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Digitalisation & Beyond: The COVID-19 Pandemic & Productivity Growth in G20 Countries

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Digitalisation and Beyond

The COVID-19 Pandemic and Productivity Growth in G20 Countries

By Gaetano D'Adamo, Maria Bianchi and Lucia Granelli

Abstract

The Italian G20 presidency has included reviving productivity growth as one of its priorities. Against this background, this Economic Brief discusses productivity growth in G20 economies in the context of the COVID-19 pandemic, paying attention to digitalisation, the emergence of digital platforms and intangible investment, and highlights related policy priorities. The COVID-19 pandemic is affecting productivity growth in many ways (e.g. through human capital, investment, resource reallocation, frictions to global value chains, etc.) and is likely to leave scars. Fostering digitalisation and intangible investment can help the recovery thanks to their overall positive impact on productivity. Key policies to unlock productivity growth discussed in the paper include: (i) high-quality investments in innovation, human capital and infrastructure, (ii) well-functioning labour and product markets to facilitate resource reallocation also across sectors, to absorb the shock of the crisis, (iii) facilitating access to finance and liquidity, and (iv) a supportive business environment. There is strong value added in international cooperation for productivity-enhancing policies: international cooperation can allow the sharing of information on lessons learnt and best practices. Moreover, common efforts and joint initiatives (for example, in investment) can maximise the impact of the measures and the positive spillovers. International coordination in the G20 can also contribute to fill existing data gaps to enable more evidence-based policy decisions.

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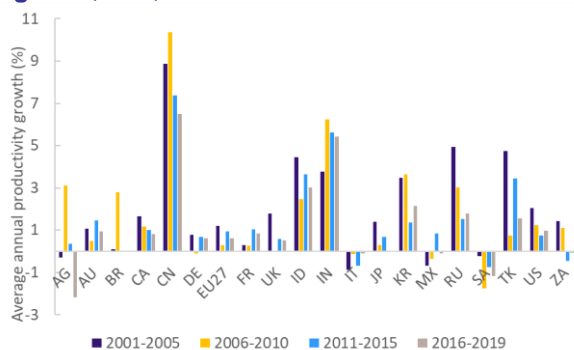
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Introduction

The 2021 Italian G20 Presidency has made reviving productivity growth one of its key priorities, with a focus on the link between digitalisation and productivity and, in particular, on digital platforms and investment in intangible assets. Accordingly, this Economic Brief discusses productivity growth in G20 economies, in light of the developments due to the COVID-19 pandemic and associated crisis and the G20 priorities for the coming year. The Brief focuses on (i) the challenges from COVID-19 to productivity, (ii) the effect of digitalisation, digital platforms, and intangible investment on productivity, and (iii) the policies to restore and strengthen productivity growth.

Productivity growth has been slowing down in recent decades. Both labour productivity and total factor productivity (TFP) growth have been sluggish since the early 2000s, and in some regions, like the EU, for even longer. Since labour productivity growth results from TFP growth and capital accumulation, the fact that also TFP growth has been declining implies that low labour productivity growth is not only due to weak investments. Across the G20, annual average labour productivity growth has been trending downwards since the beginning of the 2000s in advanced and emerging market economies alike, although with somewhat different patterns (Graph 1). In addition, the COVID-19 pandemic and associated economic crisis might have a long-lasting impact on productivity growth, due to the related shocks on digitalisation, investment, labour, education and global supply chains, to name but a few, that will affect productivity with different signs (see next Section).

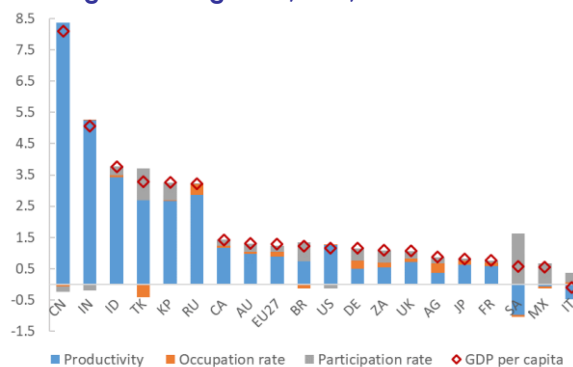
Graph 1: Average annual labour productivity growth, G20, 2000-2019



Source: WEO, AMECO and World Bank's World Development Indicators.

Productivity growth is a key driver of prosperity and convergence. Increasing productivity is crucial from a policy perspective since it is the main driver of GDP per capita growth: for example, it explains the bulk of GDP per capita growth in 2000-2019 in all but four G20 countries (Graph 2).¹ With ageing societies, the role of increasing productivity in improving living standards is even more relevant.

Graph 2: GDP per capita and components, average annual growth, G20, 2000-2019



Source: ILO, WEO, AMECO and World Bank's World Development Indicators.

The economic literature has extensively investigated the reasons behind weak productivity growth, and no clear consensus has emerged. The jury is still out on how much of the slowdown can be attributed to structural as opposed to temporary factors. The main debated causes include a weaker impact on productivity of recent IT-driven innovation cycles, the gradual adoption of the new technologies – which would require complementary investments –, a slower pace of technological change, declining growth rates of skill acquisition in advanced economies (as the gains from better education run their course), and even measurement issues.² Since the global financial crisis, these headwinds have been compounded by low investment coupled with high corporate saving. The COVID-19 crisis has increased uncertainty, placed a strain on corporate liquidity and led to a decline in corporate investment

¹ In Graph 2, GDP per capita growth is decomposed in the sum of growth in labour productivity, occupation rate (employment/labour force) and participation rate (labour force/population).

² See, among others, Bloom et al. (2020); Gordon (2012) and Summers (2015).

that might further depress productivity growth in the future (Banerjee et al. 2020).

Whether the productivity growth slowdown is temporary or structural, or a combination of both, its implications are a cause of policy concern. Lower productivity growth is associated with lower business dynamism and an increased divergence between the most and the least productive firms. This divergence, in turn, is associated to higher wage inequality (Berlingieri et al., 2017) and market concentration and even more so in sectors providing information and communication technology (ICT) services and industries intensive in intangible assets (Calligaris et al., 2020). Population ageing comes along with increasing health and pension spending, putting a strain on public finances that productivity growth can mitigate (European Commission 2018). The COVID-19 shock and its impact on productivity, as well as the acceleration in the use of digital services by the private and public sector, make these challenges even more relevant. This explains the focus on the digital transition of the EU's long-term budget for the period 2021-2027, coupled with Next Generation EU - the temporary instrument designed to boost the recovery and facilitate the transitions towards a greener, more digital and just economy.

Against this background, this Brief first discusses the likely impact of COVID-19 on productivity growth. It then focuses on digitalisation and intangible investments as levers for productivity growth, with a focus on digital platforms. The last section outlines policy priorities for unlocking productivity growth in G20 countries.

The COVID-19 pandemic and productivity growth

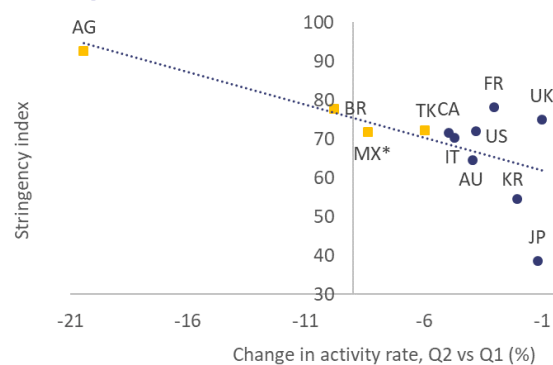
The greater take-up of digital technologies due to the COVID-19 pandemic may accelerate the structural change the pandemic has triggered and can provide both opportunities and challenges for G20 countries. Quantifying the impact of the COVID-19 pandemic on productivity is not possible conclusively at this stage, also given the delay in the availability of the relevant official statistics. Therefore, this section discusses a number of possible transmission channels of the COVID-19 crisis on productivity growth mainly based on anecdotal evidence and evidence from previous crises. These can be grouped into: (1) within-firm productivity growth, (2) resource reallocation across firms (e.g. firms in the

same sector that can weather this crisis as opposed to the ones that will be forced to exit the market), and (3) resource reallocation across sectors, as in Di Mauro and Syverson (2020).

