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Diagnosis and policy action for sustainable and inclusive productivity growth

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The global productivity slowdown, characterised by a widespread deceleration in aggregate productivity growth rates, is a prevailing concern for policy makers and academics. In this context, this report summarises evidence on productivity growth and business dynamics, highlighting long-term trends and their drivers, as well as insights specific to the COVID-19 period, with relevant implications for future productivity and innovation. It underscores the role of productivity for employment and wages, and discusses challenges related to the digitalisation of the economy and the green transition. Additionally, it considers how the resurgence of industrial policies necessitates additional analysis to measure and coordinate government action.

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Executive summary

The global productivity slowdown, characterised by a widespread deceleration in aggregate productivity growth rates, is a prevailing concern for policy makers and academics. In the European Union, annual productivity growth averaged 2% during 1996-2001 but declined to 1.5% over 2001-2007, and further dropped to 1% during 2013-2019.

In this context, this report summarises evidence on productivity growth and business dynamics, highlighting long-term trends and their drivers, as well as insights specific to the COVID-19 period, with relevant implications for future productivity and innovation. It underscores the role of productivity for employment and wages and discusses challenges related to the digitalisation of the economy and the green transition. Additionally, it considers how the resurgence of industrial policies necessitates further analysis to measure and coordinate government action.

OECD work focusing on long-term dynamics until the COVID-19 crisis highlights a persistent rise in productivity gaps between the most productive “frontier” firms and less productive “laggards”, accompanied by a decline in business dynamism, evident from decreases in job reallocation, firm entry, and the share of young firms in total employment. Furthermore, evidence points to increases in mark-ups, concentration, and entrenchment at the top, suggesting shifts in the competitive environment.

These trends may reflect an intensification of factors hampering creative destruction, experimentation, and innovation. Uneven digitalisation and the growing role of intangible assets have favoured the emergence of superstar firms. Market leaders may have also become better at protecting their markets and preventing knowledge diffusion, thus slowing business dynamics, lowering competition for the market at the top and the entry of innovative firms, as well as disincentivising laggard firms from innovating. Such a decline in creative destruction raises concerns about the future of innovation and growth.

Boosting productivity at all levels remains key for growth, employment, and wages. Despite concerns about the effect of technological progress on jobs, recent OECD evidence shows that productivity growth is positively linked to employment and wage growth both at the firm and aggregate levels. This underscores the socio-economic benefits of productivity growth.

However, recent productivity and market dynamics, particularly the rise of superstar firms, may have also contributed negatively to aggregate labour shares. Firm-level productivity and labour shares appear negatively related, and value-added has been reallocated to firms with high-productivity but persistently low labour shares. Although productivity-enhancing, this reallocation may reduce the aggregate share of valued-added that goes to workers, indicating that productivity-enhancing policies should also take into account inclusiveness.

A silver lining to these headwinds was thought to come from the sudden widespread adoption of digital technologies and telework during the COVID-19 pandemic together with the implementation of ambitious rescue and recovery packages. However, evidence on digital adoption during COVID-19 and artificial intelligence (AI) diffusion suggests that pre-existing disparities may have been reinforced and may continue to pose challenges in the future.

During the COVID-19 crisis, more productive, larger, and already more digital-intensive firms saw a more pronounced increase in their adoption of digital technologies. Recent analysis of artificial intelligence adoption unveils that these firms are also more inclined to adopt AI technologies and underscores significant links between AI use and complementary assets, including digital infrastructures and skills, and the use of other digital technologies.

Addressing rising gaps and persistent heterogeneities should remain a policy priority to ensure productivity growth benefits all. Coherent and sound policies and industrial strategies can help boost digital adoption, technology diffusion, productivity, employment, and wages inclusively while supporting the green transition. Appropriate policies should:

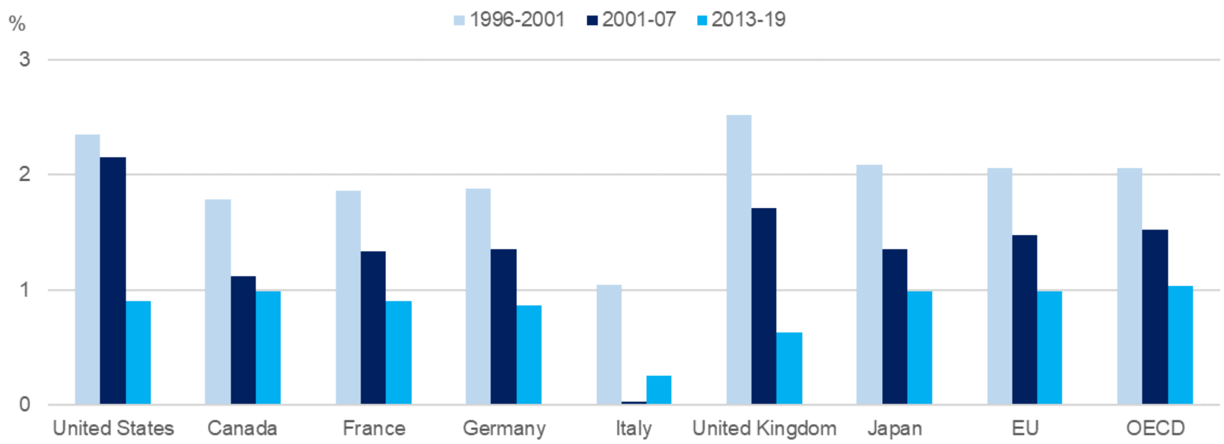
- Ensure open and competitive markets and a large market size to incentivise firms to invest in innovation.
- Bolster firms' capabilities with investments in managerial and workforce skills, including enhancing laggards' absorptive capacities.
- Ensure the conditions for creative destruction to operate, with particular attention to fostering a level playing field and the contestability of markets, as well as to reducing barriers to firm entry and growth.
- Promote spillovers across firms and sectors, for instance through integration into resilient value chains and by facilitating connections to the most productive supplier industries via worker mobility, open trade, and foreign direct investment.
- Ensure that productivity gains and their benefits are shared widely across firms and workers through investments in education and training, improved labour market matching, worker mobility, and reduced labour market concentration.
- Support the development and deployment of low-carbon technologies critical to the green transition. Recent OECD evidence shows that post-COVID low-carbon public support measures could significantly impact greenhouse gas emissions. However, these must be accompanied by more ambitious complementary climate policies, with innovation policies supporting the net-zero transition as a key component.
- Develop non-distortionary and coordinated industrial strategies to support inclusive and sustainable economic growth. Coherence and complementarity across the different policy instruments within an industrial strategy are essential, as is sound governance of the strategy to limit the risk of capture and attenuate information asymmetries. In this context, the expanding OECD Quantifying Industrial Strategies (QuIS) project offers unique insights into industrial policy expenditures, their composition, delivery modes, and the characteristics of their beneficiaries. Pursuing this quantification effort is a crucial step in understanding the importance of well-designed industrial strategies.

1 Introduction

Productivity growth is vital for enhancing living standards and bolstering overall economic prosperity. The widespread productivity slowdown, i.e., the deceleration in the rate of productivity growth, is therefore a prevailing concern among both policy makers and academics.

Figure 1.1 illustrates the widespread nature of the productivity slowdown in both EU and OECD countries. Focusing on the evolution of productivity growth over time, data reveal a notable trend in the European Union, where annual productivity growth averaged 2% during the period 1996-2001 but declined to 1.5% over the period 2001-07 and further dropped to 1% during the period spanning 2013-19.[1] These figures underscore the persistent and concerning deceleration in productivity growth over the years.

Figure 1.1. Gross Domestic Product (GDP) per hour worked; annual average growth



Note: Each bar represents the average annual growth of labour productivity, measured as GDP per hour worked for each period. The data for OECD excludes Estonia and Korea due to differences in the periods covered.
Source: Calculations based on the OECD Productivity database.

OECD research has further documented simultaneous and interconnected trends reflecting a decline in business dynamism. This decline is underscored by diminishing entry rates, reduced job reallocation rates, and a shrinking share of young firms in total employment. These indicators collectively suggest a potential attenuation in the role of creative destruction, a vital driver of both employment and productivity growth. Moreover, prior and ongoing OECD analyses shed light on the evolution of proxies of competition at the sectoral level, with increases in mark-ups, concentration and entrenchment (Bajgar et al., 2019[1]; Bajgar, Criscuolo and Timmis, 2021[2]). These trends are also coupled with an increase in the gap between productivity-frontier firms and the rest of the business population (Andrews, Criscuolo and Gal, 2016[3]; Berlingieri et al., 2020[4]) with potential consequences for innovation (Akcigit and Ates, 2020[5]) and inclusiveness (Criscuolo et al., 2022[6]).

Academic research and OECD analyses have put forward different potential explanations for the observed phenomena. Notably, the uneven and incomplete nature of digital transformation and the increasing importance of intangible assets have played a key role in widening the productivity gap between the leading performers at the frontier and the rest, with the least productive firms (laggards) further falling behind (Berlingieri et al., 2020[4]; Corrado et al., 2021[7]).

Over the last few years, heightened uncertainty and what is generally referred to as polycrises, with events such as the COVID-19 pandemic, the Russian invasion of Ukraine with subsequent increase in energy costs, heightened geopolitical tensions, global warming, and recent shifts in economic conditions, collectively moulded a new state of the economy, potentially presenting considerable challenges for productivity growth. A silver lining to these headwinds was thought to come from the sudden widespread adoption of digital technologies and telework during the pandemic (see also Criscuolo et al. (2021[8]) and Calvino, Criscuolo and Ughi (2024[9])) and the implementation of ambitious rescue and recovery packages. And the question is still open on whether the ongoing resurgence of new industrial policies and reliance on mission-oriented industrial strategies, for example in the context of COVID-19 resilience packages, could have the potential to transform these challenges into opportunities, fostering an accelerated transition towards a more inclusive and environmentally sustainable, climate neutral, economy.

