. The growing share of hours worked in these digital-intensive activities in this country reflects partly policy-driven digital transformation, supported by substantial public investment aimed at upgrading infrastructure and strengthening the integration of digital technologies across sectors, including education (OECD, 2023[26]).

Despite this increase in labour input in Croatia, the output growth in the same industry remained relatively modest over the same period. Although it is premature to draw firm conclusions about these uneven growth trajectories, the pattern could potentially reflect a J-curve pattern, where the benefits of technology adoption materialise only gradually during the initial phase of diffusion (Brynjolfsson, Rock and Syverson, 2021[27]).

However, this analysis of the role of labour reallocation across industries in shaping aggregate labour productivity performance captures only part of the picture. It does not reveal the extent to which productivity changes are driven by underlying efficiency gains, e.g. through technological progress, better management, or gains in workers' skills and experience. The following section will address this gap by examining developments in multifactor productivity at the level of the total economy and across industries.

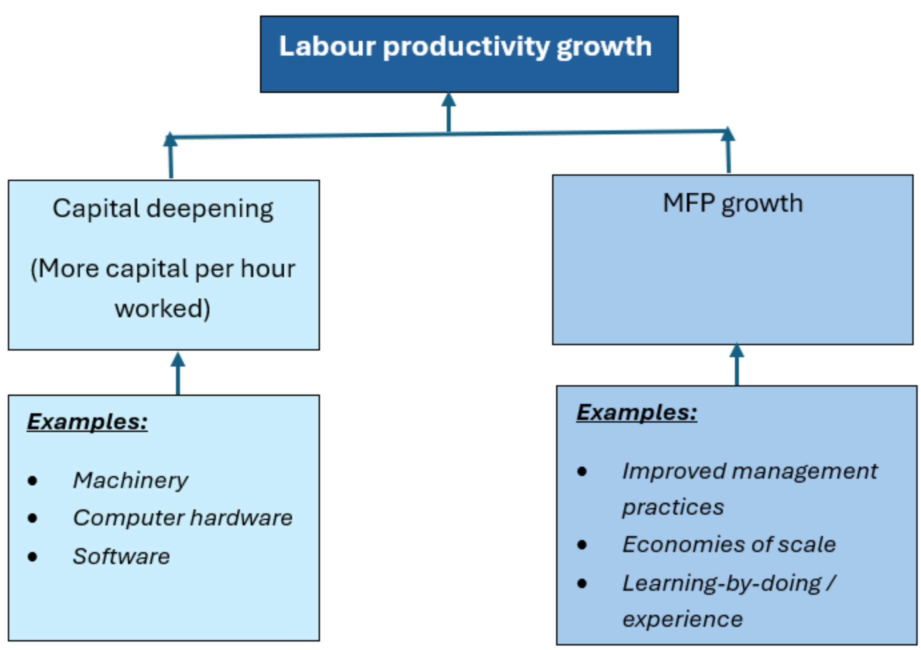
Multifactor productivity across industries

MFP is widely regarded as a key driver of economic growth and has received considerable attention in the growth literature. It is measured using the growth accounting framework developed by Solow (1957[28]). It allows for the decomposition of changes in economic output into contributions from changes in labour and capital inputs, and a residual known as MFP. As such, MFP captures changes in economic performance that cannot be explained by changes in the use of these two inputs. Increases in MFP imply that more output can be produced with a given set of inputs, and it is therefore often interpreted as an indicator of technological progress and efficiency gains.

The same framework can be used to decompose labour productivity growth into contributions from capital deepening and MFP growth, thereby distinguishing productivity gains associated with higher capital intensity from those reflecting efficiency improvements.

Figure 4.11 illustrates this decomposition of labour productivity growth into MFP and capital deepening, which can be implemented at either the industry level or for the economy as a whole. MFP growth may capture a range of factors reflecting disembodied technological change, including improved management practices and learning-by-doing effects. In addition, since the labour input measure is not adjusted for labour quality, improvements in workers' skills and experience may also be partly reflected in MFP growth. By contrast, increases in capital deepening reflect embodied technological change, through improvements in physical capital, ICT investment, and digital infrastructure.

Figure 4.11. Contributions to labour productivity growth



Note: For further discussion of the components captured by MFP, see OECD (OECD, 2001[10]).

Despite its widespread use, measuring MFP remains challenging, with important implications for cross-country comparability (Box 4.2).

Box 4.2. Interpreting Multifactor Productivity: What it measures and what it misses

MFP is a central concept for analysing the sources of economic growth, as it captures how efficiently an economy combines labour and capital to produce output. Unlike labour productivity, which relates output to a single input, MFP compares output to a bundle of inputs and is typically derived within a growth accounting framework. In this framework, output growth is decomposed into contributions from labour, capital and a residual component, MFP, which captures the part of output growth not explained by measured factor inputs. As such, MFP encompasses technological progress, organisational improvements, economies of scale and other forms of innovation that enable greater output to be generated from a given set of inputs.

New estimates of MFP have been available in the OECD Productivity Database since 2025, incorporating several key improvements over previous editions. Data coverage has been expanded, with MFP now estimated for 21 industry groups. In addition, the revised approach no longer requires extending gross fixed capital formation series or relying on strong assumptions to estimate initial capital stocks. Further details on the methodology are provided in OECD (OECD, 2025[29]).

Despite these advances, MFP remains challenging to measure and interpret. As a residual, it is sensitive to measurement errors and omitted variables arising from inaccuracies in both output and input data. Measuring output is particularly difficult in areas such as household production, non-market activities, and the informal economy, where values are not directly observed (OECD/APO, 2022[30]). On the input side, estimates may be affected by insufficient adjustment for differences in labour quality (Ward and Zinni, 2024[31]). Similarly, incomplete or imprecise measurement of capital inputs – particularly regarding asset coverage, depreciation rates and capital stocks – can bias MFP estimates (Pionnier, Zinni and Baret, 2023[32]).

More broadly, the standard productivity framework provides an incomplete picture, as it does not fully account for factors such as environmental inputs and sustainability considerations (see Chapter 6).

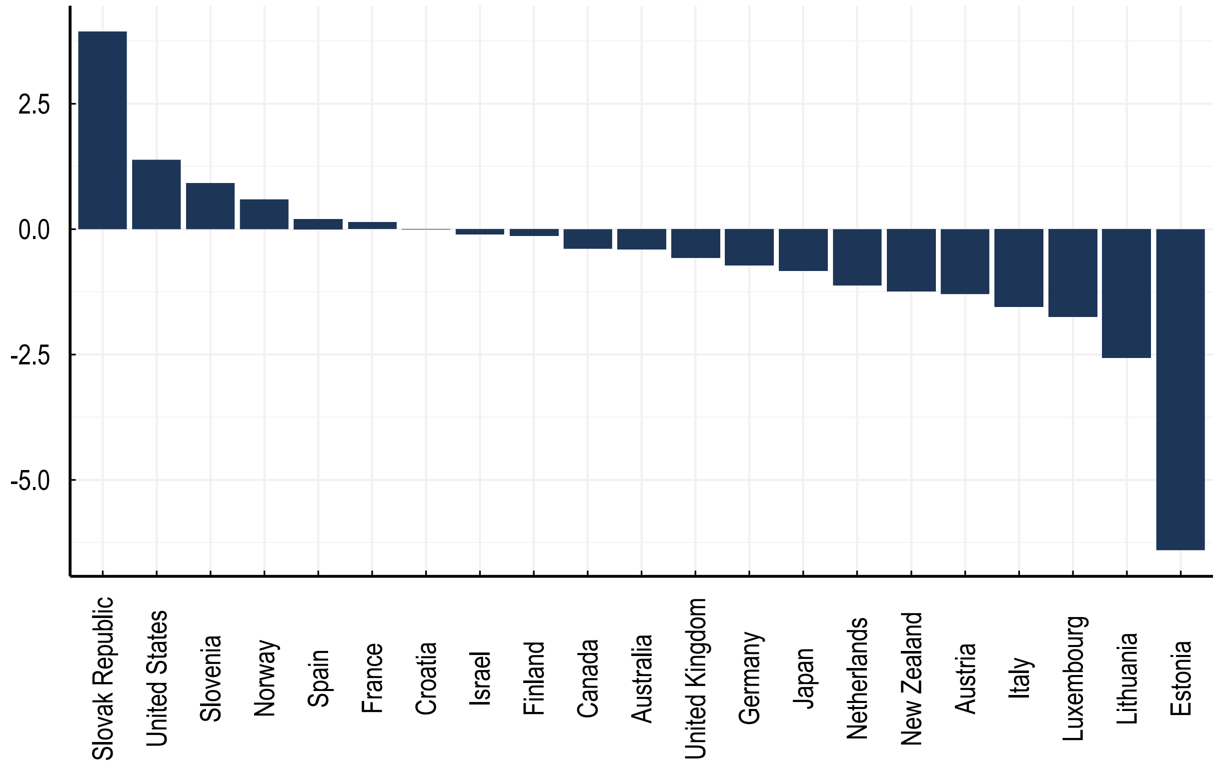
Cyclical factors, such as variations in capacity utilisation, labour hoarding, or adjustment costs during economic upturns and downturns also affect estimates of MFP as well as labour productivity. For example, during periods of weak demand, firms may retain workers or underutilise capital, leading to a temporary decline in measured MFP. Conversely, in recoveries, a more intensive use of existing inputs can mechanically boost MFP (Martin and Jones, 2023[33]; Comin et al., 2025[34]). These cyclical effects can obscure structural trends and make short-term movements in MFP more difficult to interpret.

Heterogeneous multifactor productivity developments across countries, with services leading overall growth

MFP growth for the total economy over the 2023-24 period was mixed, with roughly half of countries recording positive growth and the remainder negative growth (Figure 4.12). The largest declines were observed in Estonia and Lithuania, where MFP fell by around 6.4% and 2.5%, respectively. In contrast, the Slovak Republic continued to record the strongest growth, at around 4% over the same time. In the United States, MFP growth reached 1.4% over 2023-24, ranking second out of 21 countries with available data. Positive MFP growth suggests improvements in efficiency, allowing more output to be generated from a given combination of labour and capital inputs.

Figure 4.12. MFP growth in the total economy, 2023-24

Per cent



Note: Data for most countries refer to the unweighted average of year-on-year MFP growth over the years 2023 and 2024. When 2024 data is missing, it refers to 2023 for Croatia, Estonia, Luxembourg, Lithuania, and Spain and to 2022 for New Zealand and Norway.
Source: OECD Productivity Database.

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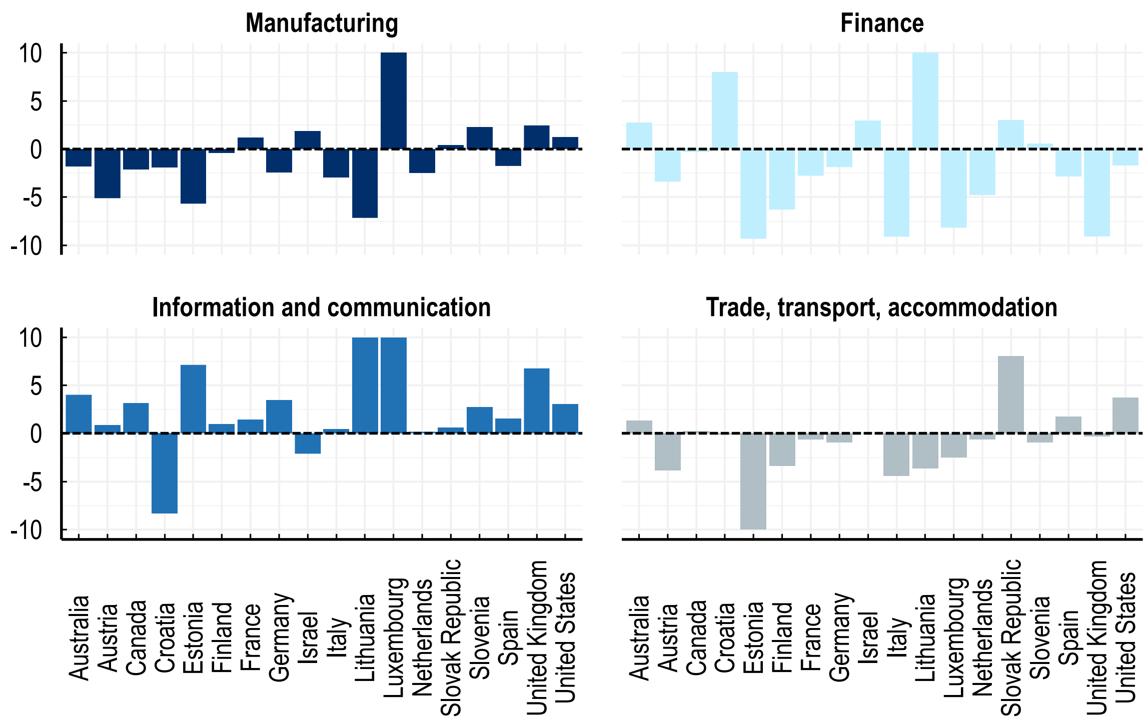
However, the economy-wide average masks significant variation across industries (Figure 4.13). Comparing MFP developments across selected industries over 2023-24 shows that mining and quarrying, manufacturing, and electricity and water management industries generally acted as a drag on overall MFP growth in most countries. In these industries, MFP growth typically lagged behind the aggregate.