Within-firm productivity growth

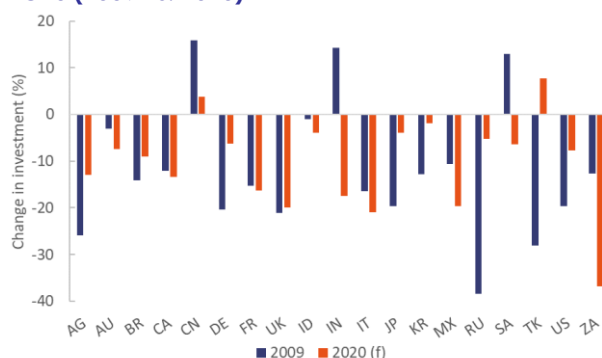
- Hysteresis and human capital.** The crisis could reduce productivity due to labour hoarding when employees are kept on the payroll in times of production decline. This phenomenon, however, should have a very short nature, reabsorbing as lockdowns are eased. More dangerously, firm-specific human capital may erode over time due to a surge in firm exit, thus having a permanent negative effect on productivity. Destruction of jobs could decrease productivity if labour reallocation is slow and results in a deterioration of the skills of workers in the long run (Oreopoulos et al. 2012). The crisis also affects human capital accumulation, due to the lockdown-induced disruptions to schooling and training, which might hurt aggregate and firm-level productivity in the long run. Graph 3 shows that G20 countries with more stringent lockdowns in 2020-Q2 experienced a larger drop in labour market participation on average, as laid off and unemployed people were discouraged from looking for a job. Although data are only available for a subset of G20 countries, the drop in participation is stronger for Emerging than Advanced Economies. At the same time, the pandemic and associated lockdowns have forced an increase in digital take-up by individuals, potentially increasing digital literacy and skills. Reduced employment possibilities or working hours may also provide an incentive to training.

Graph 3: Labour market activity rates and COVID-19 restrictions in selected G20 countries, 2020-Q2



Source: OECD, Haver Analytics, national sources (AG, MX). *Mexico: change in Q3 relative to Q1.

Graph 4: Change in investment at the global financial crisis and the COVID-19 crisis across the G20 (2009 vs. 2020)



Source: IMF WEO, October 2020.

- Investment.** Firms are likely to scale down investment, especially if uncertainty about the virus persists. Some parts of the existing capital stock may become obsolete, reducing labour productivity. Debt overhang due to the take-up of loans to cover liquidity gaps, as well as possible financial constraints, will likely weigh on investment going forward. In addition, according to some scholars, COVID-19 might lower investments due to a general belief of greater tail risks (Kozłowski et al. 2020). Lower investment could depress labour productivity growth via less capital deepening and lower TFP growth. As shown in Graph 4, in 2020, investment is expected to fall in all but two G20 countries (China, Turkey) compared to 2019. When comparing the effect of the current crisis on investment with that of the global financial crisis, the impact across advanced G20 economies appears lower than or comparable to what was observed in 2009, whereas in emerging market economies on average it will be higher.
- Business-specific intangible assets.** Intangible capital, such as buyer-supplier trust, employer-employee relations, organisational effectiveness, are key drivers of firms' productivity. These assets are immaterial and would take time and effort to replicate if destroyed by the current crisis (e.g. due to business closures), also because – unlike tangible capital – they cannot be marketed.
- Frictions to global value chains (de-globalisation).** Transaction costs may increase due to rising cross-country barriers, including those linked to COVID-19 control measures, lockdown measures and mounting trade tensions. This would threaten the productivity gains achieved through global supply chains in

recent years. In this context, firms could dedicate resources for the repatriation of activities, which would increase their resilience to future external shocks but would involve a loss of efficiency and a lower diversification increasing the vulnerability to future domestic shocks. Firms would also face more difficulties in finding appropriately skilled employees due to curtailed cross-country labour mobility.³

- The macroeconomic burden.** Higher taxes (due to the need of fiscal consolidation) and higher inflation might result from the unprecedented fiscal and monetary effort that has been undertaken to address the COVID-19 crisis. This could weigh on real disposable value of capital and labour remuneration and accumulation, and in turn reduce the productivity growth.
- Innovation and digitalisation.** The months of containment measures have given a boost to new, internet-based ways of doing things, in particular as far as e-commerce and teleworking are concerned. Some of this drive may be structural. Digitalisation, e-commerce, e-government and e-health, the development of new business models, home-work arrangements and teleworking at a larger scale might increase productivity. The COVID-19 pandemic could also accelerate the automation of production to increase resilience of firms' operations and secure business continuity, which could boost productivity (Acemoglu and Restrepo, 2020). On the downside, some aspects of digitalisation could have adverse effects on productivity (e.g. need to have parallel analogue back-up systems, distraction and loss of focus and memory, or even addiction that might stem from excessive use of digital tools).

Resource reallocation across firms

- Firm size.** There is a positive correlation between firm size and productivity (Leung et al. 2008). Although government support has been vital to prevent even worse scenarios, small firms are likely to suffer the most and exit the market more than large firms in the current crisis. This crisis-induced exit (and reallocation) might lead to within-sector productivity gains through compositional changes as long as

³ The COVID-19 pandemic severely curtailed labour migration, decimated tourism and business travel, and dampened movement of all stripes, from that of international students to family reunification. See Benton, M. et al. (2021).

government support is temporary and does not end up to so-called “zombie firms”. However, it is not yet clear whether the COVID-19 shock will select more on productivity rather than other firm characteristics (e.g. market power, rent-seeking ability, access to finance), which could instead be detrimental to productivity growth. Recent analysis shows that more productive firms are less likely to become illiquid; however, among illiquid firms, the relatively more productive firms face substantial liquidity difficulties as these firms are also relatively big (Simons et al., 2020).

- **Higher firm churning (exit and entry of firms to the market).** In addition to the firm size channel, higher entry and exit of firms is typically associated with recessions, and may boost productivity if low-productive firms exit the market and more productive firms enter or expand. This process is conditional on market conditions and policies.⁴ In the absence of higher entry rates, concentration might increase, raising mark-ups and reducing competition, thus potentially weighing on productivity in the longer run.⁵ A potential decline in early-stage venture capital due to lower investment opportunities lowers risk financing for innovative starters, sometimes referred to as leading to a ‘missing generation’ of SMEs.⁶ Recent studies indeed suggest a drop in start-up activities due to the crisis.⁷ Finally, the sizeable public support might keep “zombie” firms alive, if it goes to unproductive firms, and prevent healthy cleansing mechanisms from operating.
- **Financial constraints.** The current crisis should not strain the financial system as much as the 2008 one, but productivity outcomes in the long

run would also depend on the capacity of the financial system to channel credit to worthy projects.

Resource reallocation across sectors

- **Changes in sectors’ shares of the economy.** The current crisis will lead to cross-sector reallocations of economic activity. Sectors like tourism, entertainment, business travel and air traffic in general, or brick-and-mortar retail are likely to shrink permanently. Other sectors like healthcare and ICT might grow considerably. Such reallocation would have an impact on aggregate productivity, which is difficult to predict due to the differences in productivity and expected productivity growth across sectors and countries. Moreover, the COVID-19 shock may reinforce ongoing trends concerning in particular the digital transition, the green transition and (de-)globalisation (European Commission, 2021a).

Table 1 summarises the transmission channels described above and the expected sign of their impact, given that their specific effects may be either positive or negative (see also Afman, 2021).