This work will summarise new evidence on productivity growth dynamics and the role of productivity for employment and wages, as well as the digitalisation of the economy and the green transition, uncovered in recent and ongoing work by the OECD (see also Box 1.1 on the distributed microdata approach). It will also discuss how the resurgence of industrial policies calls for additional analysis to measure and coordinate government action. The remainder of this report is structured as follows:

The next section discusses new evidence on rising productivity gaps, emphasising a divergence among firms. This includes an increasing heterogeneity between the most and least productive firms, as well as a deterioration in the relative productivity of small and micro firms. The work also discusses novel analysis linking challenges faced by the less productive and smaller firms in keeping pace with the rest to concerns for future aggregate productivity growth.

Section 3 extends the discussion to the role of productivity growth for supporting employment growth at both the firm and aggregate levels and the importance of policies that promote catch-up and support contestable markets for boosting employment growth and resource reallocation. The work also delves into evidence on declining labour shares, indicating that the observed reduction in aggregate labour share can be, at least partly, attributed to the reallocation of value-added to high-productivity, low labour share firms. While such reallocation can enhance productivity at an aggregate level, policy makers need to ensure that potential trade-offs between productivity growth and inclusiveness are carefully considered when designing policies. Policies that focus on the development of skills, diffusion of technologies, and best practices could play an important role as they could help achieve double dividends by raising the productivity of the low productivity firms and empower workers to benefit from and support the diffusion of technology.

In section 4, the work discusses the challenges and opportunities arising with the green and digital transformation for the business sector. Evidence indicates that the COVID-19 crisis, while accelerating the digital transition, may have exacerbated digital gaps, raising concerns about further productivity divergence. Indeed, firms that were more engaged in digitalisation and were more productive before the crisis were more likely to adopt digital applications. Additional evidence examining the diffusion of AI also highlights adoption patterns that favour larger and more productive firms. Policies are necessary to accelerate a broad and inclusive digital transition, which should also align with the green transition, requiring a profound transformation of the economy and the business sector. Addressing these challenges requires boosting innovation, diffusion, business dynamics and reallocation, and simultaneously fostering inclusiveness and economic resilience.

In this context, the industrial strategies discussed in section 5 will also be paramount, and the work presents insights from the OECD QuIS project that quantifies and analyses industrial strategies across countries.

Box 1.1. OECD distributed microdata analysis for evidence-based policy-making

This report notably discusses evidence from OECD distributed microdata analyses from the *DynEmp*, *MultiProd*, and *AI diffuse* projects, led by the OECD Directorate for Science, Technology and Innovation with the pivotal contribution of researchers and experts from a large set of OECD countries. These projects leverage nationally available firm-level data which are key to understand the micro drivers of employment and productivity growth or the drivers of technology adoption, and to assess the significant heterogeneity across businesses within detailed industries.

The distributed microdata analysis offers a unique tool to analyse microeconomic data in a way that is comparable across countries and sectors, over time (and across regions when relevant). Thereby, this approach enables to obtain important policy relevant insights from in-depth analysis of granular data while respecting confidentiality rules, and to further monitor key economic developments on a regular basis using established methodologies. It relies on the use of a common statistical code developed by the OECD and run on country-specific data in a decentralised way by national experts from statistical offices, academia, or other institutions, to produce harmonised micro-aggregated moments, descriptive statistics and results from distributed regressions, while fulfilling confidentiality requirements. The data and results produced are validated by the OECD teams together with national participants and used for cross-country analysis. Further information on the methodology can be found for instance in (Berlingieri et al., 2017[10]), (Desnoyers-James, Calligaris and Calvino, 2019[11]) (Calvino, Criscuolo and Verlhac, 2020[12]) and (Calvino and Fontanelli, 2023[13]).

These projects have shed light on a wide range of policy relevant issues, including the role of young firms for employment growth and the mediating role of national policies (Calvino, Criscuolo and Menon, 2015[14]; Calvino, Criscuolo and Menon, 2016[15]), trends in business dynamism and the link with digitalisation (Calvino and Criscuolo, 2019[16]; Calvino, Criscuolo and Verlhac, 2020[12]), trends in firm heterogeneity and the determinants of firm catch-up, or the link between productivity and socio-economic outcomes (Berlingieri, Blanchenay and Criscuolo, 2017[17]; Berlingieri, Calligaris and Criscuolo, 2018[18]; Berlingieri et al., 2020[4]; Calligaris et al., 2023[19]), and stylised facts on the diffusion of AI across firms (Calvino and Fontanelli, 2023[13]). These projects are also further used in country-specific reviews of productivity and business dynamics in a cross-country perspective (see OECD (2017[20]; 2017[21]; 2018[22]; 2019[23]; 2020[24]) and OECD (2021[25]; 2022[26]; 2023[27])).

A new ongoing project extends the productivity analysis from *MultiProd* to investigate how environmental and economic performance are related at the firm-level, investigating for instance if more productive firms are more energy efficient and how climate/environmental policies jointly affect economic and environmental outcomes. The distributed microdata analysis approach has also been used in other OECD projects, including *microBeRD*, *LinkEED*, *LinkEED2.0, The Human Side of Productivity,* or a project investigating *Employment dynamics across firms during COVID-19*.

These projects contribute to long-term developments of the analysis of microdata for policy-making. They importantly complement country-specific studies conducted in participating countries, contribute to the coordination of networks of national researchers, and further aim at leveraging existing data sources and synergies with the work of participating countries. They also capitalise on the experience of microdata analysis in participating organisations and institutions and established procedures for the use of these data, but, when relevant, participation to these projects can also contribute to boosting the use of microdata for analytical purposes in participating countries.

2 Business dynamism, productivity and divergences

Slowing dynamism and creative destruction

The OECD DynEmp project has offered compelling evidence regarding the decline in business dynamism across countries, evident from declines in entry rates, job reallocation rates and the share of young firms in total employment within narrowly defined industries (Calvino and Criscuolo, 2019[16]; Calvino, Criscuolo and Verlhac, 2020[12]). Updated data show that these observed trends persisted prior to the COVID-19 crisis, as illustrated in Figure 2.1. Additional evidence from the project indicates a diminishing share of startups (0-2 years old firms) within micro firms (2-9 persons engaged) over time, which may reflect declines in entry rates but may also raise concerns about the capacity of young firms to scale up and grow out of the size group of micro firms[2]. Such evidence on declining dynamism, together with concomitant increases in dispersion of productivity (discussed next), declines in the speed of diffusion (Berlingieri et al., 2020[4]; Akcigit and Ates, 2020[5]) and the rise in industry concentration and mark-ups documented by the OECD (Bajgar et al., 2019[1]; Bajgar, Criscuolo and Timmis, 2021[2]; Calligaris, Criscuolo and Marcolin, 2018[28]; Criscuolo, 2021[29]) have pointed to a possible decline in creative destruction, and an increase in entrenchment at the top (Van Reenen, 2018[30]; Bessen, 2022[31]). This has raised concerns in the academic and policy arena on the future of innovation, independently of whether these trends are linked to technology factors (see for example (Bessen, 2022[31]; Haskel and Westlake, 2018[32]; Haskel and Westlake, 2022[33]; Van Reenen, 2018[30]), and OECD work reported in previous SRIP reports (Criscuolo, Goretti and Manaresi, 2022[34])) or to a worsening of competition enforcement (Philippon, 2019[35]; Covarrubias, Gutiérrez and Philippon, 2019[36]) or a combination of the two as discussed in Crawford, Valletti and Caffarra (2020[37]) and references therein.

New and young firms may face significant challenges when competing with market leaders (Akcigit and Ates, 2020[5]; Akcigit and Ates, 2021[38]) and need to build their reputation and customer base which requires them to charge lower prices (Foster, Haltiwanger and Syverson, 2008[39]), and this could discourage potential entrants and limit upscaling, in line also with evidence on the decline of high-growth young firms (Decker et al., 2016[40]). Barriers to the diffusion of technology and knowledge may prevent entrants and laggard firms from innovating, adopting existing knowledge or learning from the best performing firms, and may further limit experimentation and reallocation through creative destruction. Theoretical models and empirical evidence suggest that in recent years, a worsening of these challenges may be at the root of secular stagnation (Aghion and Howitt, 2023[41]). As suggested by Akcigit and Ates (2021[38]), leaders may have become better at preventing the diffusion of their knowledge, via the acquisition of patents for defensive purposes, which then in turn would discourage innovation efforts of non-frontier firms, especially laggards, and increase rents for leaders. Aghion et al. (2023[42]) compare trends in performance of frontier superstar firms and laggards and hypothesise that, thanks to the digital revolution, superstar firms may have been able to accumulate social capital and know-how or develop networks in a larger fraction of sectors while other non-frontier firms could not, and this allowed the former to increase their mark-ups. As they maintain their position as superstars, they discourage innovation and entry and thus lead ultimately to decline in growth.[3]

Empirical evidence in line with these theories has been growing, and early work by the OECD on the great divergences in productivity and wages and on the role of digital technologies and the growth in intangible assets as possible drivers of these trends (OECD, 2015[43]; Berlingieri, Blanchenay and Criscuolo, 2017[17]) has seen further corroboration in single-country studies. In particular, Bessen (2022[31]), Autor et al. (2020[44]) and De Loecker, Obermeier and Van Reenen (2022[45]) further link rising concentration and mark-ups and declining industrial disruption to the growth of proprietary software and more broadly digitalisation and globalisation.

