# Executive summary

Productivity growth has been sluggish in many OECD and APO economies, with the slowdown in productivity preceding the global financial crisis in some countries. The COVID-19 pandemic and more recently the war in Ukraine, together with rising geopolitical tensions, have increased uncertainties around economic developments, threatening the economic recovery. Concerns have risen that these developments may lead to a pronounced and long-standing fall in productivity growth.

The economic literature remains inconclusive on the impact of the COVID-19 crisis on productivity as several factors are at play. On the one hand, recessions are likely to hit primarily less productive firms and result in a reallocation of resources toward more productive firms. On the other hand, permanent loss of capital and job losses can hamper long-term productivity developments. Network effects and participation in increasingly complex and globalised value chains can magnify these effects.

The specificities of the COVID-19 crisis make the assessment even more challenging: it affected both demand and supply, curtailing large areas of activity intermittently over months; was fully global and synchronised; brought with it strong uncertainties for an extended period of time; and had important consequences for corporate investment and savings. At the same time, the policy reaction to limit the spread of the virus and cushion the economic downturn was unprecedented. The acceleration of digitalisation and take up of teleworking also helped to mitigate the depth of the recession.

In the short term, labour productivity growth surged in the first half of 2020 in most OECD countries, reflecting a fall in hours worked much larger than in GDP, before slowing down in the second half of 2020 and through 2021. By contrast, the slowdown in productivity that started in 2018 continued in 2020 in the APO economies. Productivity performance varied across economies, reflecting statistical treatments of job retention schemes but also more fundamental differences in the timing of the start of the crisis, economic structure, the magnitude and composition of fiscal packages, and the extent of digitalisation and teleworking. Disparities in productivity performance were even larger across sectors and firms, with services sectors and small and informal firms being disproportionately affected.

The medium to long-term impact of the COVID-19 crisis on productivity will depend on the balance of negative and positive effects:

- On the negative side, history suggests that pandemics are usually followed by sustained periods characterised by depressed investment opportunities. The recession may also result in a labour-market hysteresis effect, whereby long periods of unemployment lead to an irreversible loss in human capital. Reshoring strategies could slow or even revert the development of global trade, limiting further future productivity gains. Finally, the long-term impact on productivity of the large policy packages in response to the crisis will depend on how effective those packages have been in protecting productive firms without supporting non-productive firms to remain in business.
- On the positive side, the pandemic has encouraged many firms to take up digital technologies, to continue their business in spite of the restrictions and to make their production processes more efficient. Reaping the benefits of digitalisation will require changes in business practices, work organisation, skill composition, and a reallocation of resources within and across firms and

industries, but the gains from digital adoption could be substantial. In addition, there are emerging signs that the increase in teleworking is likely to persist over time. While recent studies suggest that teleworking has boosted productivity in the short term, evidence of its long-term effects remains scarce.

Against this background, reigniting the productivity engine is more important than ever if economies are to build back better and achieve sustainable, inclusive and resilient growth. Productivity reflects the ability to produce more output by better combining inputs, owing to new ideas, technological innovations, and improvements in workers qualifications and business models. As such, productivity is considered a key dimension of economic performance and an essential driver of changes in living standards.

## Why is multifactor productivity so important to boost living standards?

A pre-requisite to reinvigorate the productivity engine is to understand its role in economic growth. While there are several ways to measure productivity, the focus of this report is on multifactor productivity (MFP). MFP, sometimes called Total Factor Productivity (TFP), is commonly estimated as a residual, representing that portion of output growth that cannot be attributed to the accumulation of labour and capital. As such, it also includes measurement and model specification errors, underlining the importance of remaining prudent in interpreting its developments.

Single-factor productivity measures, such as labour productivity, relate output to a single input, and are therefore affected by changes in the volume of other inputs. This is why MFP, where output is related to a combination of inputs, is often preferred. The empirical evidence shows that MFP accounts for a significant part of labour productivity growth and that trends and fluctuations in MFP growth have a direct impact on labour productivity growth. The exact contribution of MFP to labour productivity growth depends on whether changes in the composition (or “quality”) of labour and capital are accounted for, and which types of assets are considered. In this regard, accounting for intangible capital turns out to be key for more advanced economies. Even with these adjustments, the average contribution of MFP to labour productivity growth remains significant.

Until the 1990s, most productivity studies relied on country or industry-level data. However, the increasing availability and use of firm-level microdata has revealed the existence of large differences in productivity across firms, including within narrowly defined industries. It turns out that aggregate MFP growth depends on MFP growth within firms, as well as on reallocations of resources across existing firms, and business creations and destructions. Understanding the origins of MFP growth and its drivers requires consideration of all these mechanisms and moving away from the representative firm assumption. Nevertheless, macroeconomic approaches remain key to ensure an exhaustive firm coverage and to capture all interdependencies and spillovers across firms.