Given the magnitude of the shock, the COVID-19 crisis is likely to leave scars, most likely via indirect transmission mechanisms, such as hysteresis and the drop in investment. The extent of the shock will ultimately depend on the duration and severity of the recession as well as country-specific factors, including technological readiness and sectoral composition. As shown in Table 1, the downside risks to productivity growth following the COVID-19 crisis appear to prevail. However, productivity developments will also hinge on the implementation of appropriate crisis and post-crisis policy responses.

Digitalisation, intangible investment and productivity growth

Intangible investment and productivity growth

One of the defining features of the digital economy is the shift away from physical capital towards intangible capital. Intangible assets include computerised information (software, databases), innovative property (R&D, mineral exploration, copyrights and trademarks, product development,

⁴ Anderton et al (2020) show that for EU countries: (i) Competition enhancing product market regulation is associated with a higher degree of firm-churning (ii) firm-churning is positively related to higher productivity by facilitating the entry of new competitive firms and the exit of less productive ones.

⁵ Higher mark-ups and higher market concentration do not necessarily harm aggregate productivity. Aggregate mark-ups can rise due to reallocation from low mark-up to high mark-up firms, or increased within-firm pricing power (e.g. because competition is weaker). In the latter case, this would be harmful for productivity. See Baquaae and Fahri (forthcoming).

⁶ A sharp fall in venture capital activity (-38%) was documented in the US in the first two months after the COVID-19 outbreak (Howell et al. 2020).

⁷ See Benedetti Fasil, C., et al. (2020).

architectural and engineering designs) and economic competences (advertising, market research, training,

Table 1: **Summary of the channels by which COVID-19 affects productivity growth**

Channels		Potential positive drivers	Potential negative drivers
<i>Within-firm reallocation</i>	Hysteresis and human capital	Increase in digital take-up by individuals; incentive to training from reduced working hours	Labour hoarding; erosion in firm-specific human capital; deterioration of workers' skills in case of slow reallocation; disruptions to schooling and training; missing positive spillovers in the workplace.
	Investment		Falling investment due negative macroeconomic prospects
	Business-specific intangible assets		Business closures destroy e.g. buyer-supplier trust, employer-employee relations, organisational effectiveness
	Innovation and digitalisation	Digitalisation, e-commerce, e-government and e-health, new business models, higher automation, teleworking diffusing at large scale	Distraction, addiction and other negative effects of digitalisation
	Frictions in global value chains		Higher transaction costs; repatriation of activities might reduce efficiency, curtailed cross-country labour mobility.
	Macroeconomic burden		Fiscal/monetary consolidation in the medium term
<i>Reallocation across firms</i>	Firm size	Composition effect (exit of smaller, less productive firms)	
	Firm churning	Higher firm churning as low-productive firms exit the market and more productive firms enter or expand.	Higher concentration/lower competition, decline in early-stage venture capital reduces innovative start-ups, sizeable public support might go to "zombie" firms
	Financial constraints		Credit crunch risk, viable illiquid firms becoming insolvent
<i>Reallocation across sectors</i>	Changes in sectors' shares	Cross-sector reallocation of economic activity as some sectors shrink and others expand. The sign is difficult to predict due to differences across sectors and countries.	

management consulting).⁸ Intangible investment is key to enhance firms' innovation performance and productivity growth (Bontempi and Mairesse, 2015). R&D investment and digital technologies are also at the core of the response to the COVID-19 pandemic, as also discussed in the previous sections. However, the ability of an economy to invest in intangibles and

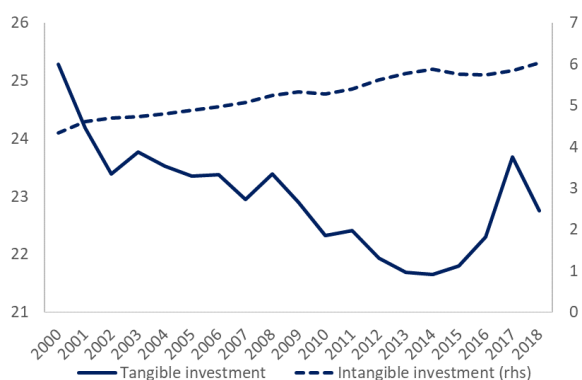
innovate depends on country-specific characteristics, including the countries' economic structure and economic policies, institutions and governance.

Intangible investment in G20 countries has been increasing relative to GDP over the period 2000-2018, and it was more resilient to the global financial crisis than tangible investment. Whereas, across the G20 countries for which data are available, intangible investment represents about 6%

⁸ Corrado et al. (2009)

of GDP compared to 23% for tangible investment (i.e. dwellings, infrastructure investments, machinery and equipment), the share of intangible investment in GDP has been increasing between 2000 and 2018. The share of tangible investment, instead, declined markedly over the same period (Graph 5). The increase in importance of intangible investment is explained, among other things, by the growing role of the knowledge economy and of ICT as well as the increasing share of services (which rely less on tangible assets) in the global economy.

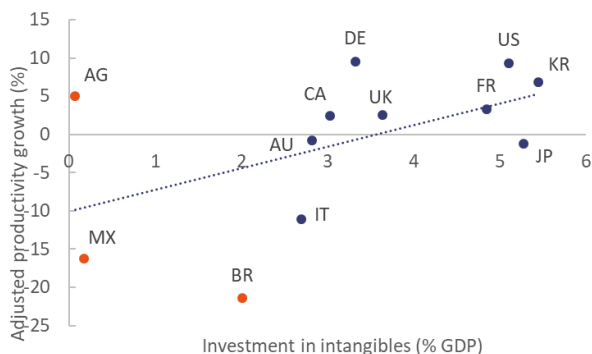
Graph 5: Intangible vs. tangible investments in selected G20 countries



Source: OECD.

Note: % of GDP. The G20 aggregate includes: AU, CA, FR, DE, IT, US, UK, BR, JP, KR, MX.

Graph 6: Intangible investments and productivity growth in selected G20 countries (2002-2017)⁹



Source: OECD, AMECO.

Note: "Intangible investment" proxied by R&D, software, databases. Productivity measured by TFP.

Investment in intangible assets is indeed positively associated to productivity growth. Data for a subset of G20 OECD countries suggest that intangible investments were on average higher in advanced

economies than in emerging market economies, and countries with higher intangible investment had higher productivity growth (Graph 6). Several studies indeed show that intangible capital is a driver of productivity growth and other measures of firms' performance, e.g. sales growth and innovativeness (Roth and Thum, 2013).

R&D investment, digital investment and skills acquisition are at the core of the productivity and competitiveness of an economy. R&D investment boosts innovation, by helping firms to develop new products, services or processes, or to improve existing ones (Crépon et al. 1998). ICT investment has a decisive effect on both the propensity to innovate and productivity gains. Once a new technology is produced, its diffusion throughout the economy and across firms is a key productivity driver, and skills acquisition is necessary for innovation absorption and diffusion (Diaz-Chao et al. 2015). It may be worth noting that half of the investment in intangibles is not accounted for in national accounts, e.g. advertising, market research and branding; design and product developments; purchased organisational capital; vocational training; and own-account organisational capital. Some estimates attribute to non-national accounts intangibles the bulk of productivity growth due to investment in intangibles in the business economy.¹⁰

Intangible assets have some specific characteristics affecting their financing and their use. Since they present informational asymmetries and large sunk costs, and are harder to pledge as collaterals, intangible investments face more financial constraints than tangible assets, and rely more on internal rather than external capital (Baum et al. 2013). Easing financing conditions may thus spur firms' productivity and more efficient resource allocation in intangible-intensive sectors.¹¹ Given the important role of intangible assets as driver of productivity growth and the challenges associated to their financing, the Italian G20 presidency with the collaboration of the OECD aims at delivering a policy toolkit for financing intangibles to boost productivity. Intangible assets present synergies and complementarities among them and with tangible assets (e.g. software, hardware and ICT training) and

⁹ Since productivity should grow more in countries with lower initial productivity, in figure 6 we control for initial productivity by regressing TFP growth over the whole period on initial TFP.