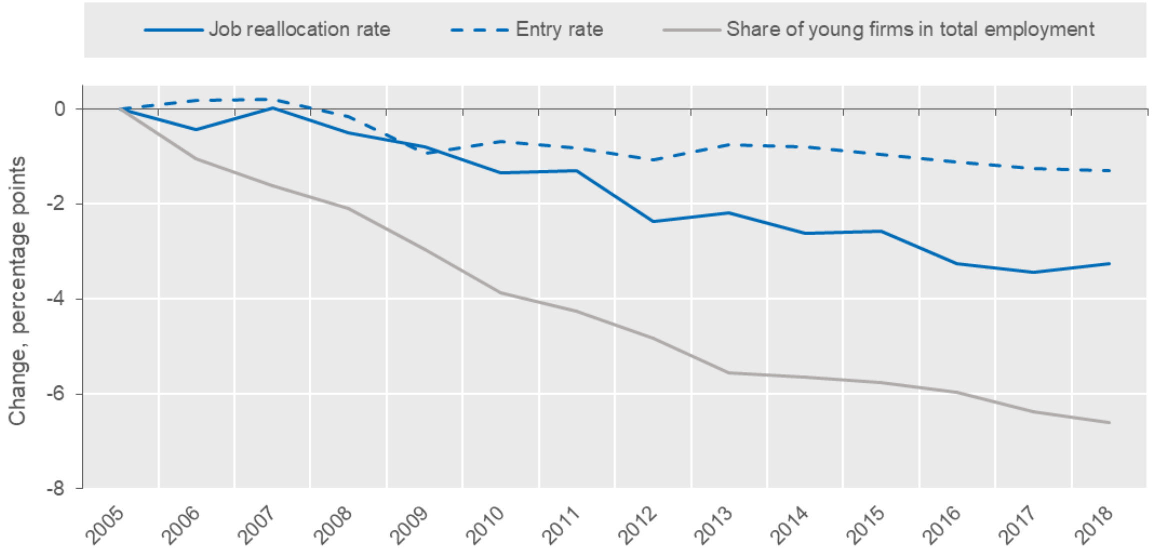
In sum, larger gaps between leaders and laggards and stronger concentration of both sales and labour/talent, defensive use of Intellectual Property rights and higher entrenchment may represent important factors hampering the creative destruction process as they reduce the chances for startups and laggards to leapfrog the leaders, potentially reducing incentives for experimentation and innovation. These dynamics related to slower knowledge diffusion and increased market power are possibly amplified by the digital transformation (Calvino, Criscuolo and Verlhac, 2020[12]).

In this context of declining dynamism over the long-term, dynamics of new business registrations and venture capital financing observed since the onset of the COVID-19 crisis have been noticeable (Berger, Dechezleprêtre and Verlhac, forthcoming[46]). Following a large decline in registrations, many countries have experienced a rapid recovery and a surge in registrations that persisted in 2021. Overall, the impact of the crisis appears to have been mitigated and a “missing generation” of new firms seems to have been avoided in most countries (with some noticeable exceptions such as Portugal). Therefore, business dynamics have shown significant signs of resilience during the COVID-19 crisis, in stark contrast with the 2008-09 crisis which demonstrated the potential disproportionate impact of economic and financial disruptions on young firms. The venture capital (VC) market (further analysed in Berger, Dechezleprêtre and Verlhac (forthcoming[46])) also demonstrated resilience across various funding stages, regions, and sectors and even reached peak values during the pandemic. The surge in registration and the peak in VC funding raises hopes that the pandemic may have triggered a wave of innovation.

Nevertheless, significant uncertainty prevails regarding whether these dynamics mark a turning point in the long-term trends of declining business dynamism across countries or simply a temporary uptick. Recent data from the OECD Timely Indicators of Entrepreneurship already suggest that this revival has been fading away, in a context marked by the Russian Federation’s (hereafter, 'Russia') invasion of Ukraine in 2022, the related energy crisis, rising political and economic uncertainties and large inflation. In 2022 many countries have experienced a slowdown or even a decline in business registration relative to 2021, and these dynamics have persisted over the first half of 2023 while bankruptcies returned to pre-crisis levels after the lows experienced during the pandemic. Mirroring the overall business dynamics, the VC market experienced a “boom-and-bust” cycle as it reached peak values during the pandemic but subsequently reverted to pre-crisis levels towards the end of the pandemic. Therefore, reigniting business dynamics beyond the transient improvements experienced during the pandemic and its aftermath should remain a key policy objective.

Figure 2.1. Declining business dynamism

Average cumulative changes within country-industries, percentage points



Note: This figure reports average within-country-industry cumulative changes in the share of employment in young firms, changes in job reallocation rates, and changes in entry rates based on the year coefficients of regressions within country-industry, for the period 2005-18, including 16 countries: AUT, BEL, CAN, DEU, DNK, ESP, FIN, FRA, HRV, HUN, ITA, NOR, NZL, PRT, SVN, SWE. Each point represents cumulative change in percentage points since 2005.
Source: OECD DynEmp database, updated from Calvino, Criscuolo and Verlhac (2020[12])

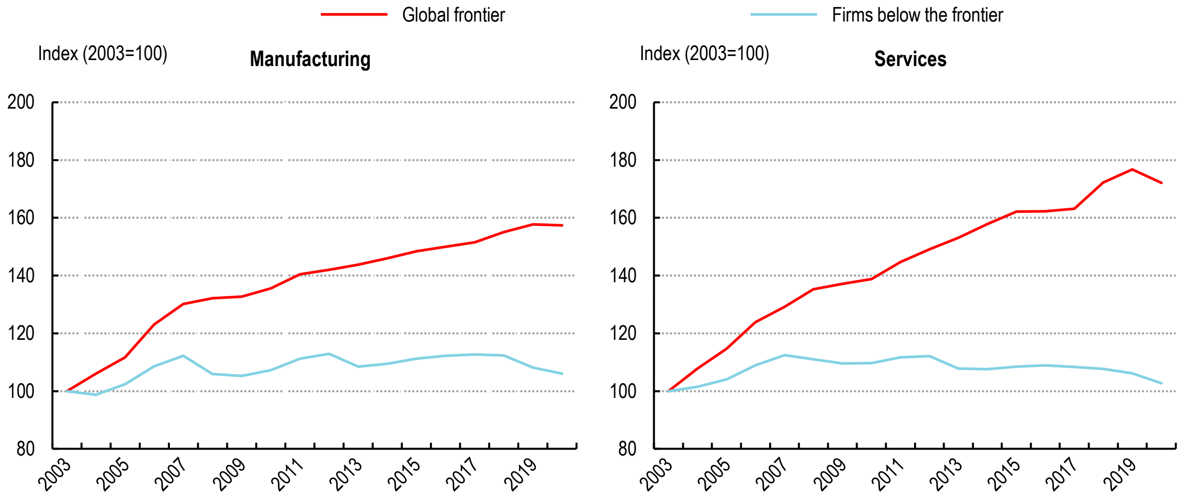
New evidence on dispersion and the link between productivity divides and aggregate productivity growth

The widening of the productivity gap between firms at the frontier and others has occurred between the global frontier and the rest, but also between the national frontier and non-frontier firms (Berlingieri, Blanchenay and Calligaris, 2017[47]; Berlingieri, Blanchenay and Criscuolo, 2017[17]; Corrado et al., 2021[7]; Andrews, Criscuolo and Gal, 2016[3]). Updated evidence shows that such divergence has persisted over the recent period prior to the COVID-19 crisis, with increasing disparities between the global frontier and other firms (see Figure 2.2).

The widening dispersion in productivity among firms of different productivity levels mirrors a similar trend observed in the divergence between firms of varying sizes. Berlingieri, Calligaris and Criscuolo (2018[18]) documented substantial differences in productivity across firms of different size (in terms of employment), revealing more prominent disparities in manufacturing than in non-financial market services. Data from the MultiProd project suggest that the productivity gaps between firms of different size have increased over time. In manufacturing industries, the productivity advantage of medium and large firms relative to smaller firms has increased significantly over time, while the relative productivity of small and micro firms has deteriorated. In non-financial market services industries, the productivity gap between small and micro firms and the rest has also widened. Further evidence suggests that the productivity of both older and younger micro firms relative to larger firms has declined over time. This raises additional concerns about the widespread diffusion of technology and knowledge, especially among micro, small, and medium-sized firms.

Figure 2.2. Productivity divergence of the global frontier

Labour productivity – frontier vs. the rest



Note: Index (2003 = 100) of productivity at the frontier and below the frontier, approximated by changes in logs. Average across detailed industries using firm-level data, and 3-year moving average. Labour productivity is defined as value-added per employee. The “Global frontier” is defined as the average of the productivity for the top 5% firms in the productivity distribution *within* each detailed (2-digit) NACE Rev.2 industry from 24 OECD Member countries for which firm-level data is available. “Firms below the frontier” is the average productivity of all other firms within the detailed industry. See more details in the paper cited in the source.
Source: André and Gal (2024[49]). Updated calculations following the methodology in Andrews, Criscuolo and Gal (2016[3]).

In light of the simultaneous long-term deceleration in aggregate productivity growth and the increasing divergence in micro-level productivity, recent work by the OECD explores the connection between these two phenomena. The analysis of Criscuolo et al. (forthcoming[50]) delves into the question of whether policy makers, in their pursuit of economic growth, should be concerned about productivity divergence and the degree to which such divergence might indicate or exacerbate barriers to overall productivity growth. Specifically, it investigates the extent to which changes in divergences are associated with changes in productivity growth over subsequent years. This dynamic relationship between productivity and divergence can originate from several mechanisms.