Declines in MFP in these industries appear to reflect a combination of declining gross value added (GVA) and relatively limited adjustments in inputs. For example, in Germany, GVA in manufacturing over 2023-2024 declined by approximately 3% while hours worked in the same industry only declined by 1%. This pattern is consistent with the well-documented procyclical nature of MFP: during downturns, firms often retain labour and maintain capital capacity due to adjustment costs and expectations of future demand, leading to lower measured efficiency as output contracts more rapidly than inputs (OECD, 2025[8]; Comin et al., 2025[34]).

Figure 4.13. MFP growth in selected industries relative to the total economy, 2023-24

Percentage points



Note: The category "Finance" encompasses finance and insurance services, corresponding to section K of ISIC Rev 4. "Trade, transport, accommodation" covers wholesale and retail trade (Section G), transportation (Section H), as well as accommodation and food services (Section I). Manufacturing corresponds to section C, while information and communication correspond to section J of ISIC Rev 4.
Source: Authors' calculations based on OECD Productivity Database.

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By contrast, information and communication services were the main contributors to overall MFP growth in many countries in the same period. Similar, though generally more moderate, contributions were observed in professional and administrative services across a number of countries. In trade and other market services, which are typically characterised by relatively low productivity levels, MFP growth nevertheless outperformed the total economy in more than half of the countries with available data.

The prominence of MFP growth in information and communication services may partly stem from productivity gains related to investments in ICT and other intangible assets, whose growth has outpaced other forms of investment since the mid-2010s (Gal et al., 2026[35]). The accumulation of these assets fosters the diffusion of frontier technologies, such as AI, enhancing operational efficiency and production processes, and gradually contributing to productivity gains.

Multifactor productivity explained the overwhelming part of labour productivity growth

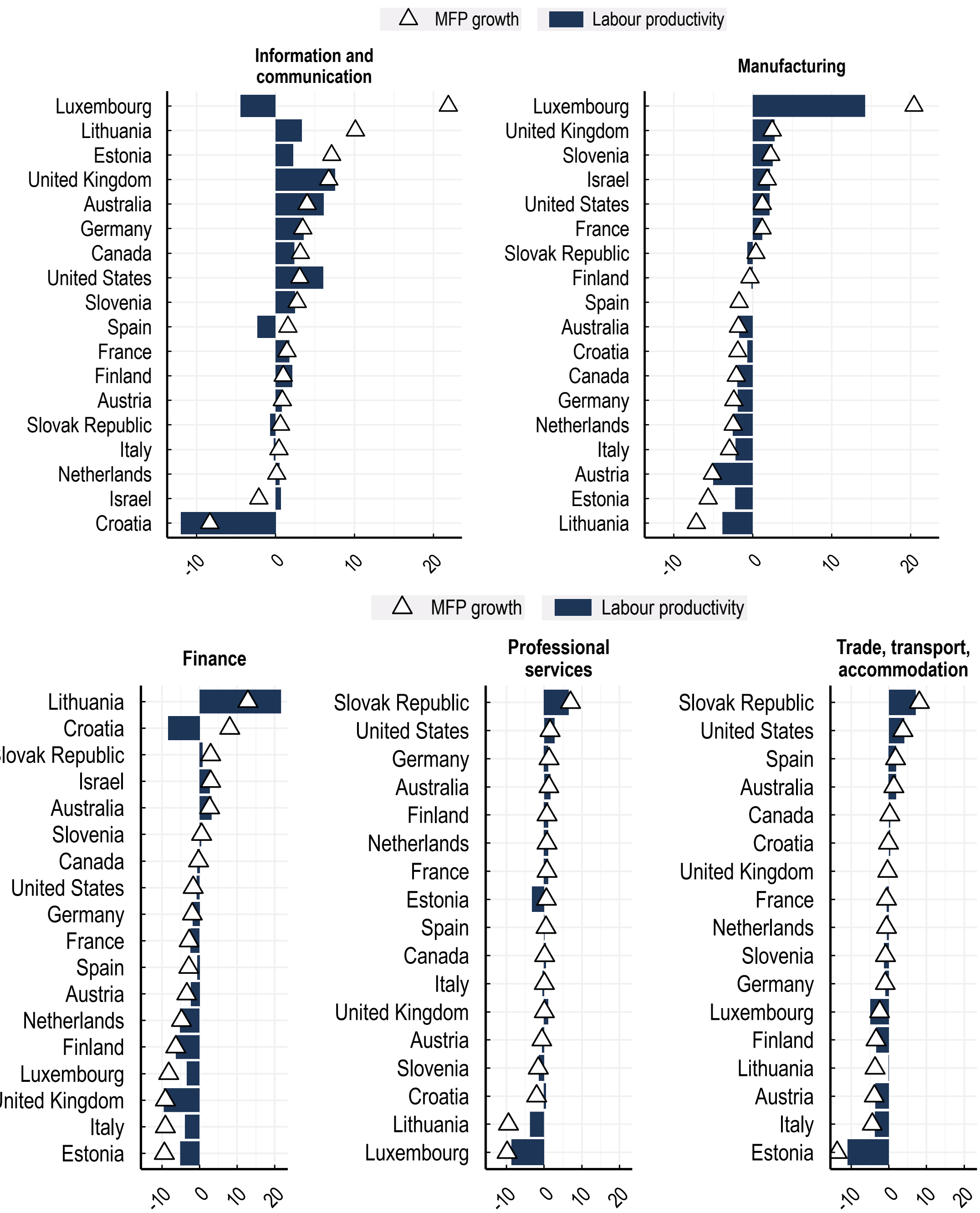
Labour productivity growth can be split into two main sources: capital deepening and MFP growth (Figure 4.11). This decomposition shows whether labour productivity improvements arise from greater capital intensity or from more efficient use of inputs.

Over the 2023-24 period, labour productivity growth in most industries was largely driven by MFP growth (Figure 4.14). As a result, differences in industry-level labour productivity growth across countries largely reflected variation in MFP performance across industries in these countries. The greater contribution of MFP growth relative to capital deepening has been a persistent feature of productivity growth over time (OECD/APO, 2022[30]). This pattern is consistent with subdued investment dynamics observed in recent years, partly linked to heightened economic uncertainty (Dlugosch et al., 2025[36]).

The dominant role of MFP growth in explaining labour productivity growth is particularly pronounced in manufacturing and trade, transport and accommodation services. By contrast, in information and communication services, capital deepening makes a relatively larger contribution to productivity growth. This increase in capital deepening in this industry is consistent with investment in ICT and intangible assets (see Chapter 3).

Figure 4.14. Contribution of MFP in labour productivity growth in selected industries, 2023-24

Percentage points



Note: The category “Finance” encompasses finance and insurance services, corresponding to section K of ISIC Rev 4. “Trade, transport, accommodation” covers wholesale and retail trade (Section G), transportation (Section H), as well as accommodation and food services (Section I). Manufacturing corresponds to section C, while information and communication correspond to section J. Professional services encompass professional (Section M) and administrative service activities (Section N).
Source: OECD Productivity database.

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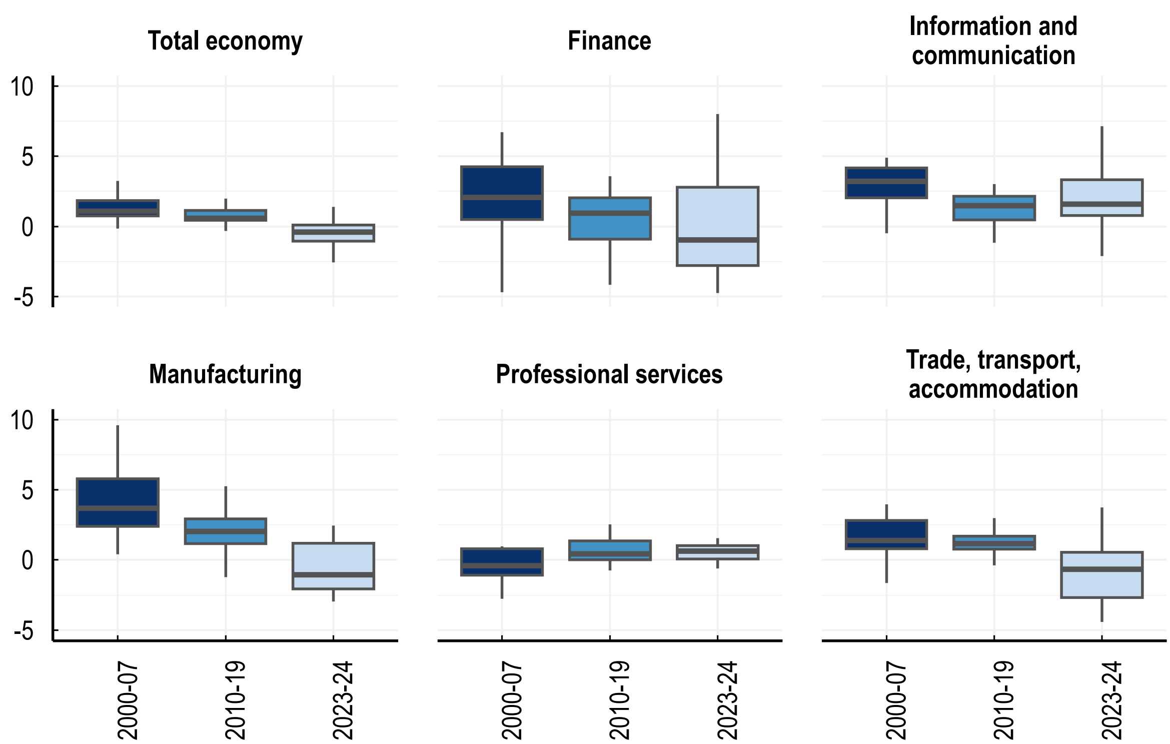
Multifactor productivity growth continued its downward trend over time, with increasing divergence across countries

MFP growth has shown a downward trend since the early 2000s (Figure 4.15). This slowdown is visible not only at the level of the total economy but also across several major industries in the business sector (Nikolov et al., 2026[37]; Acemoglu, Autor and Patterson, 2023[38]; Fernald, Inklaar and Ruzic, 2023[39]). Professional and administrative services represent a notable exception, as MFP growth in this industry has, on average, strengthened over the same period.

Figure 4.15. Dispersion of MFP growth in selected industries since 2000

Per cent



Note: The category “Finance” encompasses finance and insurance services, corresponding to section K of ISIC Rev 4. “Trade, transport, accommodation” covers wholesale and retail trade (Section G), transportation (Section H), as well as accommodation and food services (Section I). Manufacturing corresponds to section C, while information and communication correspond to section J of ISIC Rev. 4. Professional services include professional, scientific, technical (Section M), and administrative and support activities (Section N). The horizontal line in the boxes represents the median, the upper and lower edges of each boxes reflect the 25th and 75th percentiles of the distribution of MFP growth for a given industry and period.
Source: OECD Productivity Database.