¹⁰ See section 4.2 in Sanchez Martinez et al. (2021).

¹¹ See, for instance, Demmou et al. (2019).

generate substantial network effects, so that early movers have a sizeable advantage.

Higher shares of knowledge-intensive sectors (which are, in part, endogenous to the structure of the economy) are also likely to lead to better productivity performance, since these sectors have higher R&D intensity, tend to innovate more and are more likely to adopt innovative products or processes due to e.g. network effects.

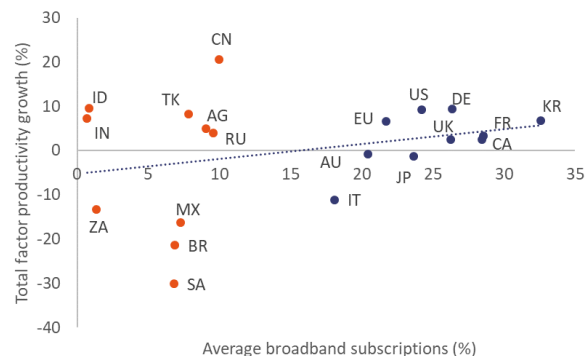
Digitalisation and productivity growth

The combination of declining aggregate productivity growth and progress in ICT in recent decades has given rise to the “productivity paradox” (Solow 1987). Contrary to what one would expect a priori, in fact, economic studies, especially those using data at the aggregate or sectoral level, have failed to find a strong positive empirical relationship between digitalisation and productivity growth.¹² In Graph 7, a positive link between the level of digital adoption (proxied by broadband subscription) and TFP growth in G20 countries could only be found over a long horizon (2002-2017), and does not necessarily suggest a causal relationship. Graph 7 also shows a divide between advanced and emerging market G20 countries, with the former having substantially higher level of digital adoption.

Aggregate developments hide important dynamics at the micro level. The presence of strong economies of scope favours the development of digital networks and gives incumbents strong competitive advantage (Crémer et al. 2019). Productivity dispersion across firms has increased, with a few frontier firms becoming more productive and a large mass of laggard firms with dismal productivity growth (Berlingieri et al. 2020). This suggests that technological diffusion has been weak. Divergence across firms has been stronger in highly digitalised industries, where winner-takes-all dynamics have compounded the rise of global technological champions, with increasing market concentration and mark-ups (Bajgar et al. 2019).

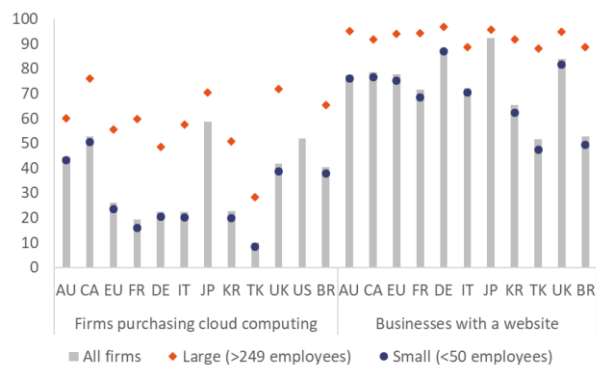
¹² The economic literature has provided a number of explanations for this paradox. Van Ark (2016) suggested that productivity benefits from ICT-related innovations do not yet show up in aggregate figures, and productivity effects will show up in the “deployment phase”. Ahmad and Schreyer (2016) mentioned possible measurement issues including prices in the services sector.

Graph 7: Digital adoption and productivity growth in G20 countries, 2002-2017 (*)



Source: World Development Indicators Penn World Tables and authors' calculations.
Note: AE in blue, EMEs in red. (*) After controlling for initial productivity. See fn. 9.

Graph 8: Digital adoption of businesses across the G20



Source: OECD.
Note: Firms with at least 10 employees. Latest available data (2017-2019 depending on the country).

Studies using firm level data disentangled the positive relationship between digital adoption and productivity (Gal et al. 2019). Digital technologies support productivity in combination with organisational capital, management skills, R&D and intangible investments, human capital and ICT-related skills, and a supportive regulatory environment. Different digital technologies are complementary, and productivity gains from digitalisation can show up with a lag. The relationship between digitalisation and productivity also tends to be higher in manufacturing than in services. Industries that are intensive in routine tasks present a stronger effect of digitalisation on productivity, which suggests that digital adoption can streamline production processes, reinforcing the view that it is a substitute for routine labour input.

The productivity gains from digitalisation were captured by few, highly productive firms

(Berlingieri et al. 2017). Digital adoption is consistently higher in large firms than it is in SMEs (Graph 8). Economic research has also found that the relationship between the adoption of digital technologies and productivity is stronger for highly productive firms, which are likely to benefit from organisational and technical skills. This implies that digitalisation might exacerbate the dispersion in firms' outcomes. Moreover, it confirms the view that there is an issue of technological diffusion. The digital revolution is thus creating new markets and changing existing markets in a way that challenges both competition policy and data protection, though increasing corporate market power in recent years has been rather a feature of advanced economies than emerging market economies (IMF 2018).

Digitalisation affects the demand for skills, and the lack of such skills can prevent countries from reaping all the benefits of digitalisation. An immediate consequence of digitalisation is higher demand for digital and technology-related skills. In this respect, science, technology, engineering and mathematics (STEM) skills, including ICT skills, are crucial. The demand for digital skills created by the digital transformation is however higher, since the widespread use of digital technologies makes some level of digital skills necessary for most jobs. This is the case for certain routine tasks that are more easily automated (e.g. accounting and clerical work). In addition, to complement technology and to adapt to changes in tasks and jobs, workers need a broad set of skills, which include non-cognitive ones like communication, managing skills, creativity, and critical thinking, the shortage of which may hinder the positive effects of digitalisation on productivity (Morandini et al. 2020).

Higher penetration of digital technologies also has labour market implications. Increasing technological adoption, including the development of artificial intelligence (AI), can displace jobs, but is also able to create new jobs. The displacement effect is stronger in routine tasks-intensive industries. At the same time, on balance, new technologies do not necessarily destroy jobs, since the overall effects of technologies on productivity and the overall wealth also create jobs elsewhere (Cappelli 2020). Instead, most likely digitalisation will have an impact on the distribution of earnings across sectors and skills, and the size of employment across sectors.

Digital Platforms

The previous section discussed the role of digitalisation in affecting productivity growth. As also identified by the Italian Presidency of the G20, one of the most defining features of the digital revolution, with potentially important effects on productivity, are digital platforms. For the purpose of this note, the term “digital platform” describes a range of services available on the internet including search engines, social media and communications services, marketplaces and app stores, payment systems or in general services comprising the “collaborative” or “gig” economy. These include, for example, digital labour platforms like Uber or Upwork, and online marketplaces like Amazon, social media platforms like Facebook, video-sharing platforms like YouTube, online search engines like Google, and digital payment services like PayPal. No matter what the service provided by digital platforms, these share three characteristics: (i) the use of ICTs to facilitate interactions between users, (ii) the collection and use of data about those interactions, and (iii) the generation of important network effects. Some large digital platforms may also act as “gatekeepers” when they have a strong economic position, significant impact on the market, a strong intermediation position, and an entrenched and durable position in the market.¹³

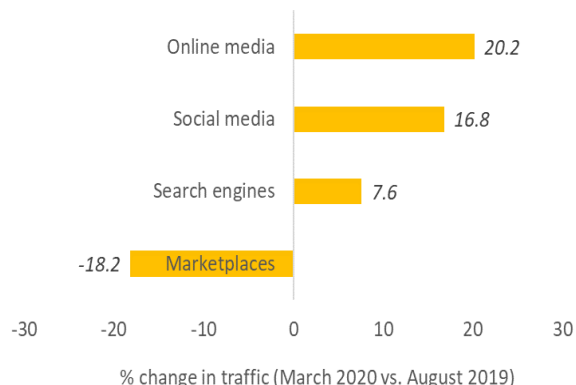
The economic significance of digital platforms can be assessed quantitatively but more granular data would be necessary. Data on revenues, traffic share and trade flows show that the economic significance of platforms has risen over time.¹⁴ Aggregate data are however not always telling, given there are important differences between digital platforms. An interesting example in this regard is the COVID-19 pandemic. Data on traffic share of digital platforms by sector in March 2020, the first month of lockdown for many countries, compared to August 2019 show that the use of online search engines, social media platforms and online entertaining

¹³ The EU's Digital Markets Act (See Section 5) refers to such large digital platforms as “gatekeepers”. https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/digital-markets-act-ensuring-fair-and-open-digital-markets_en.