On the one hand, the level of productivity dispersion may have direct effects on aggregate productivity growth as it may impact the pace of reallocation, the incentives for innovation, and the returns to market entry, related to a very similar set of mechanisms as the ones discussed previously. More specifically, a widening of the productivity gap can induce a discouragement effect on the firms that fall further behind and a diminishing escape competition effect on the leader that widen their technological advantage (Akcigit and Ates, 2020[5]). These mechanisms may be reinforced when markets become more dominated by leaders (in terms of market shares and market power).[4]

On the other hand, rising dispersion may also be a consequence of different underlying mechanisms and forces such as innovation, technology diffusion, or changes in the regulatory environment, which have different implications for productivity growth, and shape the empirically link between productivity divergence and aggregate productivity growth.

The analysis of Criscuolo et al. (forthcoming[50]) shows that counteracting mechanisms may indeed be at play and that rising dispersion may be both positively and negatively related to future productivity growth, depending on the prevalent forces. Rising dispersion at the top (i.e., between the most productive firms and the rest) appears to be linked to the presence of successful innovators and is associated to positive changes in aggregate productivity growth over subsequent years. On the contrary, rising dispersion at the bottom (between the least productive firms and the rest) appears to be related to slower technology diffusion and is associated with lower aggregate productivity growth.

Given these findings, the rise in productivity dispersion concentrated at the lower end (i.e., laggards falling behind) is a matter of concern. This divergence potentially played a role in decelerating productivity growth, emphasising the need for policy intervention. To minimise the cost of divergence, policies may boost technology diffusion (absorptive capacities, skills, financial support to smaller and younger firms) while also ensuring that market selection and productivity-enhancing reallocation occur. On the contrary, policies that favour innovation and boost productivity growth at the top can contribute to aggregate productivity growth despite rising dispersion at the top of the distribution, if markets remain competitive and contestable.

Large and rising productivity gaps between firms shapes aggregate productivity growth but also influence regional productivity performance. Productivity gaps across regions can be substantial in OECD countries. On average, labour productivity in the most productive region is nearly twice as high as in the least productive one and regions experience significantly different productivity growth within countries, reinforcing existing disparities (OECD, 2022[48]). Evidence suggests that beyond differences in sectoral compositions across regions, regional productivity gaps may also arise from productivity differential across firms within sectors rather than (see for instance Calvino et al. (2022[51]) for Italy). Therefore, addressing the divergence between frontier and laggard firms also matters to ensure inclusiveness across regions.

3 Productivity growth, employment, and wages

While policies should aim to revive productivity growth, the impact of productivity on employment and wages is the subject of ongoing debates, particularly in light of growing concerns about the potential negative effects of technological progress on labour demand. Furthermore, declines in the aggregate labour share of value-added question the extent to which the value created by firms and workers also benefits the latter.

A positive link between productivity growth and employment

Some studies show adverse effects of robotisation on employment and wages (Graetz and Michaels, 2018[51]; Acemoglu and Restrepo, 2020[52]), which are related to the disappearance of routine tasks (Autor, Levy and Murnane, 2003[53]). At the same time, technological change may also trigger favourable employment responses. New technologies may create demand for new tasks in the labour market (see Acemoglu and Restrepo (2016[54])), and firms that adopt productivity-enhancing technologies may become more competitive and increase sales, therefore increasing their use of inputs, including labour (Acemoglu, Lelarge and Restrepo, 2020[55]; Aghion et al., 2020[56]; Koch, Manuylov and Smolka, 2019[57])).

Overall, the extent to which there may be a trade-off between productivity and employment growth is an open empirical question, which has been addressed in a recent work by the OECD (Calligaris et al., 2023[19]) using unique data from the OECD MultiProd project. The work finds little evidence of a trade-off, and it rather suggests that productivity growth and labour demand are complementary rather than alternative policy targets.

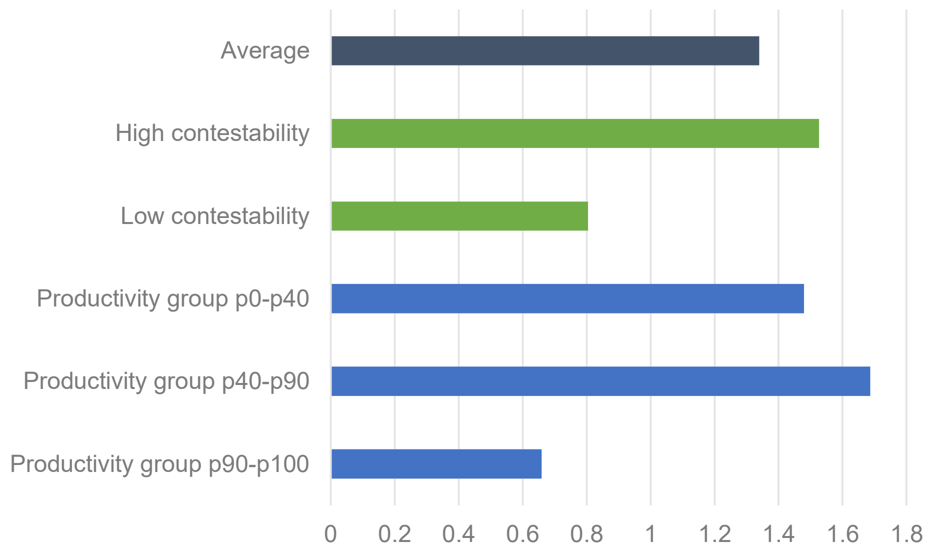
The evidence across 12 countries suggests that this complementary relationship persists across levels of aggregation. Focusing on firm-level dynamics, firms at the top of the productivity distribution experience higher employment growth than less productive firms. However, after accounting for initial differences in productivity, firms that improve their productivity more also experience stronger employment growth than other firms, suggesting additional benefits in promoting productivity growth and catch-up. This result is presented in Figure 3.1, which illustrates the estimated micro-level response of employment to an initial increase in productivity. The estimated elasticity suggests that firms that initially experience stronger productivity growth by 10% grow by around 1.35% more in terms of employment over five years on average.

The results also point to the importance of the policy environment in shaping these relations. Indeed, the positive relationship between initial productivity growth and subsequent employment growth appears to be stronger in environments characterised by a higher contestability of markets, as proxied by lower mark-up gaps across firms within country-sectors. This result is shown by the second and third bar in Figure 3.1, which shows that the positive employment-productivity link is only around half as strong in less contestable environments, compared to more contestable ones. Therefore, competitive markets and environments favouring reallocation may foster greater employment gains associated with productivity growth. Additionally, while more productive firms tend to exhibit higher employment growth, results also indicate that the positive link between productivity growth and employment growth is more pronounced for non-frontier firms improving their productivity (see the last three bars in Figure 3.1). Combining these insights, results suggest that firms catching up in terms of productivity also tend to experience higher employment growth in a more competitive environment, suggesting that upscaling might be easier for them in such environments, in line with the theories discussed in the previous section.

The analysis finds that the link between productivity growth and changes in employment and wages at the industry level is weaker than the one at the firm-level (but tends to remain positive). This may be related to the fact that increasing employment among expanding firms tends to offset decreasing employment in shrinking or exiting firms. However, the analysis additionally finds that productivity gains at the industry level contribute to stronger employment growth in downstream industries through domestic and global value chains, possibly linked to a decrease in prices of the intermediate inputs associated to supplier productivity gains (see also Acemoglu, Akcigit and Kerr (2016[58])). This result points to the importance of considering the positive role that productivity improvements along the value chain can play, as they can spur employment growth at a more aggregate level.

Figure 3.1. A relative increase in productivity is positively associated to employment growth

Estimated elasticity of 5-year employment growth to 1-year multifactor productivity at the micro (firm) level



Note: The figure shows the estimated elasticity of 5-year employment growth to 1-year productivity growth at the micro (firm) level i) on average, ii) in country-sector with high contestability (10th percentile, across country-industries, of the distribution of the mark-up difference between firms with high and median mark-ups) vs. low contestability (90th percentile of the mark-up difference distribution) iii) for different initial productivity groups defined according to the percentiles of the multifactor distribution. The estimated elasticity suggests that on average firms that initially experience stronger productivity growth by 10% grow by around 1.3% more in terms of employment over 5 years. This figure illustrated the results of regressions based on a sample including 22 SNA A38 industries within manufacturing and non-financial market services across nine countries (Belgium, Croatia, Hungary, Italy, Japan, Latvia, the Netherlands, Portugal, and Sweden). Observations are weighted by the number of firms represented in the full population, normalised at the country level.
Source: Elaborations based on Calligaris et al. (2023[19]).

Productivity and the labour share

Beyond employment levels, the labour share of national income is an important indicator of the extent to which value-added is shared with workers through the distribution of wages.