## Policies and good governance can foster multifactor productivity growth

MFP is a complex, multifaceted concept whose developments can be influenced by a wide range of policies and institutions. A simple and illustrative framework, inspired by the analysis set out by the OECD in 2015 in *The Future of Productivity*, helps to classify these drivers into three categories:

- Those that boost innovation and experimentation of new knowledge and technologies: Research and Development (R&D), digitalisation and investment in intangible assets;
- Those that contribute to the diffusion of existing knowledge and technologies: skills and qualifications, and public infrastructure; and
- Those that facilitate the allocation of resources within or between sectors and firms: competition and business dynamics, globalisation and financial development.

In practice, this allocation is somewhat arbitrary with some of the drivers belonging potentially to several categories. For instance, public infrastructure can arguably boost innovation and promote the diffusion of existing technologies. Governance and institutions are a cross-cutting issue affecting all three dimensions. In addition, very often drivers of MFP growth interact and complement one another.

### *Boosting innovation and experimentation of new knowledge and technologies*

The innovation boosting properties of ***research and development (R&D)*** are well-documented, acting as a major source of innovation and knowledge accumulation in an economy. The System of National Accounts 2008 (2008 SNA) introduced the treatment of R&D expenditures as investment. R&D is therefore treated identically to all other assets, contributing to the stock of capital in a country and providing production services. As a result, the direct contribution of R&D to GDP growth is included in the overall contribution of capital input and excluded from MFP growth. Nonetheless, R&D may still have indirect effects on MFP growth, for example through its interaction with other production factors. Moreover, R&D can raise the stock of knowledge thereby reducing future R&D costs and enabling future innovations to begin from a higher knowledge level. However, measuring R&D can be challenging, with empirical studies having used a wide variety of measures, including total company expenditures on R&D, company-financed R&D expenditures, the number of research scientists and engineers, and number of patent requests. Furthermore, empirical studies need to carefully account for reverse causality, given a two-way relationship between R&D and productivity.

***Digitalisation*** has been identified as another important driver of MFP growth, as it has drastically changed production processes and consumption patterns. It is expected to stimulate a new wave of productivity growth, which has not yet materialised, as productivity growth in most of the world has been relatively subdued even prior to the 2007-2008 financial crisis. Much of the empirical evidence on ICT and productivity has noted a strong relationship, highlighting the importance of complementarities between ICT and other MFP drivers, in particular human capital, as sufficient and adequate skills are necessary for the efficient adoption of ICT to spur productivity growth. Digitalisation brings with it an increase in the use of intangible assets other than R&D, including organisational capital, brand equity, firm-specific on-the-job training and data.

***Intangible assets*** make up an increasing part of economic capital, but many have not yet been included in the fixed asset boundary of the national accounts. Data, in particular, has become a social and economic resource for value creation, decision-making, innovation and production. Although there is evidence of a tenuous relationship between intangibles and productivity, and of complementarities between ICT and intangible assets, much work remains to be done to improve the reliability of measures of intangible assets and in particular data. Artificial intelligence (AI) is expanding the set of tasks that can be automated towards less-routine tasks, such as driving cars or even making medical recommendations. While the productivity gains to AI are currently somewhat subdued, the evidence shows that there is substantial potential for future gains. Regarding automation and AI, the need for improved measurement is paramount, requiring an adjustment of economic measurement frameworks to fully account for these types of additions to the intangible capital stock.

### *Fostering the diffusion of existing technologies*

***Public infrastructure*** can boost innovation and help the diffusion of existing technologies, with “core” infrastructure (i.e. transport infrastructure and utilities) typically playing a larger role as compared with other types of infrastructure (e.g. educational and health care buildings). However, the magnitude of the effect of public infrastructure on MFP varies substantially across studies, reflecting differences in model specifications and estimation techniques. In addition, quality considerations, network or spillover effects, financing and governance have proved important in shaping the impact of public infrastructure on productivity. Furthermore, diminishing returns to investment in public infrastructure require an accounting

of the stock of public infrastructure to capture non-linearities or threshold effects in its impact on productivity. A major issue is the absence of a universally accepted definition of public infrastructure, as the range of assets covered and their scope varies significantly across studies. The lack of a common definition of public infrastructure complicates its measurement and undermines an accurate assessment of its impact on productivity. National accounts can be used as a starting point to construct time series estimates of infrastructure and build a common view of its coverage.