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Although MFP growth has generally slowed at the total economy level, the extent and nature of this deceleration vary markedly across industries. At the aggregate level, the shift has been relatively moderate: unweighted average MFP growth across OECD countries in the period of 2023-24 is estimated at around -0.3%, compared with 0.8% in the pre-COVID period (2010-19) and about 1.5% during the period of 2000-07. Much sharper declines are observed in manufacturing and financial activities, where MFP growth in 2023-24 stands approximately 4.5 percentage points below the levels recorded during the 2000-07 period.

While cross-country dispersion in MFP growth is relatively modest at the aggregate level, it is much more pronounced at the industry level. This reflects the nature of MFP itself, which captures industry-specific differences in technology adoption, management practices, innovation, and organisational capabilities.

Differences in MFP growth have become increasingly visible in digital-intensive industries, including finance and insurance, and information and communication services. Compared with 2010-19, these industries displayed greater dispersion in 2023-24 (Figure 4.15).

Cross-country MFP trajectories since the 2000s point to increasing divergence across countries (Figure 4.16). In the information and communication services, this pattern has been driven by a small group of countries – notably the United Kingdom and Australia – that have experienced comparatively strong gains in MFP performance. By 2023-24, their MFP growth rates were around twice those observed in the benchmark period (2000-07). In contrast, many other economies have shown a flat MFP path, suggesting little MFP growth since the early 2000s.

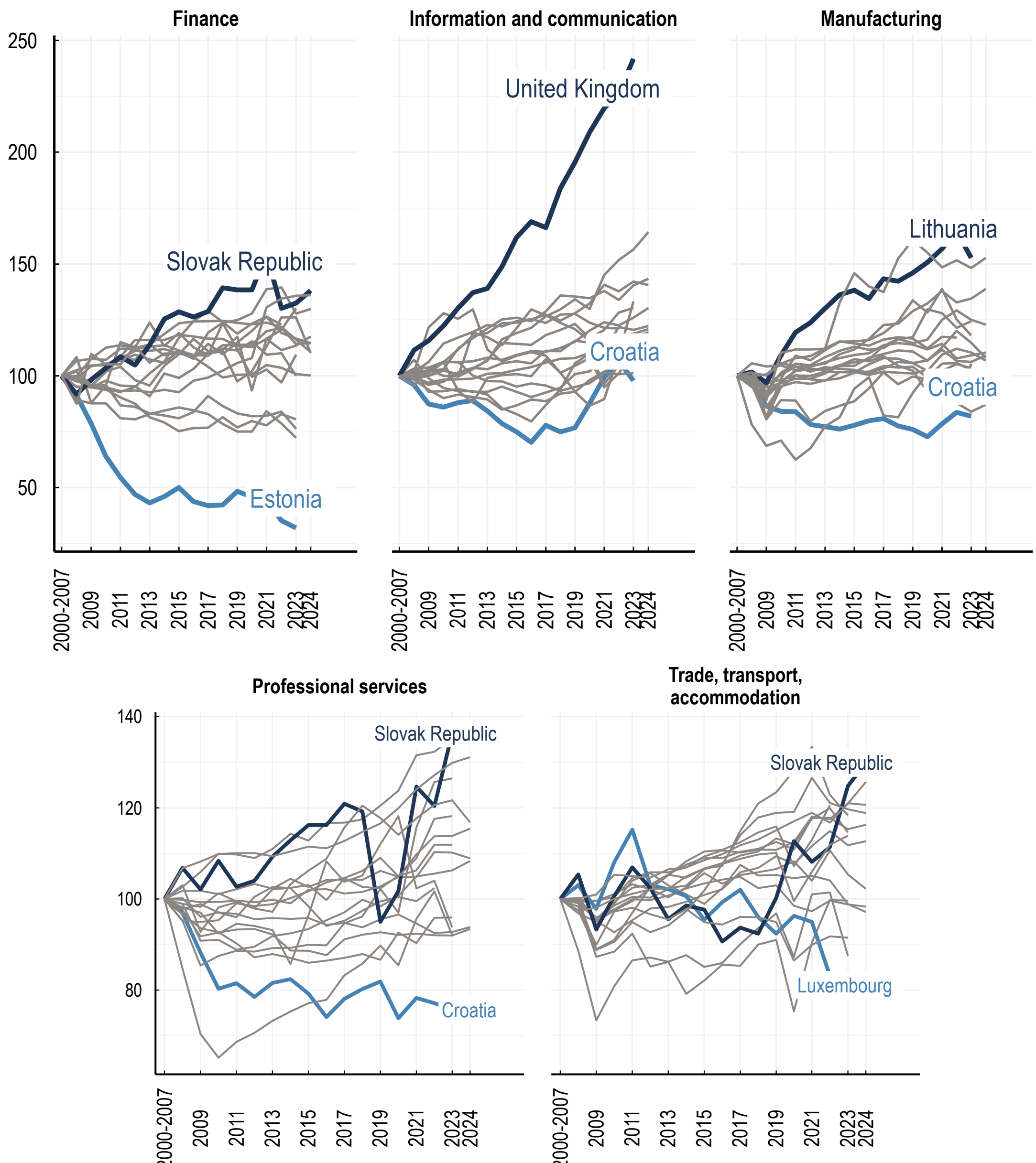
Conversely, in the finance and insurance services, the widening dispersion in MFP performance reflects a group of economies, including Estonia and Luxembourg, that have more frequently recorded negative growth, while others have seen modest gains. In these economies, MFP in 2023-24 remained below 2000-07 levels.

The observed dispersion in MFP growth across countries likely reflects underlying structural differences, including country's resilience to successive economic shocks and differences in the pace of technology adoption (see Chapter 3), which influence countries' capacity to sustain growth and catch up (Andrews, Criscuolo and Gal, 2016[40]; Tsvetkova, 2024[41]).

Looking ahead, the widening dispersion in MFP performance across countries could potentially translate into more persistent differences in economic performance across economies if sustained over time. The uneven adoption and diffusion of AI and other advanced digital technologies are likely to exacerbate this pattern. These technologies require significant investments – such as data infrastructure, digital skills, organisational change and other intangible assets – which differ widely across countries due to differences in digital readiness, innovation capacity, regulatory frameworks and policy support for technology adoption (Brynjolfsson, Rock and Syverson, 2021[27]; Corrado et al., 2021[42]; Denmou and Franco, 2021[43]).

Figure 4.16. Development of MFP over time in selected industries

Index, 2000-07=100



Note: The category "Finance" encompasses finance and insurance services, corresponding to section K of ISIC Rev 4. "Trade, transport, accommodation" covers wholesale and retail trade (Section G), transportation (Section H), as well as accommodation and food services (Section I). Manufacturing corresponds to section C, while information and communication correspond to section J of ISIC Rev. 4. Professional services include professional, scientific, technical (Section M), and administrative and support activities (Section N). MFP is expressed as an index relative to each country's 2000–07 average (2000-07=100). A value of 100 indicates that the country has the same MFP level as it did in 2000-07. The country shown in dark blue recorded the highest MFP growth among the 21 countries with available data in 2024 or the latest available year. The country shown in light blue recorded the lowest MFP growth over the same comparison.
Source: OECD Productivity database.

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Note

[1] The methodology document can be accessed through the following link: *www.oecd.org/content/dam/oecd/en/publications/support-materials/2023/02/oecd-compendium-of-productivity-indicators-2023_bdbeba7d/oecd-compendium-of-productivity-indicators-2023-methodology.pdf.*

5 Labour productivity patterns across firm sizes

Key findings

- In 2024, small and medium-sized enterprises (SMEs) employing less than 250 persons in the business sector displayed significantly lower productivity levels than large firms with 250 or more persons employed. Across OECD and accession candidate countries, unweighted average SME labour productivity was only 65% of that of large firms. The size-productivity gap, defined as the difference in labour productivity between SMEs and large firms, varied substantially across countries, ranging from nearly 60 percentage points (p.p.) in Ireland to just 2 p.p. in Switzerland. Since 2013, this gap has widened in most countries (20 out of 32) and across most industries.
- Among SMEs, labour productivity increases with firm size, with micro firms (fewer than 10 persons employed) exhibiting the lowest productivity. In manufacturing, productivity remains strongly scale dependent. By contrast, in business services, medium-sized enterprises (50 to 249 persons) often match or even outperform large firms.
- Large productivity gaps also exist among firms of similar size. Evidence from the OECD MultiProd project shows that productivity dispersion within size classes explains around 95% of total productivity variance within a given industry.
- Firm-level data from Italy and Spain reveal large productivity differences between firms in different regions of the same country, even within a given industry and firm size class, underscoring the role of local factors beyond firm size and industrial composition.

Introduction

A large body of evidence points to a significant productivity gap between large firms and small and medium-sized enterprises (SMEs), particularly in manufacturing (Cunningham et al., 2022[1]). Key explanations for productivity differences across firms include economies of scale, access to capital, and skills of workers and managers (Ferrando and Ruggieri, 2018[2]; Criscuolo, Gal and Freund, 2024[3]; Criscuolo et al., 2021[4]). Ownership and management structures are also relevant, with professional management often associated with higher productivity levels (Aguilera et al., 2024[5]). In addition, firm internationalisation contributes to variation in productivity performance, as large firms, particularly multinationals, are more likely to engage in exporting, importing, and foreign production, potentially reinforcing both scale and productivity advantages (Bernard et al., 2018[6]).

This chapter examines differences in labour productivity beyond industry-level patterns, comparing SMEs (firms with 1 to 249 employees) with large firms (250 or more employees). To provide a comprehensive picture of productivity differences between firms, it uses several data sources that are more granular than those underpinning standard industry and total-economy productivity statistics. Due to data gaps and limited harmonisation of key variables across countries (see Box 5.1), productivity measures in this chapter are not directly comparable to those in other chapters of the Compendium.

The first part of this chapter relies on the OECD Structural and Demographic Business Statistics database, with labour productivity measured as turnover per person employed in nominal terms. It provides an economy-wide overview of productivity patterns by firm size and their evolution between 2013 and 2024. The discussion then examines how firm-size productivity gaps differ across industries, highlighting a weaker relationship between size and productivity in services than in manufacturing. Complementary firm-level evidence relies on data from the OECD MultiProd project, where labour productivity is measured as value added in constant prices per worker (see Box 5.2.). The final part of the chapter explores differences in productivity performance across firms in regions of Italy and Spain. Drawing on firm-level data from Bureau van Dijk's Orbis database, this last part uses both labour productivity and multifactor productivity (MFP) measures.