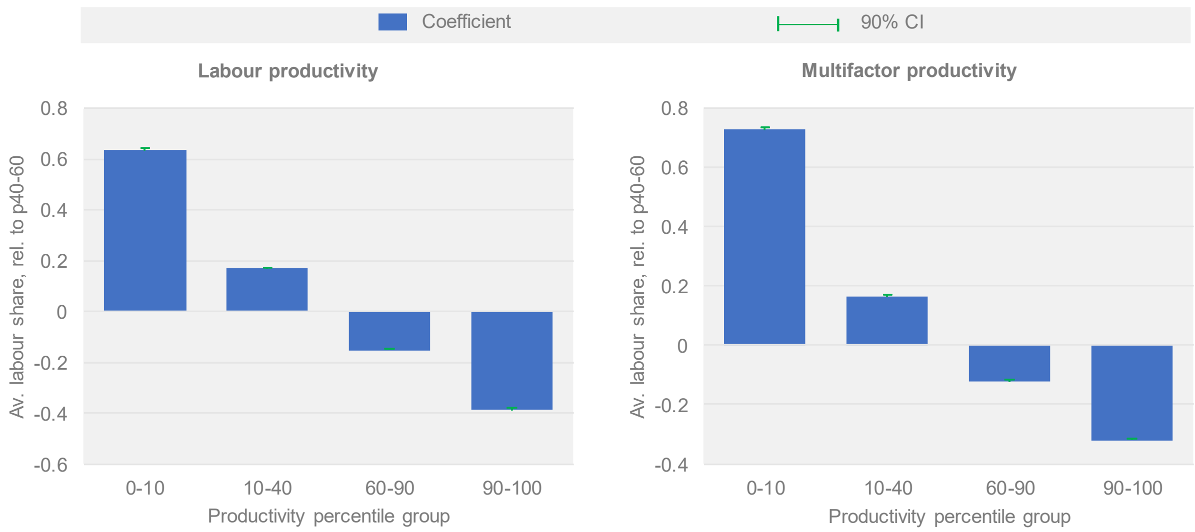
Existing evidence, mainly focused on the US, suggests that reallocation of resources towards high-productivity firms with low labour shares may have depressed the aggregated labour share in recent decades. This reallocation may be in favour of productivity superstars, i.e., the most productive firms in an industry (Autor et al., 2020[44]), but there may also be a role for "shooting star", firms that benefit from a temporary boost in demand (Kehrig and Vincent, 2021[59]).

Recent OECD work (Cho, Manaresi and Reinhard, forthcoming[60]) extends the scope of the analysis of the nexus of productivity dynamics and the labour share to the cross-country level, providing novel evidence across 18 OECD Member countries based on the OECD MultiProd database.

The analysis provides several important insights that contribute to the existing literature. First, there is a robust, negative link between productivity and labour share, both at the firm and industry levels. Figure 3.2 shows the difference in labour share across firms in different productivity quantiles relative to the median group and illustrates that more productive firms tend to have lower labour share (for both labour and multifactor productivity). This implies that firm-level rents from higher productivity are not fully passed on to the wage bill (see also Criscuolo et al. (2020[61])).

Figure 3.2. Firms' productivity and labour share are negatively related

Difference in average firm-level labour share of each productivity group and the medium group of productivity



Note: Based on regressions of average labour shares on an indicator variable for the productivity percentile group, controlling for fixed effects for the country-year and country-industry, and using the share of firms in the country-year as weight. Result is based on data for 18 countries: AUT, BEL, CAN, CHL, EST, FIN, FRA, HUN, HRV, IDN, ITA, JPN, LTU, LVA, NLD, PRT, SVN, and SWE.
Source: Cho, Manaresi and Reinhard (forthcoming[60]).

Second, some firms appear to have consistently low labour shares (they preserve a low labour share over at least three years). Firms with such a persistently low labour share are further found to be consistently among the most productive firms in their industry and can be considered "superstar firms". Despite previous evidence showing an overall positive wage-productivity link (e.g., Berlingieri, Calligaris and Criscuolo (2018[18]), Criscuolo et al. (2020[61])), these firms tend to pay low wages relative to their high-productivity (for similar result also for developing countries and different data sources, see Saumik and Hironobu (2019[62])). This raises concerns regarding the extent to which rents from high-productivity at the top are shared with workers. Lower labour shares in more productive firms may arise from technological factors (notably a higher capital intensity). However, other factors could also contribute to lower labour share of "superstar firms", such as employer monopsony power or domestic outsourcing, and those factors can call for policy attention, as discussed next.

Third, the analysis shows that value-added has been reallocated to firms with a persistent low labour share status and this contributes to reducing the aggregate labour share.[5] Reallocation to firms with a more transient low labour share status ("shooting star" firms) has also occurred, although to a lesser extent and reallocation to these firms seem to have a smaller weight in explaining aggregate trends.

The study suggests that structural and policy factors do matter when explaining differences in labour shares trends across countries over time. In particular, the labour share declines more in the presence of rising productivity gaps between leader and follower firms. Falling labour shares are also linked to falling entry rates, globalisation, in particular rising export intensity, and the digital transformation as declining labour shares respond negatively to rising AI patent activity and Information and Communication Technology (ICT) investment shares. Growing productivity gaps at the top of the productivity distribution and rising export intensities are found to be negatively linked to labour shares by contributing to promoting reallocation to high-productivity, low labour share firms.

In conclusion, the new OECD cross-country evidence supports the view, originally derived from US data, that labour shares may be driven down by the increasing the weight (in terms of value-added) of productivity superstars. Although this reallocation may be grounded in higher competitiveness, technological advantage and efficiency, and lead to higher overall productivity growth, a significant policy concern is how to ensure that productivity rents derived from globalisation and digitalisation are also shared more broadly with workers. Additionally, Cho, Manaresi and Reinhard (forthcoming[61]) uncover differences in firms at the frontier with respect to the pass-through of productivity differences to wages, highlighting that downward pressures to the labour share are driven by the reallocation of value-added towards a subset of "superstar firms" with low labour shares. This further raises concerns about why some firms pay relatively low wages relative to other high-productivity firms, and the extent to which this reduces the socio-economic benefits of productivity-enhancing reallocation. This pressing concern might be even more relevant given the deterioration of the relative productivity of small and micro firms that tend to have higher labour shares.

To understand how lower labour shares may directly link to different facets of inclusiveness, it is important to think of the labour share as being the ratio of wage bill, i.e., average wage in the firm times number of workers, over value-added. Lower labour shares at the top firms might therefore reflect not only a weakened link between firm-level productivity and the number of workers that might derive from automation, but also a lower pass-through of higher and increasing productivity to wages (in line with the negative link between productivity and labour shares presented in Figure 3.2). The latter might reflect externalisation of part of the employment increase through outsourcing of some of the tasks and the reliance on non-standard forms of work (e.g., "gig-workers"), and/or a lower wage increase for workers relative to the increase in productivity. Evidence discussed in Criscuolo et al. (2022[6]) suggests that the former is more likely in less dynamic business environment where workers are less mobile, for instance because of non-compete clauses (see work by Marx (2011[63]) and Starr (2019[64])) and in environments where labour market concentration is higher (for the evidence on the potential role of monopsony see e.g., Manning (2003[65]), Azar, Marinescu and Steinbaum (2020[66]), Marinescu, Ouss and Pape (2021[67]) and Marinescu and Posner (2020[68]), etc).

Further to higher employment and wages, the extent to which productivity growth and a dynamic business environment are conducive of inclusiveness also crucially depends on how their benefits are shared with workers across industries, occupations (e.g. across low, medium and high wage pay occupations), socio-economic group (for instance by educational attainment, gender, migrant status, age), but also to other broader aspects of job quality (such as contractual arrangements, access to training, etc). Evidence suggests that a dynamic business environment can indeed promote wellbeing. For instance, evidence previously discussed highlight potentially large benefits to addressing productivity gaps, due to a higher responsiveness of employment and wages in less productive firms. Additionally, further to their role for business dynamism and productivity, Calvino et al. (forthcoming[70]) find that young firms can contribute to job quality and inclusiveness, focusing on wage levels and job security, as well as diversity in terms of the share of women and foreign-born workers. However, further to policies aimed at providing incentives and firms capabilities to raise productivity through innovation and adoption, labour market and social policies are key to ensure that a productivity revival across firms can also result in higher inclusiveness across all groups of workers.

Promoting economic wellbeing through an inclusive productivity revival

Evidence on the link between productivity and employment as well as the link with wages suggests that boosting productivity is not a standalone economic objective, but has also further socio-economic benefits, in particular through employment and wage growth. Several policy areas may be leveraged to support employment creation and wage through a productivity channel and should focus on i) fostering business dynamism and productivity, ii) strengthening the link between productivity and employment and iii) strengthening the link between productivity and wages. These objectives may be achieved through a comprehensive policy mix. Policies should support innovation to continue pushing the frontier of technology and knowledge outward and unlock new sources of productivity gains, while simultaneously ensuring the diffusion of technology and knowledge through a combination of incentives and capabilities and allowing creative destruction and reallocation to operate.

- First, ensuring open and competitive markets and a large market size could incentivise firms to invest in innovation as they guarantee returns on investment. Thus, continued efforts to achieve a single market and global level playing field are crucial for innovation. In this respect, the OECD indicator on regulatory barriers affecting services trade within the European Economic Area (the intra-EEA STRI), shows that there is still relevant heterogeneity across sectors and countries in the restrictions on foreign entry, restrictions to movements of people, barriers to competition, regulatory transparency or other discriminatory measures (Benz and Gonzales, 2019[69]). Given the role of digitalisation in productivity dynamics and firm heterogeneity, policies should also focus on challenges related to digital trade and market openness (e.g., see López Gonzalez and Ferencz (2018[70])).
- A second margin for policy action needs to focus on capabilities, with not only a crucial role for investments in managerial and workers' skills for technology development, but also for technology adoption among laggards to ensure that they have the necessary absorptive capacities.
- Third, policies should ensure the condition for creative destruction to operate, in order to maintain incentives for innovation and adoption, and to support productivity-enhancing reallocation. To this end, policies should ensure a level playing field, the contestability of markets, and reduce barriers to entry and growth. Competition and regulations that ensure a level playing field are key to incentivise entry and scale up of younger firms. They are also key in ensuring healthy dynamics at the top with competition for the market, as well as a smooth and efficient selection of firms at the bottom, e.g., thanks to efficient bankruptcy legislation. To ensure a level playing field, competition authorities may play a role in the enforcement and advocacy of competition neutrality of state interventions to prevent distortions to the competition law framework, the regulatory framework, public procurements, or public support measures.[6] This also implies revisiting concepts, measurement and competition policies in specific sectors such as digital markets (OECD, 2022[71]) or energy markets.[7]
- Fourth, policies can promote spillovers both across firms and across sectors. Spillovers across firms can be spurred not only by increasing absorptive capacity through managerial quality and worker skill, but also through a fair and transparent design of Intellectual Property regime. In

particular, this requires setting pro-competitive licensing arrangements that strike a balance between protecting the inventor or creator's rights and fostering innovation diffusion and follow-on or cumulative developments, as well a close scrutiny by competition authorities of licensing practices that have been identified as potentially having anticompetitive effects, such as field-of-use restraints, grant backs, no-challenge clauses, patent holdups and others (see OECD (2019[72]) and (2019[73]), and also Haskel and Westlake (2022[33])).[8] Policies can also promote spillovers across sectors, by supporting integration to resilient global and domestic value chains and facilitating connections to the most productive supplier industries via mobility of workers, open trade, and foreign direct investment.