¹⁴ Observatory on the Online Platform Economy (2020), Economic significance, <https://platformobservatory.eu/state-of-play/economic-significance/>

media increased, while the traffic share of online marketplaces decreased as immediate consequence of the pandemic outbreak. Consumers started spending less during the March 2020 lockdown and retail sales went down (Hartman 2020), although the closure of physical outlets boosted the services of online marketplaces and online grocery or food delivery digital platforms.^{15,16} The distribution of online traffic across industries also showed major changes. While online traffic for supermarkets increased by over 60%, the traffic share of tourism websites dropped by almost 50% (Graphs 9 and 10). Besides these differences, aggregate data for digital platforms can be distorted by the market share of the leaders.¹⁷ More granular data are needed for further assessing the economic impact of digital platforms.

Graph 9: Change in traffic by type of platform, March 2020 vs. August 2019



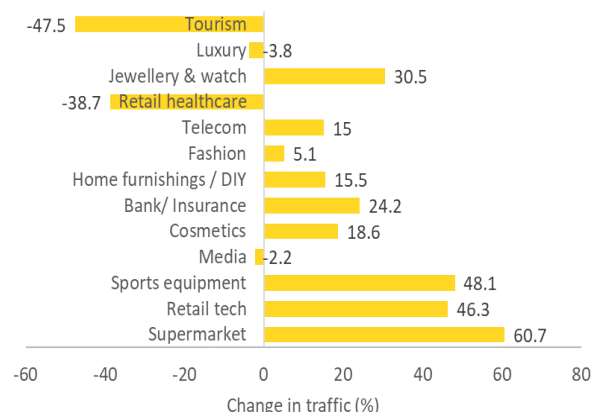
Source: Sokolyanskaya, Lechardoy (2020).

¹⁵ For example, between mid-March and mid-April 2020, Amazon has hired 175,000 workers in the U.S. to meet the increasing demand for online shopping. See <https://www.aboutamazon.com/news/company-news/amazon-has-hired-175-000-additional-people>.

¹⁶ In Europe, most national e-commerce associations indicated that the COVID-19 crisis will lead to a decline in sales and a release of staff (For details: <https://ecommercenews.eu/eu-ecommerce-associations-covid-19-leads-to-less-revenue/>). According to Ecommerce News Europe, Ecommerce in Europe is expected to be worth 717 billion euros at the end of 2020. That would mean 12.7% more than 2019, i.e. a growth than is almost 2 percentage points lower than the increase of the European ecommerce registered between the end of 2018 and 2019.

¹⁷ For example, as of January 2020 Facebook was the leader in the social media market in Europe, with a 70% share of traffic, and Google was the leading search engine, with a 94% share of traffic.

Graph 10: Change in traffic by type of industry, March 2020 vs. August 2019



Source: Sokolyanskaya, Lechardoy (2020).

Digital platforms contribute to innovation and productivity growth. They make learning, sharing, and profiting from good ideas and information easier and faster. A clear example is the app stores, which offer application programming interfaces and software development kits. By making it easier for developers to create and profit from ideas and innovations, app stores raise the incentive for app developers to invest in innovation. The platforms themselves can be major innovators too, including by generating new and improved business models (Evans and Gawer 2016). In addition, digital platforms enhance productivity by helping economies to allocate resources faster and more efficiently (OECD 2019a), mainly because of the enhanced competitive pressure that they bring. Platforms have been proved to be efficient at matching one side of a market with another side, in so doing putting resources to more productive uses.

Via stronger innovation and productivity, digital platforms could contribute to economic growth (Scott et al. 2018). First, the greater market access for retailers made possible by digital platforms translates into those retailers being able to contribute more to GDP, notably to the benefit of small and medium-sized enterprises (SMEs). Second, the greater competition in both input and output markets leads to lower prices as well as greater production and consumption. But there is a fundamental difference between types of platforms. “Aggregator” platforms that connect existing service providers to consumers (e.g. Booking.com, TheFork) tend to push up productivity, profits and employment of existing service firms. In contrast, more disruptive

platforms that enable new types of providers to compete with existing ones (e.g. Uber, Airbnb) were not found to have had a significant effect on the productivity of existing providers, but tended to reduce their mark-ups (which is positive for excessively concentrated markets), employment and wages (Bailin Rivares et al. 2019). Further analysis would be required to determine the factors that lead a platform to perform as aggregator or have disruptive effects on a market.

The relative novelty of digital platforms raises a number of questions and challenges both on the demand and supply side. On the supply side, digital platforms affect the organisation of production, including the organisation of work (OECD 2016). Keeping transaction costs low, digital platforms enable new suppliers to enter markets previously dominated by few large firms. In addition, workers in digital platform markets often benefit from low entry barriers and high flexibility. On the flip side, pay, job security, social protection, and upskilling options tend to vary greatly and may be poorer for people in a digital platform environment than for people in the same or similar sectors in the ‘traditional’ economy. In connection with this, there remain questions about the employment legal status of such people. A number of rulings in European courts have deemed these to be ‘false self-employed’. This might have consequences for those platforms’ business models which are found to be based on misclassification of workers as independent contractors, rather than employees. On the demand side, digital platforms have induced new consumption behaviours and fuelled trade in goods and services among peers. In contrast to traditional markets, consumers often take on a more active role in digital platforms, for example by providing reviews of or by producing and/or selling goods or services themselves. While ratings and reviews may support consumers’ choices, peer transactions challenge traditional consumer protection frameworks, raising additional policy questions (OECD 2017).

Some platforms may raise competition and privacy concerns. Beyond delivering innovative services, algorithms and big data may be used to increase market power and enable anti-competitive conduct. Given the characteristics of platforms, digital networks, and the data economy, it can be claimed that a number of established concepts, approaches and methodologies might need to be adjusted,

concerning e.g. market definition, the measure of market power, and the competition framework (Crémer et al. 2019). At the same time, high market concentration alone does not necessarily imply less competition. By the nature of digital platforms, size may at times bring benefits to users. For example, the quality of a search algorithm increases as more people use it. Still, few times have new entrants displaced or seriously challenged major platforms (OECD 2019a), suggesting challenges to competition *in* the market once competition *for* the market has taken place. Competition issues due to abuse of dominant position have also been raised concerning the activity of app stores.¹⁸

Lastly, many digital platforms run business models that enable practices that are not always accounted for in existing taxation frameworks. The OECD started to work on addressing the Tax Challenges of the Digital Economy in 2015 (OECD 2015a), and G20 Finance Ministers reached an agreement on the taxation of the digital economy in July this year, concerning both the reallocation of profits of multinational enterprises and a global minimum tax. The OECD/G20 Inclusive Framework is now working to finalize the design elements by October 2021.