Economy-wide patterns in labour productivity by firm size

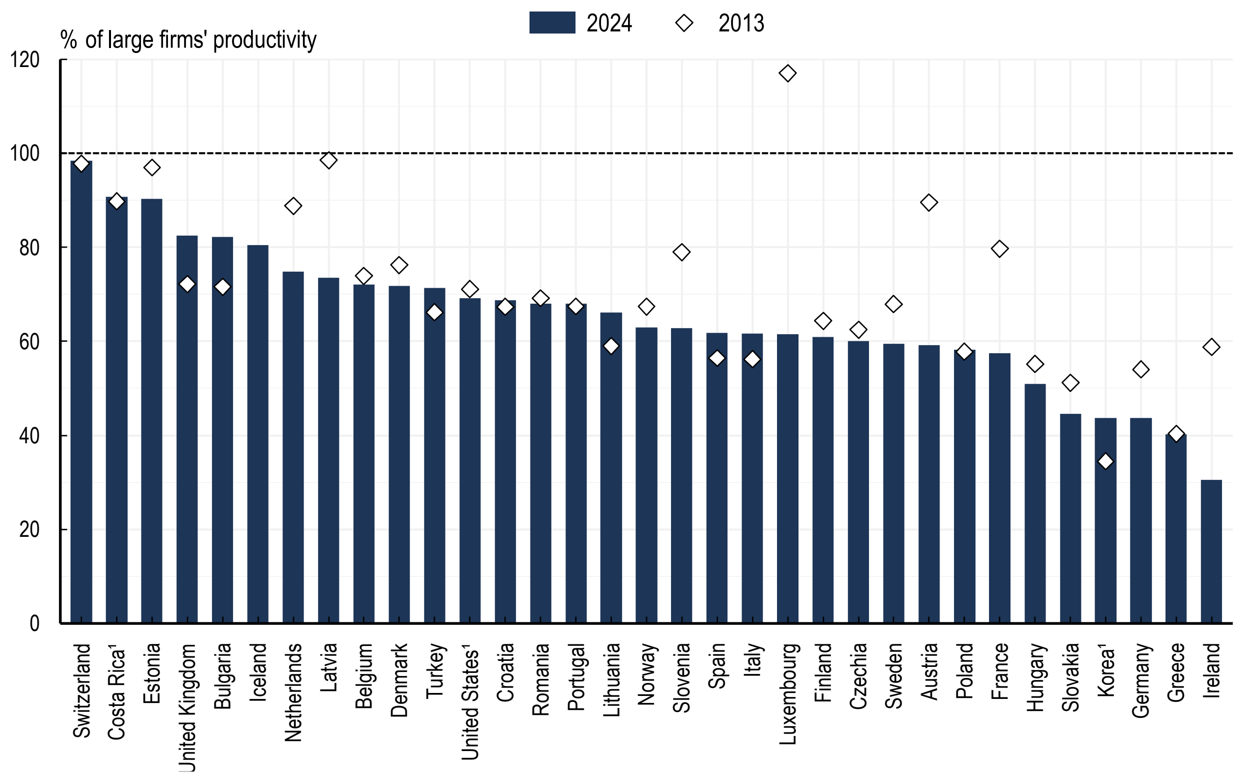
In 2024, SMEs in the business sector operated at significantly lower labour productivity levels than large firms. Productivity of SMEs, on average across 33 OECD and accession candidate countries, was only 65% of that of large firms, measured by turnover per person employed, ranging from 30% in Ireland to 98% in Switzerland (Figure 5.1). Large firms typically benefit from size-related cost advantages, easier access to finance, stronger managerial and HR capabilities, and deeper integration into foreign markets, contributing to their higher productivity (Marchese et al., 2019[7]).

SMEs in the business sector consistently exhibit lower productivity than large firms. The size-productivity gap generally increased between 2013 and 2024 in 20 of 32 countries with available data. In ten countries, the productivity differential between large and small firms has narrowed slightly over the past decade, suggesting either slower productivity growth among large firms or catch-up among SMEs driven by a small group of rapidly growing firms or 'scalers' (OECD, 2025[8]). For example, in Korea, where SME catch-up was most pronounced, large firms experienced average annual productivity growth of 0.8% during this period. SMEs' productivity grew almost five times faster, at 3.7% on average, in nominal terms.

In contrast, countries with a strong presence of multinational enterprises (MNEs) have seen a substantial increase in the productivity gap between large firms and SMEs between 2013 and 2024. The gap almost doubled in Ireland, where the productivity of large firms grew almost three times faster over this period than that of SMEs, at approximately 9.6% per year. In Luxembourg, the size-productivity gap widened sharply between 2013 and 2024, shifting from a situation in which SMEs were 17% more productive than large firms to one where SMEs reached only 62% of large-firm productivity. This shift in Luxembourg was driven by annual productivity growth of about 5.3% in large firms, compared with near-zero growth among SMEs.

Figure 5.1. Labour productivity of SMEs relative to large firms in the business sector

Per cent of large firm productivity, as measured by turnover over total employment



Note: The Business sector corresponds to ISIC, Revision 4, Sections B to J and M to N. SMEs are defined as firms with 1 to 249 persons employed, except in the US, where they correspond to 1 to 299 persons employed. Data for Costa Rica, Korea and the United States correspond to 2022, and for the United States, the diamond corresponds to 2012.
Source: OECD SDBS database, Business population estimates of the UK Department of Business and Trade, and U.S. Census Bureau Statistics of US Businesses.

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Box 5.1. Challenges in measuring productivity by firm size

Firm-size-specific productivity measurement is based primarily on business surveys and economic censuses rather than national accounts. Compared with national-accounts-based productivity measures, this implies a less integrated and less harmonised statistical framework, which introduces a number of measurement challenges:

- First, size class definitions are not fully harmonised. Some countries apply national firm-size classifications tailored to domestic enterprise structures, improving internal relevance but reducing international comparability.
- Second, reporting thresholds vary across countries as well as by industry within countries. Employment-based thresholds, such as including only firms with at least ten employees, are common but may lead to systematic coverage differences across industries. Large firms are consistently included, while micro-firms are often excluded or only partially sampled, despite representing a substantial share of employment in certain industries. Alongside employment-

based cut-offs, thresholds may also be based on turnover, adding to the complexity of cross-country comparisons.

- Third, data on hours worked, especially in services sectors, are often unavailable. Moreover, some countries provide firm-size data only for economic census years, resulting in gaps in the time series. Similarly, some countries do not report value added by firm-size class.
- Finally, all data are reported in nominal prices, as firm-size-specific deflators are not available.

Due to these limitations, the labour productivity metrics in this chapter are not entirely comparable to those in other chapters. To maximise country coverage, the main analysis based on the OECD Structural and Demographic Business Statistics database measures labour productivity as turnover in current prices per person employed. This is complemented by two analyses based on micro data – Box 5.2 (firm-level) and a subsection focused on firms in different regions – where productivity is instead measured as value added in constant 2005 USD PPPs per employee or person employed.

Diverging patterns of productivity gaps across economic activities

Productivity gaps between SMEs and large firms vary markedly across industries. Most research has historically focussed on the manufacturing sector, highlighting a noticeable productivity gap between SMEs and large enterprises (Bartelsman, Haltiwanger and Scarpetta, 2013[9]; Cunningham et al., 2022[1]). This is partly driven by measurement issues in productivity estimates for services (also see Box 4.1 in Chapter 4). In non-financial business services, the link between firm size and productivity is less pronounced (Berlingieri, Calligaris and Criscuolo, 2018[10]; Mourougane and Kim, 2020[11]).

Microdata evidence offers an additional perspective on differences across sectors (Box 5.2). In services, productivity variability is overwhelmingly driven by differences in productivity among firms within the same sector and size class, which account for around 95% of total variance. In manufacturing, productivity differences within firm size classes explain a slightly smaller share of variance (around 92%), pointing to stronger scale effects.

Over the past decade, the unweighted average size-productivity gap between SMEs and large firms across 33 OECD and accession candidate countries with available data has widened by nearly 5.5 percentage points in the business sector (Figure 5.2). In 2024, SMEs, on average, reached about 65% of the productivity level of large firms, down from 70.5% in 2013. In 2024, this productivity gap was more pronounced in the industrial sector – comprising Mining and Quarrying, Manufacturing and Utilities – than in the business services sector. On average, SMEs in the industrial sector did not even reach 50% of the productivity of large firms.

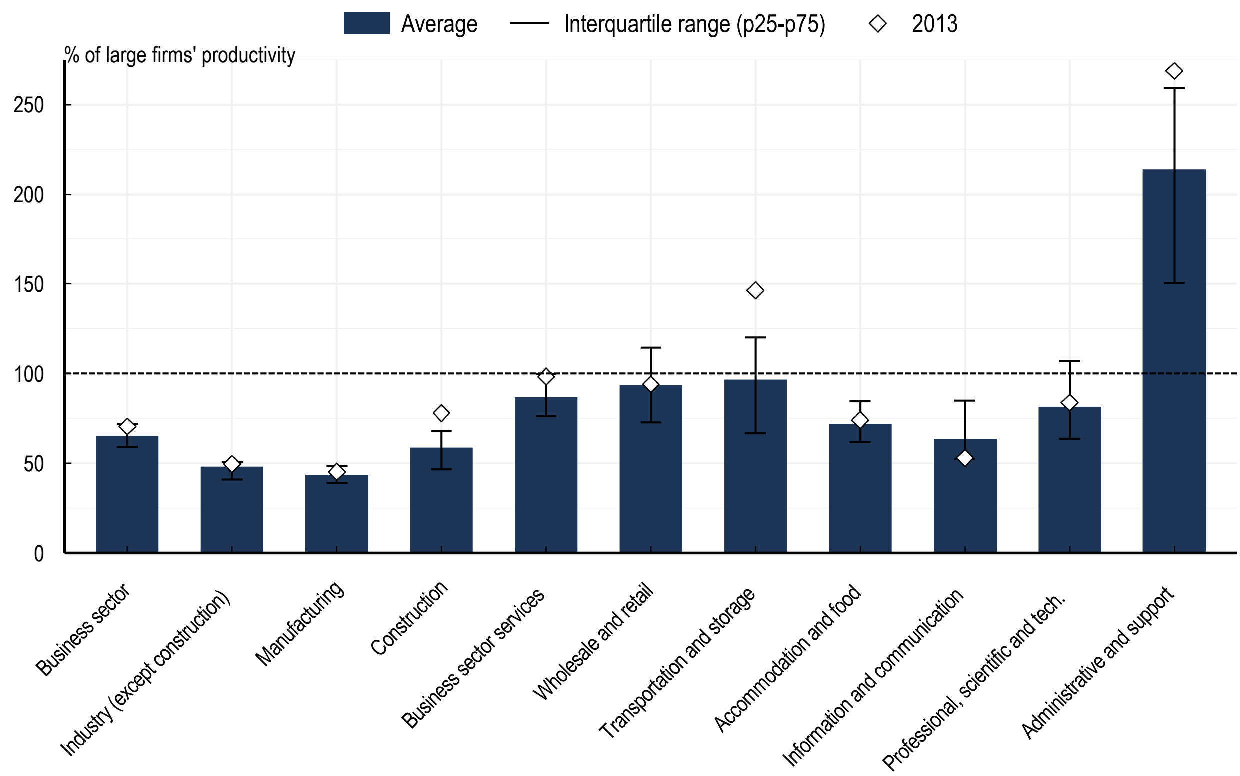
The disparity was most noticeable in manufacturing, where even the most productive SMEs did not attain half the productivity of large enterprises. Additionally, the gap expanded by approximately 1.5 p.p. in both the industrial and manufacturing sectors over the past decade. This trend could reflect that large, capital-intensive companies are increasingly outperforming smaller producers, a trend that has been attributed to large firms' more favourable access to finance and intangible capital (Chen and Lee, 2023[12]).

The link between firm size and productivity is more tenuous in business sector services, with the average size-productivity gap across 33 OECD and accession candidate countries around 13 p.p. in 2024, meaning SMEs reached about 87% of the productivity of large firms. Overall, this gap has grown in business sector services by over 11 p.p., with SMEs' productivity level having fallen from 98% of the level of large firms in 2013 to 87% in 2024. A notable productivity gap exists in the information and communication industry, where SMEs' productivity was less than 64% of large firms in 2024. The gap has, however, narrowed since 2013, when SMEs achieved just 53% of large-firm productivity.

The firm-size productivity gap is, on average, closer to parity in industries with lower value added, where SMEs in several countries outperform large firms on average. In 2013, SME productivity in transport services was, on average across countries, 46% higher than that of large firms. Administrative and support services is the only industry that consistently shows higher productivity among SMEs than among large firms across countries and over time, except in Germany. In 2024, SMEs in this industry were more than twice as productive as large firms on average across countries. However, the relative advantage of SMEs has diminished over time, reflecting faster productivity growth among large firms.