- Finally, policies should ensure that productivity gains and its benefits are shared widely across firms and workers. This requires strengthening education and training to increase the supply of skills, in particular those in high demand (e.g., STEM workers) and those that are complementary to technology adoption (e.g., digital and soft skills of employees, managerial capabilities) while improving labour market matching of job-seeking workers to vacancies, also through enhanced worker mobility and lower labour market concentration. While digital technologies may be associated with a lower aggregate labour share, promoting reskilling, upskilling and job mobility could help displaced workers finding jobs at firms paying higher wages, thus leaving low-demand and low-wage segments of the labour market. Furthermore, while firm performance and workers' qualifications play a key role for wages, there is room for well-designed policies to encourage wage-setting practices that raise wages and reduce wage inequality without adverse effects on employment and output (Criscuolo et al., 2022[6]). This could help ensuring that potential productivity improvements within firms are passed on to workers through the sharing of productivity related rents, including to lower skilled workers. In this respect, while productive high-paying firms may benefit from domestic outsourcing, this may be a concern to job quality and earnings in low-wage occupations through reduced sharing of productivity related rents. Appropriate collective agreements that consider inter-industry occupational wages may for instance contribute to preventing cases of outsourcing that exploit different wage levels for the same occupations in different industries without enhancing productivity (OECD, 2021[74]). More generally labour market institutions and labour policies frameworks (e.g., also the design of work contracts, employment protection legislation, unemployment insurance, minimum wages, wage floors, collective bargaining, as well as access to training) can play a key role in supporting productivity (for instance through enhanced reallocation) while ensuring that the benefits of productivity are shared widely across workers, through higher employment, wages but also enhanced job quality and satisfaction.

4 COVID-19 and the accelerating digital and green transitions for the business sector

A significant trend associated with the COVID-19 shock has been the surge in the use of telework as firms quickly adapted to remote work arrangements (Criscuolo et al., 2021[8]). This surge was accompanied by the acceleration in the adoption of digital technologies across various sectors, reflecting a broader trend towards increased reliance on digital tools. The entrepreneurial landscape also witnessed a notable resilience, even marked by an increase in business formation across many countries, with individuals exploring innovative business ventures and solutions in response to the challenges posed by the pandemic.

Nevertheless, important challenges persist on the horizon. The macroeconomic landscape continues to bear the imprint of inflation. While enduring repercussions of the crisis linger, policy makers face the imperative of addressing longstanding challenges tied to the digital and the green transitions. The formulation and implementation of effective industrial policies also become paramount, given their pivotal role in navigating these multifaceted challenges.

Uneven adoption of digital technologies during the COVID-19 crisis

The COVID-19 crisis has spurred the adoption of digital technologies, albeit differently across firms. An upcoming analysis by the OECD (Calvino, Criscuolo and Ughi, 2024[9]) leverages a comprehensive commercial database from Spiceworks Ziff Davis to examine digitalisation at the firm-level during the pandemic across 20 European countries. Drawing on this unique cross-country data source on digital product installations by firms, which are linked to IT expenditures and information on firm financials, the analysis reveals that the integration of digital technologies has experienced a rapid acceleration during the pandemic.

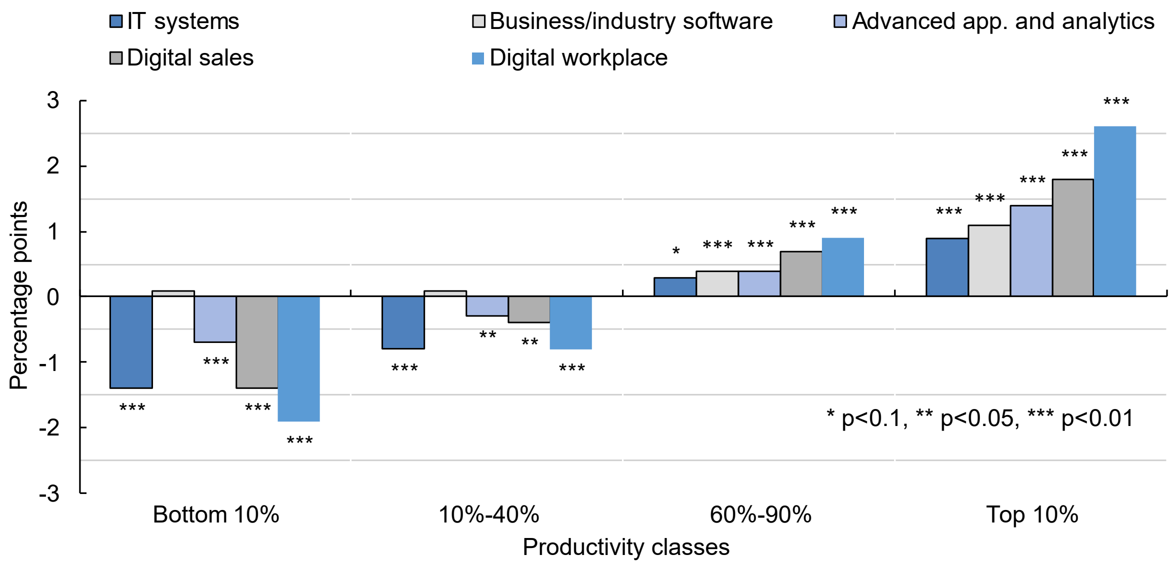
Focusing on detailed applications grouped into five technological classes, the analysis shows that a significant share of firms introduced new digital technologies during the pandemic, with the highest shares introducing “IT systems”, followed by “Digital sales” and “Digital workplace” (respectively around 80%, 50% and 45%).[9]

Nevertheless, existing disparities have played a crucial role in determining firms' capacity to respond to the crisis through digital adoption. Firms that exhibited higher levels of productivity, larger size, and a greater emphasis on digitalisation prior to COVID-19 saw a more pronounced increase in their adoption of digital technologies in the aftermath of the pandemic shock. Notably, firms with elevated levels of digitalisation before the pandemic, as measured by a novel digitalisation index used in the analysis, and higher complementary factors (e.g., IT staff) were generally better positioned to introduce new digital products during the crisis. Furthermore, businesses that were more productive already before COVID-19 were also more inclined to embrace digital applications that gained traction during the pandemic, such as digital commerce, collaborative software, cloud services, and analytics (Figure 4.1)

These trends may amplify winner-takes-most dynamics and exacerbate the divides previously documented in this work, i.e., the ones between the top-performing firms and the rest of the business population and the gap between large and small and micro firms.

Figure 4.1. Firm productivity in 2019 and likelihood of introducing new digital products during the pandemic

Regression coefficients for labour productivity classes, by digital technology classes (reference productivity class: 40%-60%)



Note: The figure displays the relationship between firm labour productivity (in 2019) and the probability of introducing new digital products in 2020 and/or 2021, for each digital technology class ("IT Systems", "Digital Sales", "Digital Workplace", "Advanced Applications and Analytics", "Business/Industry software"). For each technology class, the estimated regression model is a linear probability model that employs a dummy for digital technology class adoption as dependent variable and includes – in addition to the productivity group – size class, age class, and other complementary factors (IT staff, and an ex-ante digitalisation index) as main independent variables. The technology class dummy is equal to 1 if the firm has introduced a new digital product for the given technology class in 2020 and/or 2021. The labour productivity proxy is computed as (log) turnover over employment in 2019. Productivity groups are computed within country-sector (2-digit NACE sectors). Productivity coefficients are computed with respect.to the 40%-60% productivity group. Each regression includes 2-digit sector-country fixed effects and employs robust standard errors. Results for the "missing productivity" group are not reported. Results are robust to the log of labour productivity in 2019, excluding plants at the top 1% of the productivity distribution, employing a logit model as the main regression model, and to the use of a different proxy for digitalisation as control. In the figure, results are ordered with respect to the magnitude of coefficients of digital classes for the productivity group "Top 10%".
Source: Calvino, Criscuolo and Ughi (2024[9]).

Navigating the AI landscape: artificial intelligence adoption across firms

A notable change in the digital landscape that also characterised the last few years has been the acceleration in the diffusion of AI, which is already changing the demand for skills and may play an important role in tackling societal challenges, such as those related to health and climate change. AI has a strong potential to affect radically and widely the economic landscape, with relevant implications for several economic and social outcomes. Often considered a general-purpose technology, its applications can potentially bring significant improvements to adopters and users.