Key policies for productivity growth in G20 countries in the current context

This note discussed how the COVID-19 pandemic is affecting productivity growth, and how digitalisation and intangible investment can contribute in the current context to unlock productivity. We now turn to the policy side. Appropriate and well-designed crisis and post-crisis policies are key to boost productivity and fully reap the gains from digitalisation. This section discusses productivity-enhancing policies, focusing on those that are particularly relevant in the current context. Some of these policies boost productivity growth regardless of the impact of COVID-19, but they are even more relevant in the current crisis since they foster resource reallocation. In the EU, the investments and structural reforms embedded in the national recovery and resilience plans under “Next Generation EU” will help Member States address key challenges. They will also support the digital transition, since a

¹⁸ See for example https://ec.europa.eu/commission/presscorner/detail/en/ip_21_2061.

minimum of 20% of the funds under the Recovery and Resilience facility will be geared to this objective.

The G20 Italian Presidency has included restoring productivity growth through digital transformation at the core of its priorities. The G20 will define a set of recommended policies for (i) inclusive digitalisation and reducing productivity gaps; (ii) maximising the productivity gains associated with the development and diffusion of digital platforms; and (iii) financing intangible assets, including through bank, equity, and government direct support.¹⁹

There is no single silver bullet policy for unlocking productivity growth, but rather there are productivity-friendly policy principles, requiring implementation at various government levels. Challenges to productivity growth and the optimal policy mix to enhance productivity also vary across G20 economies depending on country structures and initial/current situation. Broadly speaking, the key productivity drivers are (i) investments in innovation and infrastructure; (ii) human capital; (iii) digitalisation; (iv) a dynamic and supportive business environment. Graph 11 maps the key productivity drivers and policy principles.

Investments in innovation, infrastructure, and human capital

Investment in high-quality network infrastructure and innovation can have positive multiplier effects provided there is no overprovision (European Commission 2014). The transition towards greener and more digitalised economies will also require substantial investments. Lack of competition in network industries harms firms' competitiveness and growth in the network industry and among providers and customers of the network. Public policies should thus support public investment, also through public-private partnerships, and leverage private resources while improving the quality and the efficiency of infrastructure investment. Improving the quality and composition of public finance would be warranted.

Knowledge production and diffusion are key to boost productivity growth. Policies should foster intangible investment, while promoting a supportive business environment and an innovation-friendly regulatory framework. This includes striking a

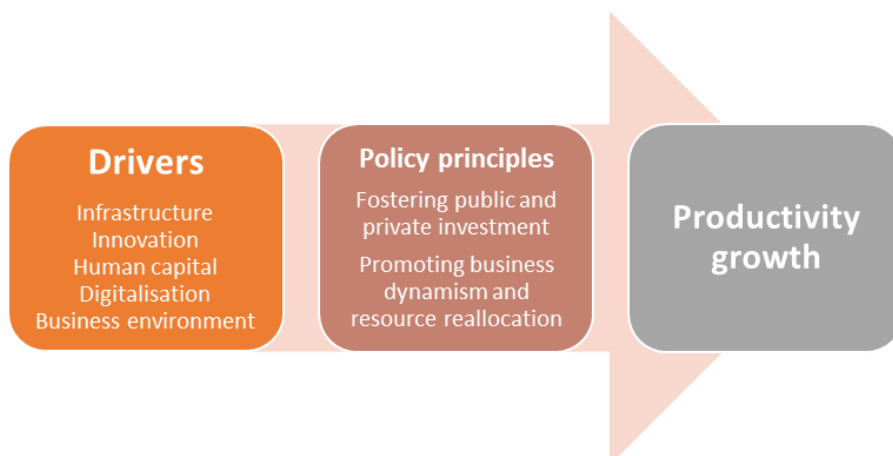
balance between promoting flexible and competitive markets and modernising intellectual property rights. In turn, investment in intangible capital, including education and life-long learning, can speed up knowledge creation and diffusion. Intangible investments could be fostered through direct public support (e.g. public R&D), tailored taxation schemes, public procurement and improving links between academia, industry, citizens and policymakers (Thum-Thysen et al. 2019).

Policy should maximise the potential benefits of digitalisation on productivity. First, appropriate investments in digitalisation are important. These include broader access to broadband connection, as well as investments in cloud computing services and other resource management services, which can unlock firm productivity. Second, effective education and training that provide attention to developing all the relevant cognitive and non-cognitive skills in education and training curricula at all levels contribute to the economy's readiness to adapt to technological transformations.

Adequate and efficient investment in education is key to innovation and productivity growth (OECD 2015b). As job skills requirements are on the rise, partly because of digitalisation, productivity will be more linked with education than in the past. High-quality and inclusive education programs, as well as lifelong learning, can equip the workforce with the skills needed for the digital transition, and reduce skills gaps and mismatches. Training should also target the management of SMEs to facilitate adoption of new technologies and adaptation of production processes. Investments in human capital will also be crucial to ensure that the educational fallout due to the COVID-19 containment does not turn into a permanent drag for some groups of students. This is relevant since the forced move to distance learning may have exacerbated inequalities. In July 2020, the European Commission launched the European Skills Agenda, which acknowledges the higher demand for digital skills. It also includes a dedicated action to contribute to the required increase of STEM graduates.²⁰

¹⁹ Annex I reviews G20 work on productivity in recent years.

²⁰ European Skills Agenda - Employment, Social Affairs & Inclusion - European Commission. <https://ec.europa.eu/social/main.jsp?catId=1223>.

Graph 11: **Productivity drivers and productivity-enhancing policy principles**

Digitalisation

The digitalisation of the economy and its acceleration due to COVID-19 present challenges that need to be addressed with the appropriate policies. These challenges are in particular the increasing market concentration in sectors with high digital content and the issue of data protection. The latter is even more important as both governments and firms have quickly increased their activities online due to the COVID-19 pandemic. The current crisis has especially benefitted some digital companies, which have increased their market shares and profits while most traditional businesses were struggling.²¹ Policy should strike the balance between data protection (to address privacy concerns) and data access (to facilitate the flow of information and prevent winner-take-all dynamics in ICT). In addition, also for a matter of fairness, ensuring that all companies, including digital multinational ones, pay their share of taxes is also a priority.

These issues also concern the development of online platforms. Digital platforms are increasingly important for the economy, as discussed in the previous section. Finding the balance between consumer protection, data privacy and access to data to foster competition is crucial.²² Policy should also

²¹ See for example the Financial Times series “Companies prospering in the pandemic”, <https://www.ft.com/content/d298bf34-9644-4b49-be09-c775256639ba>.

²² For further information on the EU’s regulatory response to the challenges and risks arising from the platform economy see <https://ec.europa.eu/digital->

ensure a fair relation between large platforms and their small business users to avoid abuses of dominance, where such market position exists, or to tackle behaviour by gatekeeper platforms that could undermine contestability of markets in the digital sector or is unfair. The Commission proposed the Digital Markets Act with a series of obligations and prohibitions on such gatekeeper platforms to address some of these issues. At the same time, the Commission will continue with the vigorous enforcement of EU competition rules, which the Digital Markets Act complements. It is also necessary to build up statistics that are able to capture the differences among digital platforms and their evolution, with a view to improving collective decision-making.

In December 2020, the European Commission proposed a comprehensive set of new rules for digital services that operate in the EU that will foster innovation, growth and competitiveness and will provide users with new, better and reliable online services. The Digital Services Act and the Digital Markets Act are two draft Regulations that aim at (i) a safer and fairer online environment for users; (ii) a level playing field that will allow innovative digital businesses to grow and compete globally. The draft Regulations provide a benchmark for regulating digital services with clear obligations tailored to the societal and economic importance of the online platforms and their availability and reach to consumers. The new rules support the scaling up of smaller platforms, SMEs and start-ups, facilitate access to customers across the single market while

single-market/en/news/how-do-online-platforms-shape-our-lives-and-businesses-brochure.

lowering compliance costs and prohibit unfair conditions; they also tackle dissemination of illegal content and the sale of illegal goods and services through platforms, expected to be partially substituted by legal activities and fostering growth for lawful businesses. They will therefore contribute to foster innovation and the growth of digitalisation across the EU while tackling unfair behaviour by gatekeeper platforms that could undermine contestability of markets in the digital sector. Finally, the new rules provide a framework for the provision of data from very large online platforms to vetted researchers and public authorities, which is critical for investigations on the online systemic societal risks as well as for risk mitigation (European Commission 2020b).