Figure 5.2. Labour productivity of SMEs over large firms across economic activities, 2024

Unweighted average of turnover over total employment across 33 OECD and accession candidate countries



Note: The figure shows the unweighted average for 2024 as bars, the interquartile range (between the 25th and 75th percentiles), and the unweighted average for 2013 as a diamond, by economic activity. Distribution statistics (i.e. the median and percentiles) are computed across 33 OECD and accession candidate countries. The Business sector corresponds to ISIC revision 4 Sections B to J and M to N, the Industry (except construction) to B to E, Manufacturing C, Construction F, Business sector services G to J and M to N, Wholesale and retail G, Transport and storage H, Accommodation and food I, Information and communication to J, Professional, scientific and technical activities to M and Administrative and support activities to N. SMEs are firms with 1 to 249 persons employed, except in the United States, where they are firms with 1 to 299 persons employed.
Source: OECD SDBS database, Business population estimates of the UK Department of Business and Trade, and U.S. Census Bureau Statistics of US Businesses.

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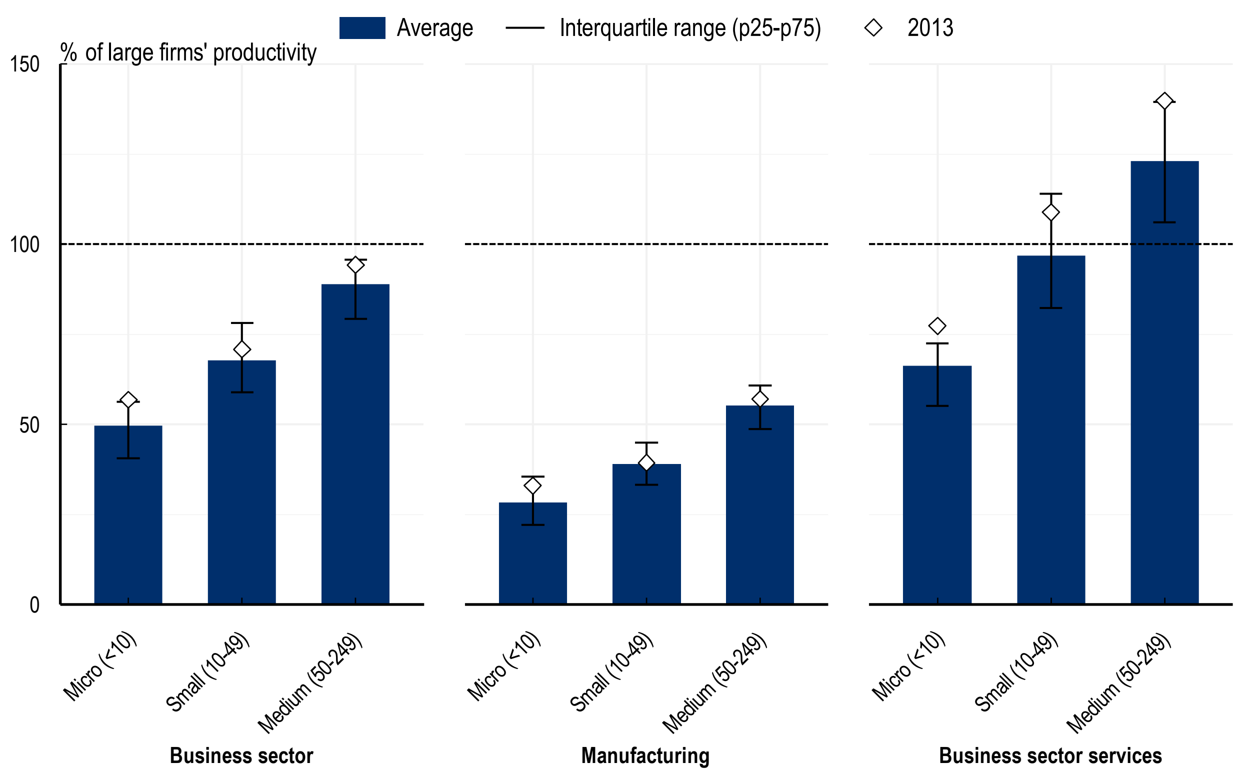
Furthermore, productivity in the business sector generally increases with firm size. Micro firms in this sector have less than half the productivity of large firms on average across countries, while medium-sized firms are nearly as productive, reaching up to 96% at the 75th percentile.

However, significant differences exist between SMEs in manufacturing and business services (Figure 5.3). In 2024, the most productive manufacturing SMEs at the 75th percentile achieved only about 61% of the productivity of large firms, with micro firms averaging only a quarter of that. In the business services sector, a similar pattern occurred, though with some differences. Medium-sized firms, with 50 to 249 employees, were, on average, 23% more productive than large firms across countries. Small firms were close to parity with large firms, with only a three-percentage-point difference.

This suggests that, while size matters for average productivity levels of firms, it explains only a limited portion of the overall variability in productivity across firms – a point explored further in Box 5.2.

Figure 5.3. Labour productivity of SMEs relative to large firms, 2024

Unweighted average of turnover over total employment across 33 OECD and accession candidate countries by size category



Note: The figure shows the unweighted average for 2024 as bars, the interquartile range (between the 25th and 75th percentiles), and the unweighted average for 2013 as a diamond, by economic activity and size. Distribution statistics (i.e. the median and percentiles) are computed across 33 OECD and accession candidate countries. The business sector corresponds to ISIC revision 4 Sections B to J and M to N, Manufacturing C, Business sector services G to J and M to N. SMEs are firms with 1 to 249 persons employed, except in the United States, where they are firms with 1 to 299 persons employed.
Source: OECD SDBS database, Business population estimates of the UK Department of Business and Trade, and U.S. Census Bureau Statistics of US Businesses.

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Box 5.2. Productivity heterogeneity within size classes drives most of the variance of productivity within industries

Using value-added-based labour productivity (as opposed to turnover-based measures used above), firm-level data reveal large productivity performance gaps among firms operating in the same industry. The OECD MultiProd project, a collaboration of the OECD Directorate for Science, Technology and Innovation with experts in participating countries, exploits firm-level data across countries to provide granular insights into productivity differences and complements conventional productivity statistics by industry and firm size. The project complements conventional productivity statistics by using data that either cover the full population of firms or by reweighting representative samples to reflect the demographic structure of the business population. The evidence from MultiProd indicates that the 10% most productive firms are, on average across 15 OECD countries, around seven times more productive than the 10% least productive ones within the same country and industry. However, size explains only a small share of these productivity gaps (OECD, 2026, forthcoming[13]).

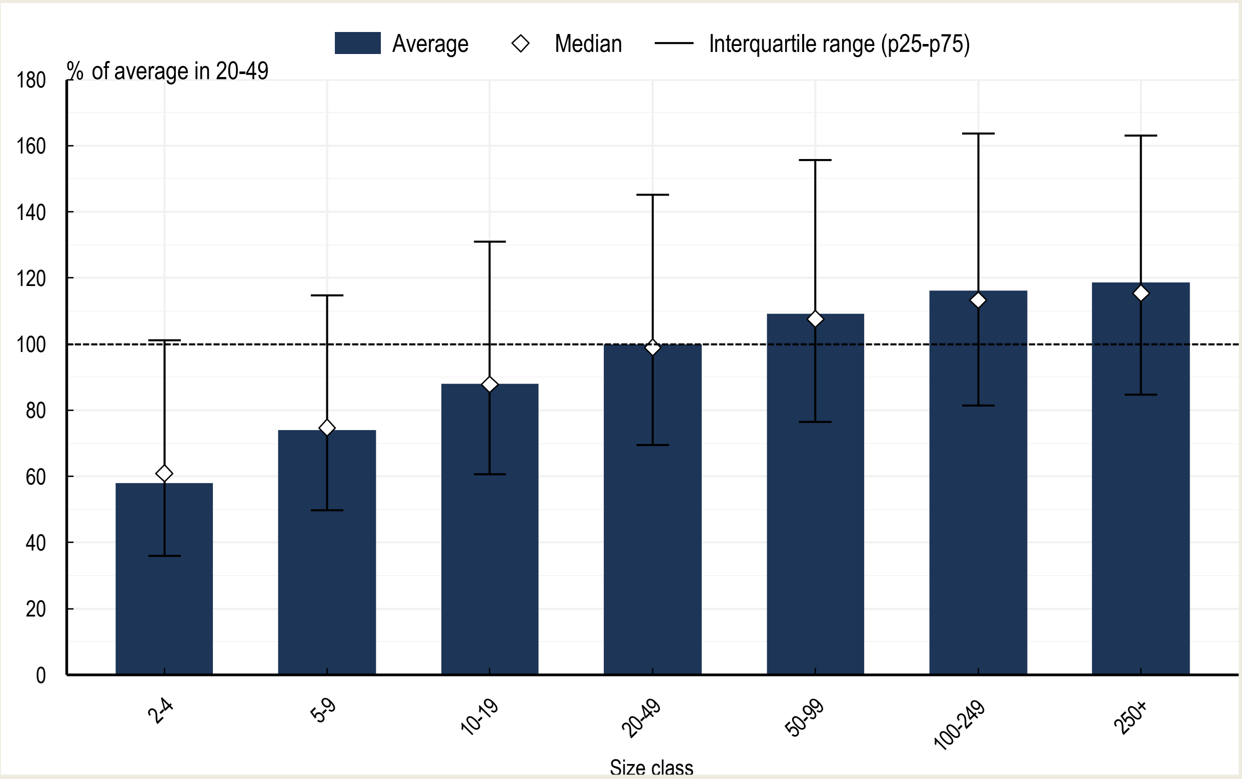
Productivity gaps are large even among firms within similar size groups in the same industry. Further to differences between size groups documented in this chapter, the interquartile ranges, for the period between 2010 and 2023, illustrate that firms at the 75th percentile within each size group are more than twice as productive as those at the 25th percentile within the same group (Figure 5.4). While larger firms tend to be more productive on average, highly productive micro firms (2-4 workers) can outperform the median small firm (20-49 workers) and approach the productivity of the median firm with 250 or more workers. Conversely, firms in the bottom quartile of the largest size class (250+) are less productive than the median small firm.

Productivity differences within size groups account for the vast majority of productivity dispersion within industries. A variance decomposition shows that on average, the within-size group component (capturing variation among firms of comparable size) explains around 95% of total variance of productivity within a given industry, while differences in average productivity between size groups play a relatively minor role. This share varies somewhat across industries and is lower where productivity is more strongly related to firm size, such as in the case of manufacturing and information and telecommunications (where the within-group component accounts for approximately 91.5% and 92.5% of total variance, respectively).

These gaps within size groups point to risks of resource misallocation and barriers to firm growth and productivity catch-up. The coexistence of low-productivity large firms and high-productivity small firms undermines the contribution of allocative efficiency to aggregate productivity. These patterns might, to some extent, point to constraints – potentially related to capabilities or incentives – that prevent more efficient firms from scaling up, or less productive ones from downsizing or exiting. At the same time, these gaps highlight the potential for stronger diffusion of technologies, knowledge and best practices among firms of the same size operating within the same industries. This implies that while policies should account for the specific characteristics of micro, small, medium, and large firms, targeting policies based on size alone is not sufficient to effectively address productivity gaps.

Figure 5.4. Labour productivity across and withing size groups

Average, median and interquartile range of labour productivity by size groups, relative to the average productivity of firms with 20-49 workers; 2010-2023 (or latest year)



Note: The figure shows the average, median, and interquartile range (between the 25th and 75th percentile) of labour productivity, by firm size. Distribution statistics (i.e. the average and percentiles) are computed across firms within country-industry (SNA A38)-year and firm size or age class. The statistics are normalised by the average productivity in the reference category (firms with 20-49 workers) and are then, for each size class, aggregated within the country-year using industries' share of total employment as weights. The figure reports an unweighted average over years (for the period from 2010 to the latest available year, which ranges from 2021 to 2023, and 2019 for Croatia and Italy) and across countries. Labour productivity refers to value-added per worker. Depending on the country, employment is measured as either headcounts or full-time equivalents, of either persons engaged or employees – in case multiple measures exist, preference is given to headcounts of persons engaged for computing LP as this is more widely available across countries (more information in OECD 2026 referenced below). Data cover manufacturing (section C of ISIC Rev. 4, excluding division 19 – "Coke and refined petroleum") and non-financial market services (sections G-N, excluding section K - financial services - and section L - real estate) for 15 countries: Belgium, Canada, Croatia, Estonia, Finland, France, Hungary, Italy, Lithuania, Latvia, Norway, Portugal, Slovenia, Spain, United Kingdom.
Source: Based on OECD (2026, forthcoming[13]).