In this context, Calvino and Fontanelli (2023[13]) depict a profile of AI adopters across countries, leveraging unique data for 11 countries collected from firm-level surveys in the framework of the *AI Diffuse* project which gathers information on AI use by firms. While AI adoption is still largely incomplete, the analysis further emphasises the characteristics of adopters, the role of complementary assets such as intangibles or digital infrastructure, and the links between AI utilisation and productivity and highlights key stylised facts.

The analysis of AI adoption unveils crucial patterns. Larger firms are more inclined to adopt AI technologies as they may benefit from scale advantages and are better equipped to leverage the full potential of AI through intangible and other complementary assets. Concurrently, young firms to some extent tend to exhibit higher rates of AI adoption, in line with their role for driving innovation particularly in the context of emerging technological paradigms such as AI.

In terms of sectoral patterns, Calvino and Fontanelli (2023[13]) find that AI adoption is noticeably concentrated in the ICT and Professional Services sectors, underscoring a sectoral imbalance. This hints that at the early stages of AI diffusion, its broader potential as a general-purpose technology is yet to be fully realised, especially beyond selected service sectors.

Similar to the findings for digital technologies previously discussed, significant links emerge between AI use and complementary assets. Intangibles, including ICT skills, digital capabilities, and infrastructure, play a pivotal role in fostering AI adoption. Firms demonstrating general skills and engaging in innovative activities also exhibit positive associations with AI adoption, emphasising the importance of absorptive capacity.

Interestingly, more productive firms are also more inclined to adopt AI, yet the productivity advantage is intricately linked to complementary assets. When factoring in the role of these assets, the initially observed productivity premia is reduced. This underscores the critical contribution of complementary assets in influencing the productivity landscape associated with AI adoption.

The polarised adoption of AI, predominantly by industry leaders, raises concerns about potential future gaps in the business landscape. This trajectory, coupled with AI reinforcing existing advantages, poses economic and societal implications and raises the question of interventions through industrial strategies, as discussed in the final subsection.

Did COVID-19 help accelerating the green transition?

The COVID-19 crisis and the associated lockdowns across the world led to a massive drop in economic output. Governments responded by implementing rescue and recovery packages and other fiscal measures to support economic activity in addition to protecting public health. In the two years following the start of the COVID-19 pandemic, national governments announced up to USD 30 trillion dedicated to rescue and recovery economic stimulus as a response to the COVID-19 crisis.

This massive intervention by public authorities around the world could give an important impulsion to the development and deployment of low-carbon technologies. Encouraging a low-carbon shift has been a priority in the aftermath of the COVID-19 pandemic. Consequently, many governments integrated a significant environmental dimension into their stimulus packages. The EU, for example, imposed that 37% of the Next Generation EU stimulus package be targeted at supporting the green transition.

Recent work conducted by the OECD (Aulie et al., 2023[75]) shows that countries around the world – members of the OECD, the European Union and the G20 – included in these fiscal packages announced USD 1.29 trillion measures for the development and deployment of low-carbon technologies. This means that, on average, OECD Member countries committed to spend the equivalent of 2% of one year of their GDP on low-carbon technologies. The sectors which received the largest share of funding were energy (39%) and transportation (35%). In contrast, only 4% of total funding was allocated to the industry sector. The vast majority of spending supported the deployment and adoption of mature technologies, while development of early-stage and emerging technologies received less than 15% of spending.

Aulie et al. (2023[75]) reported the results of a modelling exercise to analyse the impact of the post-COVID low-carbon fiscal spending ('Green Fiscal Push Scenario') on greenhouse gas emissions (GHG) reductions towards 2050. GHG emissions in OECD and EU countries decrease by 9% in 2030 and 11% in 2050 compared to a Reference Scenario in which no such spending occurred.

This reduction is triggered by both support to adoption and support to Research, Development, and Demonstration (RD&D), with the role of the latter increasing considerably over time. In 2030, only 5% of the emissions reductions are triggered by RD&D support measures, but this proportion increases to 26% in 2050. This is due to increases in the productivity of clean technology, significant cost reductions in, for example, batteries, hydrogen, wind power and solar PV, and the diffusion of knowledge spillovers across borders. By 2050, a dollar spent on RD&D induces six times more cumulative emissions reductions than the same dollar invested to support adoption. This illustrates the key role of R&D for the green transition, particularly in the context of high concentration of many critical raw materials necessary to produce renewable energy capital goods (wind turbines, solar panels, etc.). Innovation to develop leading-edge manufacturing capacities to produce renewable energy goods can reduce dependencies vis-à-vis non-OECD economies while avoiding or limiting the cost of reshoring production units currently located in low-wage economies. Innovation can also play a role in reducing dependencies thanks to the development of alternative materials or new recycling processes for critical raw materials.

The model also looks at the aggregate effects of the Green Fiscal Push Scenario on GDP and employment: although small, they are positive across EU and OECD countries. This positive effect is mainly driven by productivity improvements induced by R&D investments and learning-by-doing. The EU benefits the most from the positive effects of low-carbon investments: GDP gains for the EU reach +1.1% in 2035. In North America, the GDP effect is positive at +0.4% in 2035, driven by the impact of the Inflation Reduction Act (IRA) in the United States. Effects on employment mirror GDP projections and employment increase by 0.85% for the EU in 2035 and by 0.2% in North America.

These predictions align well with other recent OECD analyses which suggest that stricter environmental regulations can enhance productivity growth by encouraging energy efficiency investments (e.g., in cases of energy price shocks) (André et al., 2023[76]) and green investment (e.g., by complementing green management practices) (Costa et al., 2024[77]). Policy efforts to progress the green transition may further take effect through reallocation, as workers will likely transition from jobs in high-polluting industries to jobs in the "green" sector (Causa et al., 2024[78]). Policy support, in particular in the form of reskilling, may be needed to support this transition to curb further increases in inequality.[10]

Recent OECD work (Dechezleprêtre and Vienne, forthcoming[79]) also investigates the link between air pollution and productivity, and further underpins the economic benefits of policies contributing to air pollution reduction through lower emissions. Existing studies have already shown that air pollution can negatively affect workers' productivity (Zivin and Neidell, 2012[80]), but they consider particular settings (e.g., garment factories in India). Using a large-scale firm-level dataset spanning all European countries, combined with weather and air quality data based on firms' location, the findings of this study present causal evidence for a negative effect of air pollution on labour productivity. The effect, driven by firms in the manufacturing sector and in some service industries, appears economically relevant, suggesting important co-benefits of the green transition in terms of higher worker productivity and, thus, economic growth. At the aggregate level, earlier OECD analysis suggests that these effects translate into a negative impact on region-level GDP (Dechezleprêtre, Rivers and Stadler, 2019[81]).

5 The importance of coherent industrial strategies for inclusive and sustainable growth

The increased attention to climate neutrality and sustainability is evident in the focus of industrial strategies beyond COVID-19 resilience packages as shown in a recent study by the OECD that provides a novel attempt at quantifying industrial strategies (Criscuolo, Lalanne and Díaz, 2022[82]). The QuIS project is indeed the first to quantify industrial strategies across nine OECD Member countries over the 2019-21 period.

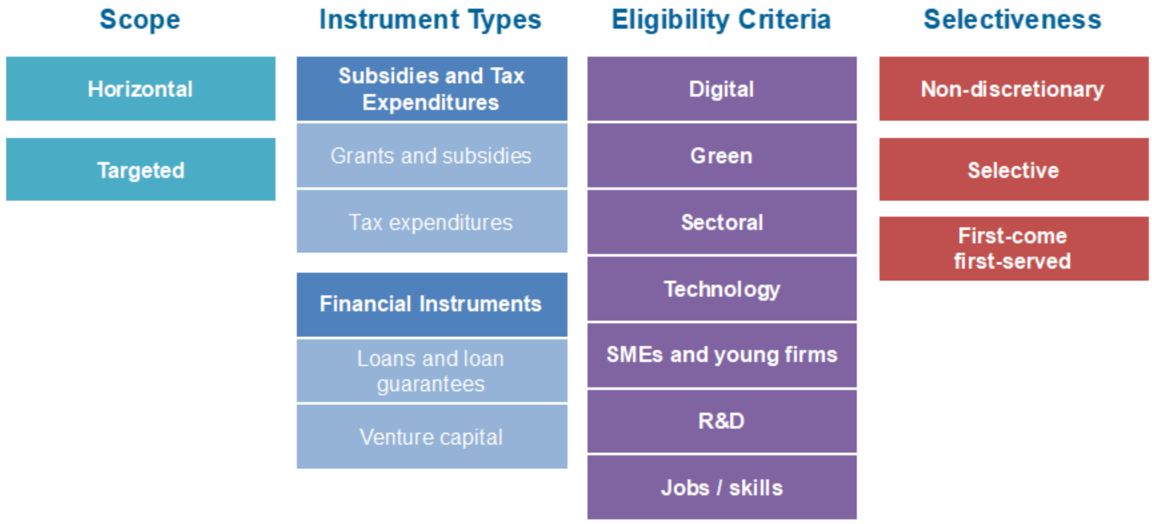
The development of this project reflects important recent developments in the economic policy arena, as industrial strategies can further complement the broad policy mix, aimed at boosting productivity in an inclusive way, discussed in Section 3. Notwithstanding scepticism and the recognition of potential important drawbacks of targeted industrial policies, many economists are reconsidering the role of targeted policies because of economic, technological, and societal needs (Rodrik, 2008[83]; Mazzucato, 2018[84]; Bloom, Van Reenen and Williams, 2019[85]). Three main reasons justify this renewed interest (see Criscuolo et al. (2022[86])):

- First, the presence of market imperfections implies that policy interventions, even those that may introduce distortions, can in fact enhance public welfare when they help achieve a second-best allocation.[11]
- Second, the speed and magnitude of technological opportunities and societal challenges necessitate both a public impetus/guidance and a large-scale private investment to be addressed. In this respect and as mentioned above, AI is expected to become pervasive in the economy but may also need new rules and new governance frameworks. Governments can also play a role in avoiding that initial investment gaps in this rapidly evolving environment eventually lead to entrenchment of incumbent adopters, notably by promoting technology diffusion to improve the productivity of laggard sectors and firms and ensuring efficient allocation and competitive markets.
- Finally, the productivity slowdown, the accompanying increase in productivity dispersion, and the decline in labour shares presented earlier in the document, as well as the increase in wage inequality (Berlingieri, Blanchenay and Criscuolo, 2017[17]; OECD, 2021[87]) put a special emphasis on the role of industrial policies for social outcomes. Industrial policies are often praised for reducing geographical or income inequalities or counteracting wage polarisation (Rodrik and Sabel, 2019[88]).