Providing a supportive business environment

A supportive business environment facilitates business dynamism (Calvino et al. 2020). Reforms that can unlock productivity growth include lowering the barriers to firm entry, growth and exit, including regulatory red tape; promoting openness to trade and foreign direct investment; implementing strong competition law and policy, including well-calibrated intellectual property rights, and making the labour and product market more responsive to economic conditions. Increasing public administration efficiency is also crucial, e.g. by promoting effective public procurement and legislative simplification, enhancing transparency, and increasing the availability of e-government services. Insolvency regimes should facilitate restructuring to ensure that viable business parts are preserved and include “second chance” provisions.

Access to finance is important, especially for young and innovative firms and to prevent liquidity issues to turn into solvency problems. Lack of sources of finance alternative to bank financing reduce investment possibilities, hindering innovation and firm growth. Facilitating access to finance also implies fostering the development of sources of finance alternative to banking (e.g. crowdfunding, venture capital, etc.). Financial systems should ensure efficient capital allocation and prevent bubbles. Easing access to finance and liquidity to viable firms is especially relevant to overcome the COVID-19-related crisis.

The international dimension

Productivity-enhancing policies have a strong country dimension but there are benefits from international cooperation. Challenges to productivity growth are, to a certain extent, country-specific and many of the policies described in this note are defined by national regulations and preferences. However, given the high international economic and financial integration and the borderless nature of technological progress, international cooperation can contribute to maximise the benefits from productivity-enhancing policies. The Menu of Policy Options on the Future of Work developed under the 2018 G20 Argentinian presidency provided some avenues for international cooperation, in particular (i) knowledge sharing (i.e. sharing best practices); (ii) improved coordination (e.g. developing new and internationally comparable relevant statistics); and (iii) common efforts (e.g. joint initiatives for investment in R&D and frontier innovation, measures for knowledge diffusion). Moreover, the work at international level should help identifying productivity-enhancing policies in view of the follow-up, update, and report on the G20 Action Plan to support the global economy through the COVID-19 pandemic. International discussions should help to strike the balance between fostering digitalisation and innovation and addressing the challenges it entails, as discussed in this note. Finally, filling data gaps to enable more evidence-based policy decisions would be desirable.

References

- Acemoglu, D. and Restrepo, P. (2020). “Robots and Jobs: Evidence from US Labor Markets” *Journal of Political Economy*, 128 (6).
- Afman, E. (2021), "Impact of Covid-19 on productivity in the medium-run: An assessment of transmission mechanisms," forthcoming.
- Ahmad, N. and Schreyer, P. (2016) "Are GDP and Productivity Up to the Challenges of the Digital Economy?," *International Productivity Monitor*, Centre for the Study of Living Standards, vol. 30, pages 4-27, Spring.
- Anderton, R., Di Lupidio, B. and Jarmulska, B. (2020), “The impact of product market regulation on productivity through firm churning: Evidence from European countries.” *Economic Modelling* vol. 91, pp. 487-501.
- Anderton, R., Jarvis, V., Labhard, V., Morgan, J. Petroulakis, F., and Vivian, L. (2020), “Virtually everywhere? Digitalisation and the euro area and EU economy”, *ECB Occasional Paper* 244.
- Ark, Bart van (2016), “The Productivity Paradox of the New Digital Economy” *International Productivity Monitor*, 31, Fall, pp. 1-15
- Bailin Rivares, A., Gal, P., Millot, V., and Sorbe, S. (2019), *Like It Or Not? The Impact Of Online Platforms On The Productivity Of Incumbent Service Providers*, Economics Department Working Papers No. 1548, OECD.
- Banerjee, R., Illes, A., Kharroubi, E., and Serena, J.-M. (2020), *COVID-19 and corporate sector liquidity*, *BIS Bulletin* No 10, 28 April 2020.
- Baum, C.F., Caglayan, M. and Talavera, O. (2013), "The Effects of Future Capital Investment and R&D Expenditures on Firms' Liquidity," *Review of International Economics*, 21(3), 459–474.
- Baqae, D., and Farhi, E., *forthcoming*. “Productivity and Misallocation in General Equilibrium”, *Quarterly Journal of Economics*.
- Benton, M., Batalova, J., Davidoff-Gore, S. and Schmidt, T. (2021) “COVID-19 and the State of Global Mobility in 2020”, *Migration Policy Institute and International Organization for Migration*, Washington, D.C., and Geneva, <https://publications.iom.int/books/covid-19-and-state-global-mobility-2020>.
- Berlingieri, G., P. Blanchenay, and Criscuolo, C. (2017), *The great divergence(s)*, *OECD Science, Technology and Industry Policy Papers*, No. 39, OECD Publishing, Paris.
- Berlingieri, G., Calligaris, S., Criscuolo, C., and Verlhac R. (2020) “Laggard firms, technology diffusion and its structural and policy determinants” *OECD Science, Technology and Industry Policy Papers* 86.
- Benedetti Fasil, C., P. Sedláček and V. Sterk (2020) *EU start-up calculator: impact of COVID-19 on aggregate employment. Scenario analysis for Austria, Belgium, Germany, Hungary, Italy and Spain*, *Publications Office of the European Union*, Luxembourg, ISBN 978-92-76-21710-7, doi:10.2760/049945, JRC121715.
- Bloom N., Jones C. I., Van Reenen J., and Webb, M. (2020), *Are ideas getting harder to find?*, *American Economic Review*, 110(4): 1104–1144.
- Bontempi, M.E. and Mairesse, J. (2015) “Intangible capital and productivity at the firm level: a panel data assessment”, *Economics of Innovation and New Technology* 24(1–2), pp. 22–51.
- Calligaris, S., Criscuolo, C., D’Adamo, G., Gonne, N., Ravet, J. and Verlhac, R. (2020), *The bottom also matters: policies for productivity catch-up in the digital economy*, in *Science, Research and Innovation Performance of the EU (SRIP) report 2020*, European Commission.

Calvino, F., Criscuolo, C. and Verlhac, R. (2020) “Declining business dynamism”, OECD Science, Technology and Innovation Policy Papers No. 94, OECD Publishing.

Cappelli, P. (2020), The consequences of AI-based technologies and jobs. European Commission, R&I paper series working paper 2020/04.

Corrado, C., Hulten, C., and Sichel, D., 2009. Intangible capital and US economic growth, in: *Review of Income and Wealth*, 55(3), 661-685.

Crémer, J., de Montjoye, Y.-A. and Schweitzer, H. (2019), “Competition policy for the digital era”, Directorate General for Competition, European Commission.

Crépon, B., Duguet, E., and Mairesse, J. (1998), Research, Innovation and Productivity: An Econometric Analysis At The Firm Level, *Economics of Innovation and New Technology*, 7(2): 115-158.

Demmou, L., Stafanescu, I, and Arquie, A. (2019), Productivity growth and finance: the role of intangible assets - a sector level analysis, Economics department working papers no. 1547.

Di Mauro, Syverson (2020) The COVID crisis and productivity growth <https://voxeu.org/article/covid-crisis-and-productivity-growth>.

Díaz-Chao, A., Sainz-González, J., and Torrent-Sellens, J. (2015), ICT, innovation, and firm productivity: New evidence from small local firms. *Journal of Business Research* 68(7): 1439-1444.

European Commission (2014), Infrastructure in the EU: Developments and Impacts on Growth, European Economy, Occasional Papers 203.

European Commission (2018), "The 2018 Ageing Report: Economic and Budgetary Projections for the EU Member States (2016-2070)", European Economy, Institutional Paper 079.