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Productivity differences across subnational regions

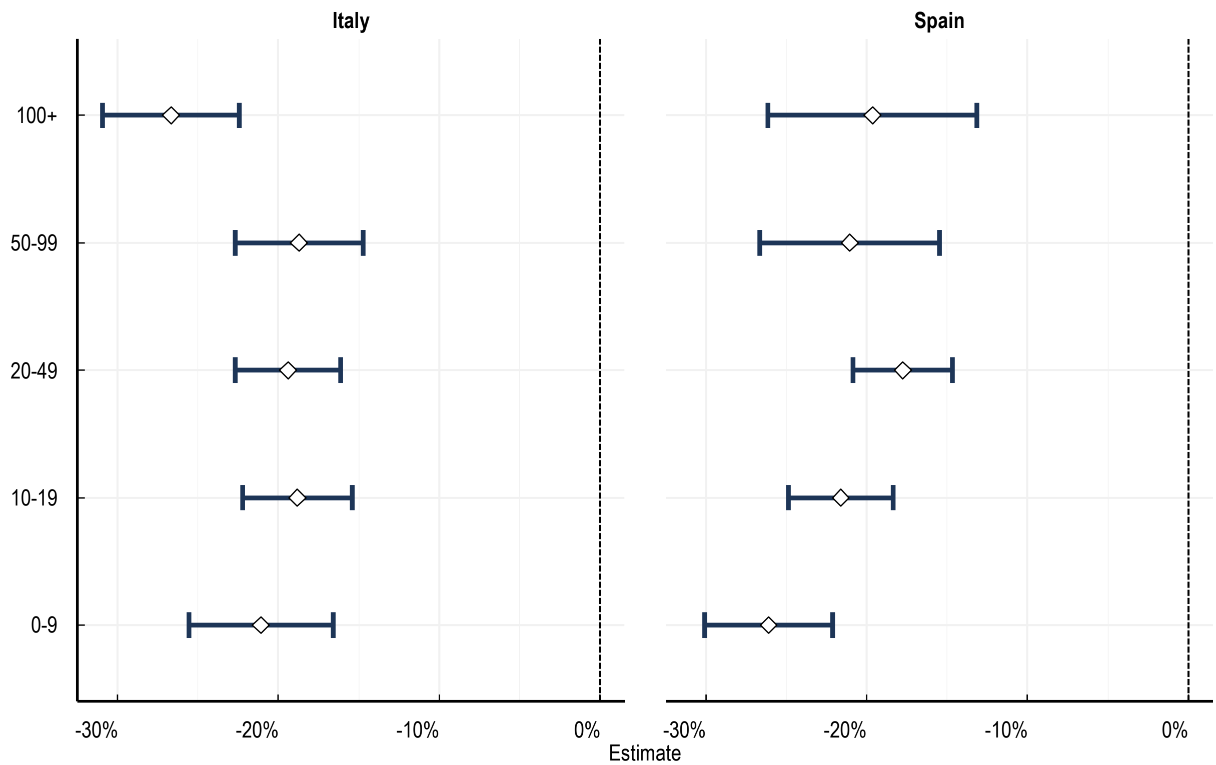
Across the OECD, productivity gaps between less and more developed regions within countries are as wide as productivity gaps among countries (OECD, 2023[14]). Moving from labour productivity to MFP using Orbis data, this part of the chapter focusses on regions at level two of the OECD territorial classification, i.e. typically the highest administrative level under the national level. Across several large OECD countries, such as Germany, the United Kingdom and the United States, productivity in the most productive region is about twice as high as in the least productive region. This within-country pattern holds also for Italy and Spain, where less developed regions, defined as those with GDP per capita below 75% of the EU average, remain about 30% less productive than more developed regions with GDP per capita above 100% of EU average, with no significant convergence observed since 1995.

An analysis of the financial statements of incorporated firms helps to determine whether the regional productivity gap reflects differences in the composition of firms between places, e.g. by sector, size or age. This information relies on Orbis database, which has been widely used to analyse firm-level productivity dynamics across countries (Gal and Hijzen, 2016[15]; OECD, 2021[16]; OECD, 2024[17]). A regional average of firm-level labour productivity (value added over employment) from the Orbis database is strongly correlated with labour productivity statistics from the OECD regional economic statistics database, and closely aligned in monetary levels (Menon and Vermeulen, 2026[18]). This reflects the good coverage of firm-level data in Orbis for Italy and Spain (Bajgar et al., 2020[19]). With the rich information on firms' balance sheets in Orbis, however, the analysis can move from labour productivity to multifactor productivity (MFP) (Gal, 2013[20]). For manufacturing and tradeable sectors, firm-level MFP estimates are used to investigate if regional productivity gaps exist within firm-size groups (Menon and Vermeulen, 2026[18]). Firms in manufacturing and tradeable services sectors provide the most reliable estimates on MFP as these sectors are dominated by private sector firms for which observed revenues are based on market prices.

There is a 20-30% multifactor productivity gap between firms in more and less developed regions in Italy and Spain, where estimates vary within that range across firm size. In Italy, small firms with less than 50 employees and medium sized firms with 50 to 99 employees are 20% less productive in less developed regions than in developed regions (Figure 5.5). Even micro-firms, those with less than 10 employees, show a similar productivity gap relative to micro-firms in developed regions. The largest firms in Italy, those with 100 or more employees, have a larger productivity gap, amounting to over 25%. In Spain, a similar picture emerges, but the smallest firms have a larger productivity gap than the other size classes.

Figure 5.5. Firms in less and more developed regions in Italy and Spain see similar productivity gaps across size classes

Percentage point gap of firms in less developed regions in multifactor productivity by size class, 2019



Note: Point estimates and standard errors from an OLS regression on firm level log MFP controlling for, log of age, age categories and two-digit industries. The coefficients and standard errors are transformed to percentage terms using the delta method.
Source: Menon and Vermeulen (2026[18]).

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6 Environmentally Adjusted Multifactor Productivity

Key findings

- Environmentally Adjusted Multifactor Productivity (EAMFP) indicators highlight the importance of integrating environmental factors in productivity metrics. Standard MFP omits two key dimensions: natural capital used in production and pollution generated as by-products. EAMFP captures both within a consistent growth accounting framework.
- Across 49 countries over 1996-2018, EAMFP accounted for around half of pollution-adjusted output growth in OECD countries and about one third in Key Partner economies, with the gap widening after the global financial crisis.
- Non-renewable natural capital extraction remains an important driver of growth in some economies. On average, non-renewable resources contributed six times more to output growth than renewable resources, notably in a small number of resource-intensive economies, including Australia, Chile, Peru, China, Colombia and Brazil.
- Conventional MFP is likely to understate productivity performance where GDP growth decouples from emissions, as observed in 33 of 49 countries, including 32 OECD members, over 1996-2018.
- Further methodological work is needed to broaden the coverage of natural capital and pollution emissions, to improve the timeliness of EAMFP estimates, and to strengthen the estimation of shadow prices for pollution.

Introduction

Multifactor productivity (MFP) has been the central driver of economic growth in most OECD countries in recent decades (see Chapters 2 and 4). MFP traditionally captures the efficiency with which an economy converts labour and produced capital, such as machines and buildings, into output. In the conventional framework, MFP increases when output grows faster than the combined inputs of labour and capital. However, MFP metrics do not account for negative externalities associated with production. In particular, they disregard the environmental pressures caused by emissions of greenhouse gases and air pollutants, and the depletion of natural capital (e.g. energy resources, minerals, land and ecosystem services). As a result, environmentally harmful and sustainable production processes tend to be treated equivalently, which can lead to an overestimation of productivity growth when it relies on resource depletion or pollution-intensive activities.

To address this limitation, efforts have sought to incorporate emissions and natural capital into a growth accounting framework and derive environmentally adjusted multi-factor productivity (EAMFP). This augmented framework adds two key elements. First, it treats emissions as undesirable byproducts of economic activity and second, it includes natural capital alongside labour and produced capital as factor inputs.

These adjustments are increasingly important for assessing sustainable growth pathways in the context of climate change, biodiversity loss, air pollution, and broader pressures on ecosystem assets. While EAMPF is still subject to data and methodological constraints, it offers a more complete representation of production processes by integrating environmental dependencies and externalities into productivity analysis. In doing so, it helps avoid overstating productivity gains that rely on resource depletion or pollution-intensive activities and strengthens the analytical basis for evaluating long-term growth. The rapid expansion of artificial intelligence (AI) and related resource-intensive digital technologies reinforces the need to address the environmental blind spots of traditional productivity indicators (De Vries-Gao, 2026[1]).

The development of EAMFP has been part of the OECD Green Growth Strategy since 2012, with several efforts undertaken to operationalise this framework. These include estimates of EAMFP at economy wide level (Cárdenas Rodríguez, Haščič and Souchier, 2018[2]; Dang and Mourougane, 2014[3]; Brandt, Schreyer and Zipperer, 2013[4]; Brandt, Schreyer and Zipperer, 2014[5]) and sectoral level applications (Cobourn et al., 2024[6]).

Implementing this framework requires data on natural resources and pollution emissions prices and quantities. Following SEEA guidance, natural capital valuation is derived from direct market transactions or approximated using resource rents. However, valuing emissions remains challenging given the absence of market prices. The literature proposes several approaches for assigning monetary values to emissions and integrating them into EAMFP calculations, most commonly through regression methods and efficient frontier methods.

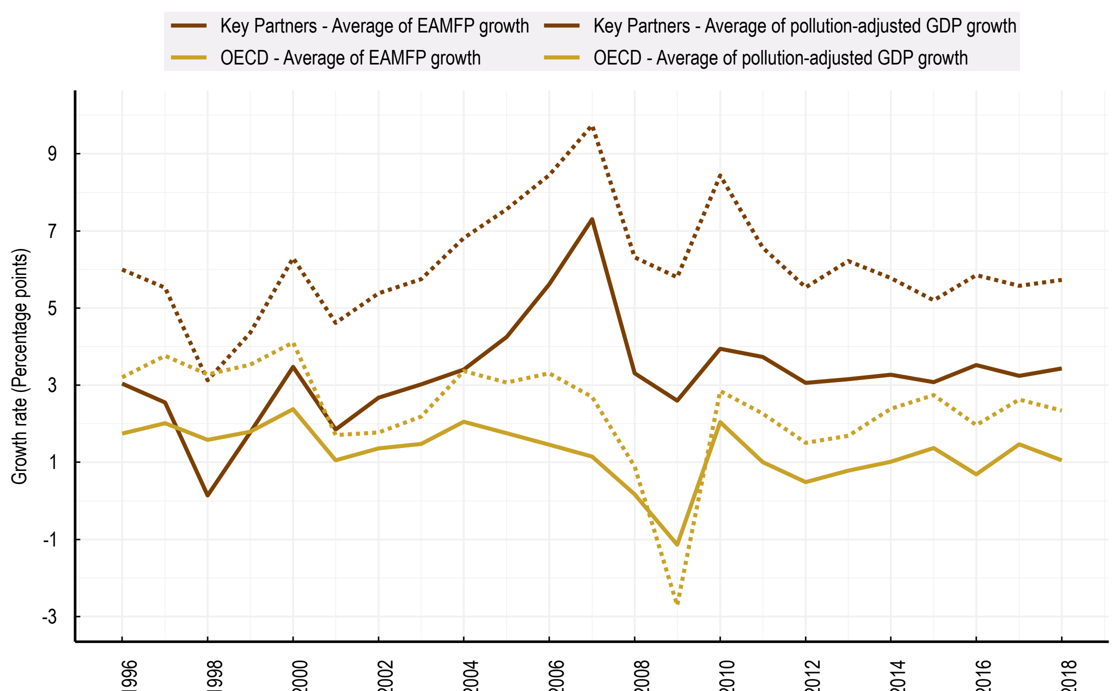
The remainder of this chapter presents the latest OECD estimates of economy-wide EAMFP by Cárdenas Rodríguez et al. (2023[7]) for 49 economies. This approach augments the production function to account for 25 natural capital inputs as factor inputs and 12 GHGs and pollutant emissions as undesirable outputs over the period 1996-2018. At this stage, data availability prevents analysis for more recent years, including the post-COVID recovery and developments such as clean energy investment and commodity price movements in 2021-23. Emission prices are estimated using a country-specific random coefficient model linking emissions to output. Finally, to enable coverage across a wide range of countries, estimates are based on a simplified version of produced capital which does not account for capital services. As a result, conventional factor inputs in the other chapters of the Compendium are not comparable to those from the environmentally augmented growth accounting framework, and differences between MFP and EAMFP cannot be attributed solely to environmental adjustments.