The COVID-19 crisis has reinforced these three arguments in favour of industrial strategies, and further put additional emphasis on the importance of climate neutrality targets, as discussed in the previous section. Furthermore, the risk of GVC disruptions, illustrated by the challenges related to the COVID-19 crisis and the heightened geopolitical tensions, have prompted the emergence of economic resilience (in particular of supply chains) and strategic autonomy as new objectives of industrial policy.

The ongoing and expanding QuIS project provides a unique source of information on the amount spent on different policy instruments as it gathers and centralises information from publicly available data from many different and decentralised sources on industrial policy expenditures. But importantly, it also classifies them along four dimensions: scope (horizontal vs targeted measures), instrument type (grants and tax expenditures vs financial instruments), eligibility criteria areas (e.g., green, sectoral, technology; skills etc) and selectiveness (see also Figure 5.1).

Figure 5.1. Classification of industrial policy expenditures in the OECD QuIS project



Source: Criscuolo, Lalanne and Díaz (2022[82]).

This quantification effort is a crucial first step in understanding the importance of developing a coherent non-distortionary industrial strategy to support economic growth that is both inclusive and sustainable.

With the same purpose, the OECD has also developed a framework that highlights the role of demand-oriented instruments (e.g., product regulation and public procurement) and different supply-oriented instruments that aim at increasing productivity growth of heterogenous firms (within-firm tool) and support the efficient allocation of resources across firms (between firm instruments). The latter distinction is a key novelty of the framework that allows to analyse how industrial strategy can foster or hinder the Schumpeterian creative destruction dynamics, a key concern in light of the evidence discussed in this report.

One important concern with industrial strategy, as highlighted also in recent theoretical models (e.g., Acemoglu et al. (2018[89])), is that to be effective, it needs to remain competition-enhancing and non-distortive. For this goal to be achieved, two key features of an industrial strategy need to be ensured.

The first key feature of an industrial strategy is coherence and complementarity across the different policy instruments deployed within an industrial strategy and with other policy areas (e.g., competition): first, complementarity is required between investment incentives and policy ensuring access to inputs, such as skill and transfer policies, as they enhance the effectiveness of investment incentives and contribute to increasing the absorptive capacities of the least productive firms, thereby fostering technological diffusion. Second, complementarity between instruments affecting firm performance (“within”) and instruments affecting the static and dynamic allocation of resources across firms (“between”) is also crucial. In the same vein, complementarity should be ensured with competition policy and framework instruments that enable firms’ entry and exit, allow the most productive firms to grow and incentivise innovation. For instance, state aid might end up favouring some firms over others, in particular incumbent large firms over new or young firms or supporting inefficient or failing firms. This may lead to the survival of less productive firms, impairing the reallocation to more productive and new ones. Therefore, the design of such policies is also crucial in order to benefit firms broadly (e.g., the design of R&D tax credits with refund provisions which may also support young firms that initially do not generate profits). Theoretical evidence suggest that this complementarity is key for translating firm-level innovation into macroeconomic growth (Acemoglu et al., 2018[89]).

The second key feature of an industrial strategy relates to the role of sound governance of the strategy to limit the risk of capture and attenuate information asymmetries (Romer, 1993[90]) and thus avoid hindering competition and innovation. In particular, it is necessary to favour their inclusiveness, notably by ensuring that young firms, and other important stakeholders are solicited to participate in the design of whole of government industrial strategies and that, to the extent possible, the specifications are technology neutral and do not discriminate between domestic and foreign firms, and incumbent and potential entrants. For this reason, they should also consider potential general equilibrium effects (sometimes unintended). In addition, ex-ante provisions for ex-post evaluations and plans for regular refit of the instruments and the strategy should be an integral part of any industrial strategy and subsequent reorientations.

In this context, the QuIS project offers a conceptual framework and harmonised measurement of industrial policies, with detailed information on industrial policy expenditures, their composition, their mode of delivery, and the characteristics of their beneficiaries. The project provides the grounds for cross-country comparisons and evaluation of the effectiveness and efficiency of policies. As such, it is also a key tool to promote international coordination, which should represent another key feature of well-designed industrial strategies.

Endnotes

[1] The figure excludes the period 2008-13 corresponding to the Great Financial Crisis and the Eurozone crisis, and subsequent recovery years, marked by particularly low productivity growth.

[2] The fact that the share of young firms in micro firms is declining could be related to two factors, including i) the decline in entry rates which is associated with a lower number of micro-entrants relative to the total business population and ii) an insufficient post-entry growth which would imply that firms stay longer in the micro-size class, changing the age composition of this group.

[3] Note that dominant positions of superstar firms may not only discourage widespread innovation of disruptive innovators but may also slow down innovation of industry leaders as they become entrenched incumbents. As they may dedicate more resources to avoiding competition, this may in turn reduce productive innovation efforts, even though they initially acquired such positions through innovation and higher efficiency. Aghion and Howitt (2022[93]) further summarise mechanisms through which incumbents may escape competition and deter innovation and growth. A first mechanism (labelled as the “automatic mechanism”) arises from the fact that dominant firms with large market shares and large technological lead face little incentives to innovate in order to escape competition, while the low prospects of catching up and effectively competing with leaders reduce the profitability of entry and innovation for followers. A second mechanism relates to the strategic behaviour of leaders using their power to block innovation by potential rivals. This includes the use of pre-emptive mergers, strategic innovations and patent thickets, as well as lobbying that help dominant firms raise regulatory barriers against potential rivals.

[4] In this respect, digital and intangible intensive sectors deserve particular attention. Digitalisation and the growing role of intangible assets have reshaped the way firms produce and reach customers and alongside have changed the way firms compete. While this may provide opportunities for new firms, this may also generate winner-takes-most dynamics, change market structures and the market power of leader firms. For instance, OECD evidence has showed that intangible and digital intensive sectors display higher increases in concentration, as well as in productivity and mark-up dispersion (Calligaris, Criscuolo and Marcolin, 2018[92]; Bajgari, Criscuolo and Timmis, 2021[91]; Corrado et al., 2021[7]). Digital intensive sectors further display lower levels of catch-up for laggard firms (Berlingieri et al., 2020[4]). Ongoing OECD research (Calligaris et al., forthcoming[94]) also shows that lower exposure to international competition is related to market concentration dynamics, as industries in which firms compete domestically have experienced higher increases in concentration. However, a larger size of the markets (in sectors that compete globally), may further reinforce the positive relation between intangible intensity and concentration, due to scale effects. Future work by the OECD Directorate for Science Technology and Innovation will further investigate the link between AI, productivity and competition.

[5] On average across countries, detailed industries, and time, over a 10-year horizon, the share of firms with a persistent low labour share in industry value-added has increased by 2.2 p.p. in manufacturing and 1.8 p.p. in non-financial business services, which corresponds roughly to a 25% increase relative to the sample period average in both macro-sectors. According to a back-of-the-envelope calculation based on labour share differentials between persistent low-labour-share firms and other firms, this reallocation has been associated with a reduction in the labour share by 1.1 p.p. in manufacturing and 0.8 p.p. in services, or -1.8% and -1.3% relative to a typical labour share of 0.6.

[6] See the OECD December 2021 roundtable on the promotion of competitive neutrality by competition authorities: https://www.oecd.org/daf/competition/the-promotion-of-competitive-neutrality-by-competition-authorities.htm.

[7] See the OECD webpage "Competition policy in the digital age" (https://www.oecd.org/daf/competition-policy-in-the-digital-age/) and the November 2022 roundtable on "Competition in Energy Markets" (https://www.oecd.org/competition/competition-in-energy-markets.htm).

[8] See also the OECD June 2019 roundtable on the treatment of the licensing by competition law and policy: (https://www.oecd.org/daf/competition/licensing-of-ip-rights-and-competition-law.htm), and the 2014 roundtable on Competition, Intellectual Property and Standard Setting (https://www.oecd.org/daf/competition/competition-intellectual-property-standard-setting.htm).

[9] The five technological classes analysed are Advanced applications and Analytic, Digital sales, Digital workplace, Industry/Business software, and IT Systems.

[10] Technological and structural transformations of the economy may come with significant adjustment costs as they induce the displacement of workers in declining industries from their jobs, with sizeable negative impacts on lifetime earnings. The decline of high-polluting sectors may affect segments of the labour market that are already at a disadvantage with particular strength, as job loss is disproportionately occurring for less educated workers and for workers in rural regions (Causa et al., 2024[78]).

[11] For instance, inefficient sectoral allocation revealed during crises may justify interventions to favour reallocations. In addition, in some cases, governments have resorted to industrial policies to compensate sectors or firms for the potential loss of competitiveness resulting from foreign policies, including tax, trade and FDI policies, that are perceived as unfair (see Criscuolo et al. (2022[86]) and references herein).

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