European Commission (2020) “Proposal for a Regulation of the European Parliament and of the Council on a Single Market For Digital Services (Digital Services Act) and amending Directive 2000/31/EC”. <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020PC0825&from=en>

European Commission (2021a), “The sectoral impact of the COVID-19 crisis”, *Note to the Eurogroup*.

European Commission (2021b), *EU competitiveness: Recent trends, drivers, and links to economic policy. A Synthesis Report*, JRC Technical Report.

Evans, P., and Gawer, A.(2016), The Rise of the Platform Enterprise: A Global Survey, https://www.thecge.net/app/uploads/2016/01/PDF-WEB-Platform-Survey_01_12.pdf.

Gal, P., Nicoletti, G., Renault, T., Sorbe, S. and C. Timiliotis (2019) “Digitalisation and productivity: in search of the Holy Grail – Firm-level empirical evidence from European countries”, OECD Economics Department Working Paper No. 1533

Gordon R. J. (2012), Is US economic growth over? Faltering innovation confronts the six headwinds, CEPR Policy Insight No. 63.

Hartman, M. (2020), Consumers are buying less while shopping online more, Marketplace, 14/05/2020, <https://www.marketplace.org/2020/05/14/consumers-are-buying-less-while-shopping-online-more/>.

Howell, S. T., Lerner, J., Nanda, R., and Townsend, R. R. (2020), Financial Distancing: How Venture Capital Follows the Economy Down and Curtails Innovation, NBER Working Paper No. 27150. <https://www.nber.org/papers/w27150>.

International Monetary Fund (2018) *World Economic Outlook: Growth Slowdown, Precarious Recovery*. Washington, DC, April.

Leung, D., Meh, C. and Terajima, Y. (2008) “Firm size and productivity”, Bank of Canada WP 2008/45.

Kozłowski, J., Veldkamp, L. and V. Venkateswaran (2020) “Scarring Body and Mind: The Long-Term Belief-Scarring Effects of COVID-19”, Federal Reserve Bank of St. Louis Working Paper 2020-009.

Morandini, M.C., Thum-Thysen, A., and Vandeplass, A (2020), *Facing the Digital Transformation: are Digital Skills Enough?* *European Economy – Economic Briefs* 054.

OECD (2015a), *Addressing the Tax Challenges of the Digital Economy, Action 1 – 2015 Final Report*, OECD/G20 Base Erosion and Profit Shifting Project, OECD Publishing, Paris.

OECD (2015b), *The future of Productivity*, OECD Publishing, Paris.

OECD (2016), *New forms of work in the digital economy*, OECD Digital Economy Papers, No. 260, OECD Publishing, Paris.

OECD (2017), *Trust in peer platform markets: Consumer survey findings*, OECD Digital Economy Papers, No. 263, OECD Publishing, Paris.

OECD (2018a), *Summary of Workshop on Protecting Consumers in Peer Platform Markets*, DSTI/CP(2018)4/FINAL, OECD, Paris.

OECD (2019a), *An Introduction to Online Platforms and Their Role in the Digital Transformation*, OECD Publishing, Paris.

Oreopoulos, P., Till, v.W., and Heisz, A. (2012), *The Short- and Long-Term Career Effects of Graduating in a Recession*, *American Economic Journal: Applied Economics*, 4 (1): 1-29.

Roth, F. and Thum, A.E. (2013), *Intangible Capital and Labor Productivity Growth: Panel Evidence for the EU from 1998–2005*, *Review of Income and Wealth*, 59(3): 486-508 and references therein.

Sanchez Martinez, M., Bauer, P. and Genty, A. (2021) "Potential factors behind the observed productivity stagnation in the EU," chapter 4 in European Commission, *EU competitiveness: recent trends, drivers, and links to economic policy. A Synthesis Report*, JRC Technical Report JRC123232.

Simons, W., Archanskaia, L., Nikolov, P., Canton, E. and Hobza, A. (2020) “Illiquidity and Productivity”, European Commission, internal note.

Scott, M. et al. (2018), *Contribution to growth: The European Digital Single Market. Delivering economic benefits to citizens and businesses*, Study for the Committee on the Internal Market and Consumer Protection, Policy Department for Economic, Scientific and Quality of Life Policies, European Parliament, Luxembourg.

Sokoljanskaya, A. and L. Lechardoy (2020), “COVID-19 and online platform economy”, Observatory on the Online Platform Economy, <https://platformobservatory.eu/news/covid-19-and-online-platform-economy/>.

Solow, R (1987), “We'd better watch out”, *New York Times Book Review*, July 12, 1987, page 36.

Summers L.H. (2015), *Demand-side Secular Stagnation*, *American Economic Review*, 105 (5): 60-65.

Thum-Thysen, A., Voigt, P., Bilbao-Osorio, B., Maier, C. and Ognyanova, D. (2019) "Investment dynamics in Europe: Distinct drivers and barriers for investing in intangible versus tangible assets?" *Structural Change and Economic Dynamics* 51(C), pp. 77-88.

ANNEX: Previous G20 work on productivity

The need for policies aimed at reviving productivity growth was already highlighted in the Communiqués of the February 2013 and September 2015 G20 Finance Ministers and Central Bank Governors (FMCBG).²³

In 2016, under the Chinese presidency, the G20 Framework Working Group (FWG) developed the Enhanced Structural Reform Agenda (ESRA), recognising the essential role of structural reforms in boosting productivity and potential output and fostering inclusive growth. The key objective was, however, labour productivity, and the digitalisation angle was not explicitly included among the key areas of actions and principles.

The ESRA identified nine priority areas for structural reforms: (1) promoting trade and investment openness; (2) advancing labour market reform, educational attainment and skills; (3) encouraging innovation; (4) improving infrastructure; (5) promoting competition and an enabling business environment; (6) promoting fiscal reform; (7) improving and strengthening the financial system; (8) enhancing environmental sustainability; (9) promoting inclusive growth. The FWG developed a system of indicators to assess and monitor the progress and effectiveness of G20 members' structural reforms. Labour productivity was the key outcome indicator for the first five areas.

In addition to the ESRA, under the 2017 German G20 presidency the FWG developed twelve resilience principles over five broad themes: real sector, public finance, private finance, monetary policy, and external sector. Resilience principle n. 2, "Promote productivity growth and entrepreneurship", included four components:

- I. Refer to the guiding principles of the ESRA priority areas on promoting competition and an enabling environment, encouraging innovation and improving infrastructure.
- II. Promote capital reallocation by fostering competition and facilitating market entry and exit.
- III. Monitor and evaluate subsidy programmes to assess whether they risk being obstacles to structural change.
- IV. Promote financial inclusion.

Promoting competition and an enabling environment: Strengthen competition law and enforcement. Reduce administrative and legal barriers to starting and expanding a business. Promote a level playing field for market competition. Implement efficient bankruptcy procedures. Reduce restrictive regulations that impair competition, lessen the excess burden of regulatory compliance and apply sound oversight of regulatory policy. Enhance the rule of law, improve the efficiency of the judicial system and fight against corruption.

Encouraging innovation: Ensure and sustain research and development expenditures. Raise effectiveness and efficiency of research and development and innovation support policies. Strengthen collaboration between research institutions/universities and industry. Improve international research cooperation. Improve access to early-stage venture capital.

Improving infrastructure: Raise the quality of public infrastructure investment and promote private sector participation including through the use of Public-Private Partnerships (PPPs). Raise the efficiency of regulatory approval processes for infrastructure projects, while ensuring transparent bidding processes. Promote the use of cost-benefit and value-for-money analysis, possibly supplemented by multi-criteria analysis, for public infrastructure projects. Reduce institutional and regulatory barriers for long-term investment financing by institutional investors and promote new financial instruments while ensuring financial stability.

²³ February 2013 FMCBG Communiqué: "We reaffirm our commitment to (...) pursue structural reforms [and] improving productivity". September 2015: "[W]e will also continue to consider the composition of our budget expenditures and revenues to support productivity, inclusiveness and growth."

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(ECFIN Economic Briefs)
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