OECD estimates of EAMFP for the total economy

Drawing on OECD work by Cárdenas Rodríguez et al. (2023[7]), this chapter presents the main empirical results for the 49 countries over 1996-2018. All statistics are based on geometric averages of annual growth rates over 1996-2018 unless otherwise stated. Details on the methodology are provided in Box 6.1. While output growth was on average higher in Key Partner economies than in OECD countries, OECD countries generated a larger share of growth through productivity improvements (Figure 6.1).

Figure 6.1. EAMFP as a share of output growth in OECD countries in Key Partner economies

Percentage points, unweighted annual arithmetic averages



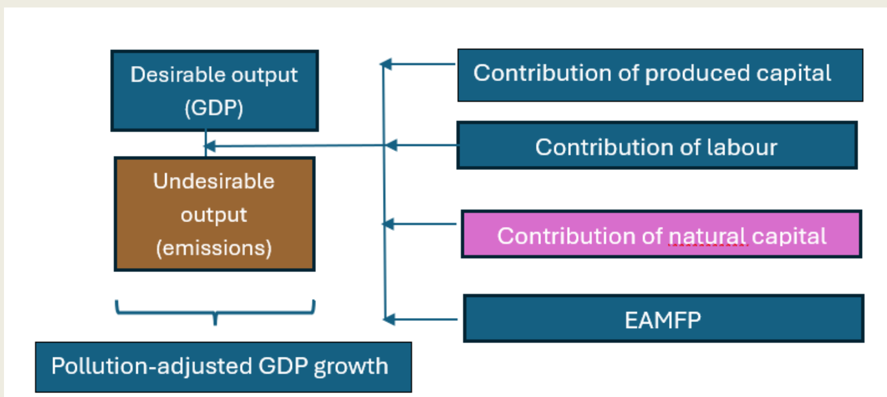
Note: Key Partners = Brazil, China, India, Indonesia, South Africa.
Source: OECD "Environmentally Adjusted Multifactor Productivity", *OECD Environment Statistics* (database), based on Cárdenas Rodríguez et al. (2023[7]).

StatLink https://stat.link/qk836b

Box 6.1. Measuring EAMFP: Methodology, assumptions and measurement challenges

EAMFP is derived from an augmented growth-accounting framework that explicitly accounts for labour inputs, produced capital, and natural capital (Figure 6.2). Unlike conventional productivity measures, the augmented framework accounts for both desirable outputs (GDP) and undesirable outputs (pollution emissions). EAMFP is measured as the residual, i.e. the share of pollution-adjusted output growth not explained by changes in measured inputs. EAMFP is therefore not inflated by natural resource extraction, nor understated by pollution abatement.

Figure 6.2. Augmented growth accounting for pollution-adjusted output



Building on earlier OECD work (Cárdenas Rodríguez, Haščič and Souchier, 2018[2]; Brandt, Schreyer and Zipperer, 2014[5]; Brandt, Schreyer and Zipperer, 2013[4]), the latest OECD EAMFP estimates are documented in Cárdenas Rodríguez et al. (2023[7]). They cover 49 countries, including OECD, accession candidate and G20 countries, over the period 1996-2018. Undesirable outputs include air emissions of 12 gases (5 greenhouse gases and 7 air pollutants), while natural capital covers non-renewable resources (four fossil fuels and ten minerals), renewable resources including three land types (cropland, pasture land and forestland), two biological assets (marine wild fisheries and non-cultivated timber), and three ecosystem services (watershed protection from forests, non-wood forest products and coastal flooding protection from mangroves).

Computing EAMFP requires estimates of the elasticity of output growth with respect to inputs and outputs. For labour, produced capital, and some natural capital inputs, which are traded in markets, estimates are derived from their cost shares under the assumption of profit maximisation (see Cárdenas Rodríguez, Haščič and Souchier (2018[2])). For natural capital inputs and ecosystem services, where market information is limited, costs are approximated using unit rents.

The costs associated with undesirable outputs (air emissions) are not directly observed due to the absence of market prices. Several approaches are used in the literature for estimating these costs, most commonly through regression methods and efficient frontier methods. Efficient frontier methods comprise Data Envelopment Analysis (DEA) and Stochastic Frontier Analysis (SFA). These approaches, in their basic form, often lack robustness and replicability and as such are challenging to use in policymaking (Luu, Menna and Lucke, 2025[8]; OECD, 2022[9]).

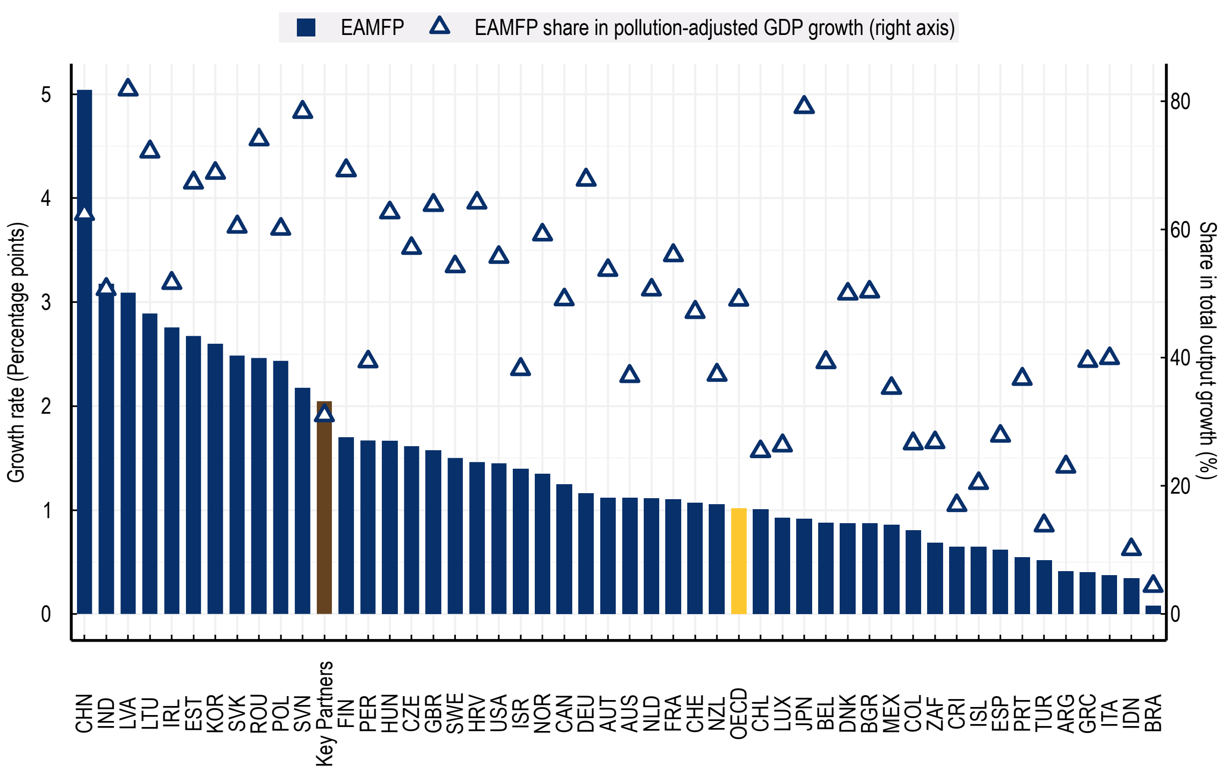
In Cárdenas Rodríguez et al. (2023[7]), costs are estimated econometrically using a country-specific Random Coefficient Model, which allows estimates to vary across countries and better reflect country-specific relationships between emissions and output.

The current EAMFP estimates are nonetheless subject to data and methodological constraints. These include the partial coverage of natural capital and pollution, constrained by data availability; and potential bias and non-trivial uncertainty in the regression-based estimates of pollution shadow prices, which are of particular concern for countries with high pollution intensities or rapid emission changes.

EAMFP and its share of output growth varies widely across countries. Latvia, Japan and Slovenia generated more than 75% of pollution-adjusted GDP growth through EAMFP gains, while EAMFP contributed less than 15% to output growth in Brazil, Indonesia and Türkiye (Figure 6.3).

Figure 6.3. Share of output growth attributable to EAMFP growth

Geometric mean 1996-2018



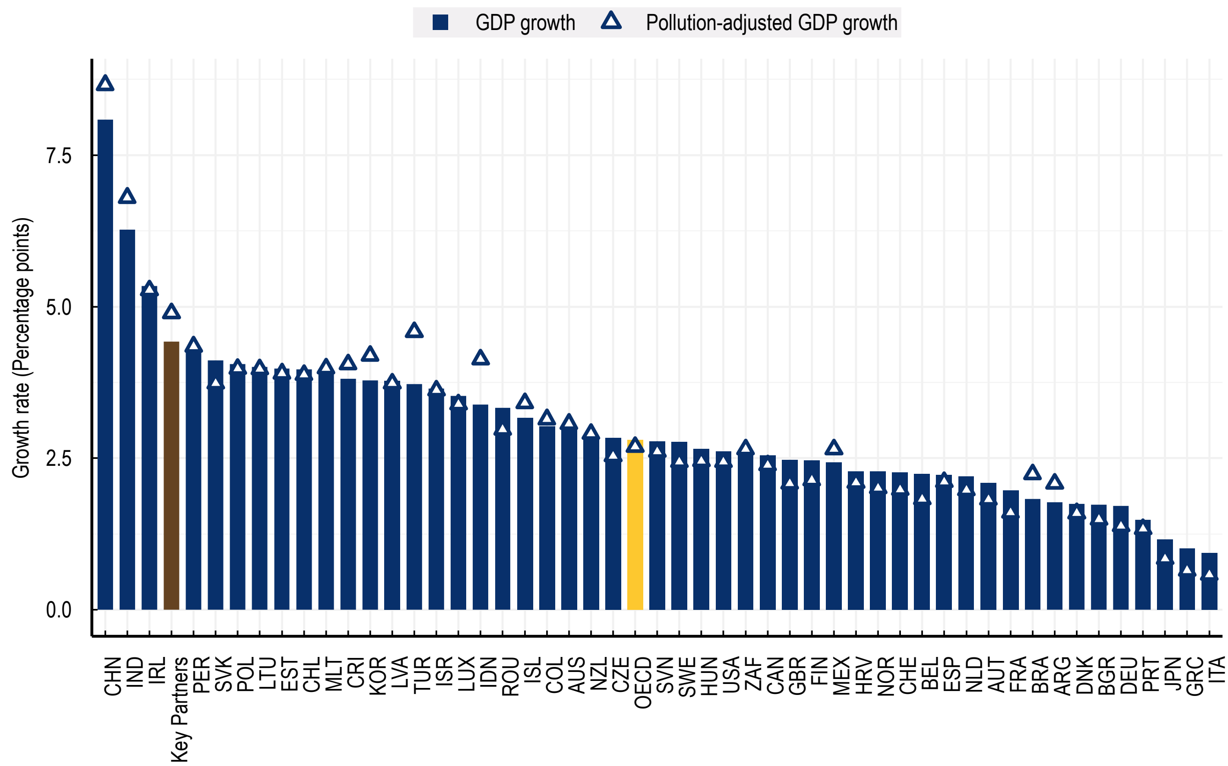
Source: OECD "Environmentally Adjusted Multifactor Productivity", *OECD Environment Statistics* (database), based on Cárdenas Rodríguez et al. (2023[7]).