***Human capital*** has been identified as a major factor supporting the diffusion of existing knowledge and technologies. It has also been shown to play a complementary role alongside other determinants of MFP growth, in particular trade openness and R&D, highlighting the importance of a qualified labour force in the adoption and diffusion of new technologies. These conclusions have been reinforced by firm-level studies that identify and capture specific characteristics of workers. Studies have revealed the importance of managerial quality and management practices in the explanation of large differences in productivity performance across firms within narrowly defined sectors. For instance, recent OECD work on the *Human Side of Productivity* shows that management practices and skills, together with gender and cultural diversity, play a particularly important role in determining productivity growth. However, despite improvements over the years, existing measures of human capital still fail to capture its complex nature. Efforts to develop more reliable measures are key to inform economic policies on the supply, upgrading and matching of skills and other human characteristics with productivity.

### *Contributing to efficient resource allocation*

***Competition*** among businesses can deliver improvements in production efficiency, lower market prices and bring newer and better products to consumers, leading to both productivity gains and increases in consumer welfare. However, important changes in business models fostered by digitalisation have led researchers to question this vision of competition. Recent increases in concentration, mark-ups and profits in the United States, and to a lesser extent in Europe, associated with the rise of “superstar firms”, have have initiated an ongoing debate on the extent of productivity gains and innovations brought by these firms. Their business models rely on large investments in intangible assets and irrecoverable sunk costs that can be difficult to finance for small or less productive firms. As the “superstar firms” operate globally, they affect competition in many economies in parallel. This stresses the need for competition authorities in all countries to ensure that their policies keep pace with these developments, and to ensure that existing competition laws are well-defined, effectively enforced and regularly reformed to reap the benefits for all. Monitoring a whole range of competition indicators, not each in isolation, is key to better understanding current trends.

***Globalisation*** can contribute to boost productivity through different channels, for example, by allowing firms to access new markets to sell their products and buy their inputs, thereby maximising the efficiency of their production process and exploiting economies of scale. Globalisation facilitates technological spillovers through exposure to new production processes, new products, and business and management practices. However, globalisation may primarily benefit large and multinational firms, increasing the productivity gap. Multinational firms can also attract demand away from domestic firms in developing countries and/or import a high share of their intermediate goods. In addition, technology spillovers may be insignificant if there is a low capacity for technology absorption and may not occur horizontally (across firms) but vertically (within firms). While the economic literature finds a positive link between engagement in international trade and in global value chains and productivity, the impact of FDI on productivity is mixed, as infrastructure in the host country, local labour-market conditions and limitations to capital flows, among other factors, can significantly alter FDI benefits for the host country. With globalisation losing momentum even prior to the pandemic, the need to improve the quality and timeliness of globalisation indicators, including those tracking the integration into global value chains, has become key to informing policy advice to prevent the straining of its productivity potential.

The ***development of financial system*** is also a key ingredient in facilitating resource allocation. Indeed, financial frictions, such as those in the form of high-cost insolvency regimes, may have a negative impact on productivity growth. In addition, financial development has a "complementary" role to play and appears to multiply or constrain the impact of all other MFP drivers, including competition and international trade, but also the returns from human capital, R&D investments and the adoption of digital technologies.

### *Good governance is key*

***Institutions***, or *governance*, are entities that influence interactions between economic actors and can affect productivity growth through several channels. They can shape behaviours of economic actors, but also impose constraints on their actions. They influence investments, the adoption of new technologies and the organisation of production. The literature supports a positive association between, on the one hand, property rights protection, rule of law and economic freedom, and, on the other hand, productivity growth. Recent studies have also shown a positive link between democracy and productivity. Most studies highlight the "complementary" nature of institutions and financial development, as they appear to multiply or constrain the impact of all other drivers of MFP growth. Nonetheless, the measurement of institutions has serious limitations, as these are typically composite indicators based on perceptions, sometimes not comparable over time, and with potentially rough scoring systems. This calls for caution when using those indicators in empirical analysis with the aim to assess their impact on productivity.

## Key findings

- **MFP is a multifaceted concept driven by a wide range of policies and institutions.** These can be oriented to foster innovation and experimentation with new knowledge and technologies (through investments in intangible assets such as R&D and digitalisation), to improve the diffusion of existing knowledge and technologies (through skills improvements and better public infrastructure), to facilitate the efficient allocation of resources (through competition, international integration and financial development), and to improve governance (institutions).
- In order to better understand MFP developments, **it is important to improve the measurement of some of its drivers** (human capital, public infrastructure, institutions), **their timeliness** (engagement in global value-chains) **and continue efforts to develop international definitions** (data, artificial intelligence).
- **Monitoring a range of indicators for each of the MFP drivers is key to grasp their complexity**. Each indicator can only capture one aspect of a given phenomenon and each is affected by its own statistical challenges.
- **Exploiting complementarities and spillovers across different MFP drivers is necessary to reap their full productivity potential.** Much of the empirical evidence shows a strong direct relationship between each of these factors and MFP growth, while highlighting their complementary role.
- **The relationship between MFP growth and its drivers is typically two-way**. Analyses failing to account for reverse causality are likely to cause an upward bias in the estimated returns to MFP.