StatLink https://stat.link/1gomvf

Standard output growth metrics underestimate the growth of countries that reduced undesirable outputs while maintaining positive GDP growth and overestimate it for countries whose GDP growth has been partly achieved through pollution-intensive production. Thirty-three of 49 countries, including 32 OECD members, reduced pollution emissions over 1996-2018, leading to a pollution adjusted GDP growth higher than GDP growth (Figure 6.4). Indicators derived from the EAMFP framework offer a more comprehensive measure of output growth when the pollution intensity of production differs across countries.

Figure 6.4. Pollution adjusted GDP and GDP growth

Geometric mean 1996-2018



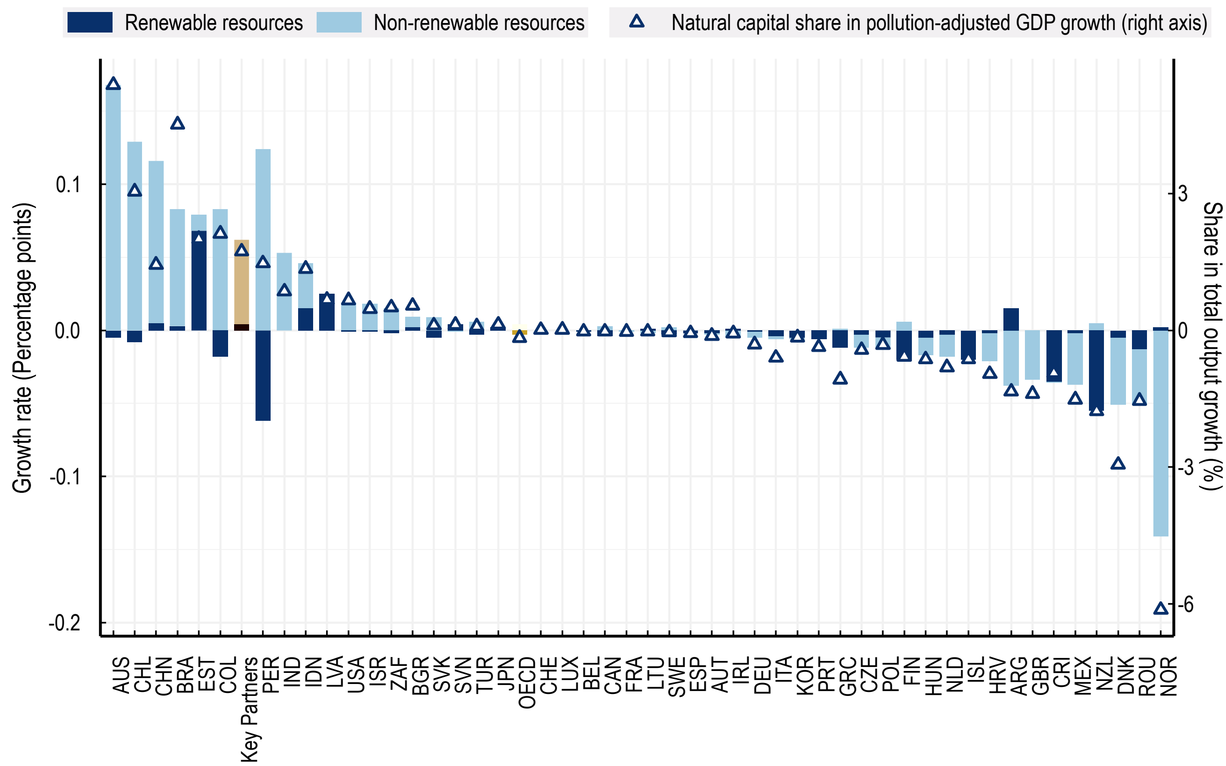
Note: Pollution-adjusted GDP growth below (resp. above) GDP growth corresponds to an emissions increase (resp. reduction).
Source: OECD "Environmentally Adjusted Multifactor Productivity", *OECD Environment Statistics* (database), based on Cárdenas Rodríguez et al. (2023[7]).

StatLink https://stat.link/ibyw3g

Natural capital is an important source of growth in several countries. In Australia, natural capital accounted for about 5.4% of all output growth per year and in Chile for about 3% (Figure 6.5). Standard growth accounting metrics attribute contributions of natural resources and ecosystem services entirely to productivity gains, while a number of countries, such as Peru, Colombia and Chile, have been relying on non-renewable natural capital extraction.

Figure 6.5. Contribution of renewable and non-renewable resources extraction to growth

Geometric mean 1996-2018



Source: OECD "Environmentally Adjusted Multifactor Productivity", *OECD Environment Statistics* (database), based on Cárdenas Rodríguez et al. (2023[7]).

StatLink https://stat.link/3b1whs

Interpretation, caveats and ways forward

Indicators from both the standard and the environmentally adjusted productivity frameworks require careful interpretation. Caveats and limitations of the (EA)MFP framework include:

- **Growth rates, not levels**: growth accounting measures changes over time, not absolute stocks. A zero natural capital contribution means resource use was stable, not that a country used no resources. This property is shared with MFP.
- **Producer perspective, not a welfare or environmental sustainability metric**: all valuations reflect the producer's private cost perspective. Sha²dow prices for pollution represent the private marginal abatement cost, not the social cost of pollution. EAMFP is a production efficiency indicator, not a welfare or sustainability indicator.
- **Interpretation of the residual:** like MFP, EAMFP is a residual and, as such, any mismeasurement in inputs or outputs flows into the estimate. By expanding the set of measured inputs and outputs, the expanded accounting framework reduces the scope of what the residual must absorb.
- **Sensitivity to business cycles:** EAMFP and MFP are procyclical. The 2008-09 dip is visible in Figure 6.1. Multi-year geometric averages, spanning at least one full business cycle, are the recommended basis for cross-country comparisons.

Indicators derived from the EAMFP framework are maturing but still evolving. **Priority areas for methodological and data improvements include:**

- **Coverage of natural capital and pollution:** while the 2023 update expands significantly the coverage of natural resources and pollutants from previous efforts, the scope remains partial and highly constrained by data availability. Future work should focus on covering natural resources such as soils, freshwater, critical raw materials (lithium, cobalt, rare earth elements), sand and gravel, ecosystem services (carbon storage, crop pollination, air and water purification), and expanding the range of undesirable outputs including emissions to soils and water bodies.
- **Improving the timeliness of EAMFP estimates:** data availability hinders the derivation of timely estimates, at a time of rapid changes in the economies. More up-to-date indicators would enhance their relevance and integration into policymaking.
- **Shadow pricing of pollution**: the regression approach has the advantage of transparency and replicability, but the current shadow price estimates carry a potential bias and non-trivial uncertainty. GDP and pollution may influence each other, and the current specification accounts only for the effect of emissions on GDP, implicitly assuming that changes in pollution emissions are unaffected by changes in GDP. These issues are of special importance for countries with high pollution intensities or rapid emission changes. Sensitivity analyses over alternative regression specifications or the use of alternative methods are a recommended robustness check for country-level studies building on these estimates (Luu, Menna and Lucke, 2025[8]).

Finally, further development and use of EAMFP indicators will require accelerating the compilation of environmental accounts in line with the System of Environmental-Economic Accounting (SEEA) Central Framework and the SEEA Ecosystem Accounting. Broader compilation of SEEA accounts in countries would allow expanding the coverage of environmental inputs and outputs in the framework and could enable more regular updates of the indicators.

Implications of the 2025 SNA for EAMFP indicators

The 2025 System of National Accounts (SNA, 2025[10]) introduces important changes that affect the natural capital component of the EAMFP framework. Overall, these revisions do not alter the conceptual architecture of EAMFP, but they improve the quality, consistency and policy relevance of the underlying national accounts data. These changes generally bring the SNA closer to the SEEA framework already used by EAMFP, though the treatment of biological resources represents a potential point of divergence between the two frameworks.

Main implications for EAMFP:

- **Depletion recorded as a cost of production.** Unlike the 2008 SNA, which treated depletion of non-produced natural resources (such as fossil fuels) as a mere balance-sheet change, the 2025 SNA records depletion as a cost of production, similar to depreciation. This lowers net domestic product and net national income in resource-extracting economies (SNA, 2025[10]; OECD, 2025[11]). For EAMFP, the indicator structure is mostly unchanged, but improved natural resource stock data should lead to better estimates of resource quantities and prices.
- **Renewable energy resources become economic assets.** Wind, solar and hydro resources are now recognised as non-produced economic assets, valued using the present value of expected future resource rents (SNA, 2025[10]) in the absence of preferred valuation approaches based on market prices or transactions of tradable permits. These resources were previously treated as an exploratory extension in EAMFP because of incomplete data (Cárdenas Rodríguez et al., 2023[7]). Their formal inclusion in national accounts should make it easier to integrate these resources into the core EAMFP indicators using more harmonised and official data.

- **Mineral and energy resource ownership is split between owner and extractor.** Instead of assigning the full value of subsoil assets to the legal owner, the 2025 SNA splits value between the legal owner and extractor in proportion to their shares of resource rent – consistent with SEEA Central Framework guidance (SEEA, 2014[12]). Since EAMFP already measures natural capital income and pollution shadow prices from the producer perspective, this change improves the alignment between national accounts data and EAMFP methodology.
- **Change in treatment of biological resources yielding once-only products.** The 2025 SNA changes the distinction between cultivated and non-cultivated biological resources yielding once-only products such as fish, timber and wild animals. It distinguishes between resources where management does not extend beyond quota regimes (e.g. wild animals and fish stocks) which remain non-produced assets, and resources where a continuum of management intensity can be observed, such as standing timber, which is recorded in 2025 SNA as a produced asset. The asset boundary for biological resources is however not changed, but there are changes in the asset classification. The 2025 SNA also separates the underlying land asset (e.g. forest land, which remains non-produced natural resource subject to depletion) from the biological resource on it (e.g. standing timber which is considered as inventories), and records the growth of timber expected to be harvested as output, rather than only harvested volumes (OECD, 2025[11]). The implications for EAMFP are not yet fully resolved and depend partly on how the ongoing revision of the SEEA Central Framework responds to these changes.[1] For non-cultivated timber specifically, the reclassification as produced capital in 2025 SNA may reduce the measurement gap that EAMFP was originally designed to address, though the appropriate treatment will require further methodological work. Wild fisheries, by contrast, will continue to be treated as natural capital inputs in future EAMFP updates.
- **Broader improvements to labour and produced capital data.** The 2025 SNA also expands detail on labour markets and includes new non-financial assets such as AI and data. These changes should strengthen measurement of labour and produced capital, which in turn improves the overall measurement of EAMFP.

The 2025 SNA implementation will require careful management of the transition to preserve comparability over time, including appropriate vintage adjustments in historical series and close alignment with the OECD Compilation Guide on natural resources measurement (OECD, 2025[11]). For areas where the 2025 SNA and SEEA frameworks could diverge, particularly regarding biological resources, implementation choices should be monitored as the revision of the SEEA Central Framework progresses.

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Note

[1] For the SEEA Central Framework, the distinction between cultivated and non-cultivated timber resources is important. As part of the ongoing SEEA CF update process, it is discussed whether the SEEA CF will follow the new SNA recommendations at this point.

OECD Compendium of Productivity Indicators 2026

The Compendium of Productivity Indicators provides an overview of recent and long-term productivity trends across OECD countries and, where possible, accession candidate countries. It decomposes aggregate productivity figures to identify the contributions of labour, capital inputs, and multifactor productivity to economic growth. Using more detailed industry level data than earlier editions, this year's report explores variation across industries. It also examines productivity differences across and within enterprise size classes and regions. A dedicated chapter discusses how the growth accounting framework can be extended to develop environmental-adjusted measure of productivity.

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