Grant agreement No. 822390

MICROPROD

Raising EU Productivity: Lessons from Improved Micro Data

H2020-SC6-TRANSFORMATIONS-2018
Supply and demand-oriented economic policies to boost robust growth in Europe –
Addressing the social and economic challenges in Europe

Deliverable 6.2

Policy contribution summarising the interim findings of the project

WP 6 – Macroeconomic and policy underpinnings of productivity. Implications for future economic policies

Due date of deliverable	Month 24 – December 2020
Actual submission date	22/12/2020
Start date of project	01/01/2019
Duration	36 months
Lead beneficiary	BRUEGEL
Last editor	Gregory Claeys & Maria Demertzis (BRUEGEL)
Contributors	BRUEGEL

Dissemination Level		
PU	Public	X
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

This Project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 822390.

Disclaimer

The content of this deliverable does not reflect the official opinion of the European Union. Responsibility for the information and views expressed herein lies entirely with the author(s).

History of the changes

Version	Date	Released by	Comments
0.1	23-11-2020	Gregory Claeys & Maria Demertzis	First draft sent out to the consortium
0.2	06-12-2020	Gregory Claeys & Maria Demertzis	Second and final draft sent out to the consortium
1.0	22-12-2020	Gregory Claeys & Maria Demertzis	Final draft to submit

Table of contents

Key word list

Productivity; growth; macroeconomic; globalisation; digitalisation; productivity shocks; intangible capitals; international trade; Global Value Chains;

Definitions and acronyms

Acronyms	Definitions
CMU	Capital Markets Union
ECB	European Central Bank
GAFAs	Google, Amazon, Facebook and Apple
GVC	Global Value Chain
GDP	Gross domestic product
ICT	Information and communication technologies
R&D	Research and development
SME	Small medium enterprise
STEM	Science, technology, engineering and mathematics
TFP	Total factor productivity

1. Introduction

1.1. General context

The Deliverable D6.2 is part of a set of papers to be developed within WP6. In particular, D6.2 represents a mid-term check point to assess the interim findings of the project and to explore the impact of the results achieved in the policy debate.

1.2. Deliverable objectives

This deliverable summarises the main conclusions of the MICROPROD papers submitted so far and how these inform the current policy debates.
Specifically, 20 papers have been analysed, which tackle the following four broad issues: (i) the measurement and effects of intangible capital; (ii) globalisation, international trade and the integration of Global Value Chains (GVCs); (iii) factor allocation and allocative efficiency and (iv) identify some of the social consequences of these two broad shocks.

2. Methodological approach

This paper summarises the main conclusions of the 20 MICROPROD papers submitted so far and how these papers inform the current policy debates at the European level.

3. Summary of activities and research findings

In this midterm policy brief, we review the 20 papers delivered so far by MICROPROD researchers. These papers contribute to four broad issues relevant for today's policy debates: the measurement and effects of intangible capital on productivity, the impact of globalisation, international trade and the integration of Global Value Chains (GVCs) on productivity, factor allocation and allocative efficiency and finally the social consequences of these two structural shocks that Europe faced in the last two decades: globalisation and technological progress.

4. Conclusions and future steps

Overall, MICROPROD papers shed light on the effects of the two main structural changes over the past 20 year on productivity: first, globalisation and the opening of China and second the increasing digitalisation-automation of the economy. Their main contributions are to point to both aggregate effects, how they affect productivity but also to highlight that there are distributional effects that are important for good societal outcomes.

This policy brief will be followed by papers summarising policy implications for each work package, that will be delivered in the last year of the project.

5. Publications resulting from the work described (if applicable)

This paper will be also published as a Bruegel policy contribution.

6. Bibliographical references (*if applicable*)

Abele C., A Benassy-Quéré and L. Fontagné, (2020) 'One Size Does Not Fit All: TFP in the Aftermath of Financial Crises in Three European Countries', MICROPROD Deliverable 6.6

Allen F. and D. Gale (1999) 'Diversity of Opinion and Financing of New Technologies', Journal of Financial Intermediation, vol. 8, pp. 68-89.

Altomonte, C., D. Favoino, M. Morlacco, T. Sonno (2020) 'Markups, Intangible Capital and Heterogeneous Financial Frictions', MICROPROD deliverable D1.4.

Altomonte, C. and A. Coali (2020) 'Employment, Productivity and Import Shock: Evidence from the European Manufacturing Industry', MICROPROD deliverable D5.2

Anelli M., I. Colantone, P. Stanig (2020) 'We Were the Robots: Automation and Voting Behavior in Western Europe', MICROPROD deliverable D5.5

Beck, T., R. Dottling, T. Lambert and M. van Dijk (2020) 'Liquidity creation, investment, and growth', CEPR Discussion Paper 14956, June.

Bergeaud, A., G. Cette and R. Lecat (2016) 'Productivity Trends in Advanced Countries between 1890 and 2012', Review of Income and Wealth. vol. 62(3), pages 420–444.

Békés G., M. Koren, B. Muraközy, and A. Telegdy (2019) 'The nature of buyer-supplier relationships: Lessons from the Central European Supplier Survey', MICROPROD deliverable D2.2.

Bighelli, T., F. di Mauro, M. Melitz and M. Mertens (2020) 'Firm Concentration and Aggregate Productivity', Firm Productivity Report, CompNet.

Bisztray M., B. Muraközy, D. Vonnák (2020) 'Analysis of the importance of intangible capital and knowledge for productivity measurement', MICROPROD deliverable D1.5a.

Bloom N., J. Van Reenen, and H. Williams (2019) 'A Toolkit of Policies to Promote Innovation', *Journal of Economic Perspectives*, Volume 33, Number 3, Summer 2019, pp163–184

Bolatto, S., A. Naghavi, G. Ottaviano K. Zajc Kejzar (2019) 'Intellectual Property and the Organization of the Global Value Chain', MICROPROD deliverable D2.4.

Braeuer R., M. Mertens and V. Slavtchev (2020) 'Import Competition and Firm Productivity: Evidence from German Manufacturing', MICROPROD deliverable D2.3.

Cameron, A., G. Claeys, C. Midões and S. Tagliapietra (2020) 'A Just Transition Fund – How the EU budget can help with the transition', prepared for the Committee on Budgets (BUDG) of the European Parliament, 2020.

Corrado, C., C. Hulten and D. Sichel (2005) 'Measuring capital and technology: an expanded framework', in *Measuring capital in the new economy*, University of Chicago Press, pp. 11–46.

Cycon L., M. Koetter, B. Meller (2020) 'Tracking the real effects of monetary policy: Evidence from European Central Bank's SMP purchases', MICROPROD deliverable D4.4.

Del Boca, D, N Oggero, P Profeta and M C Rossi (2020), 'Women's work, Housework and Childcare, before and during COVID-19', *COVID Economics: Vetted and Real-Time Papers*, Issue 28: 70-90.

De Loecker, J., J. Eeckhout and G. Unger (2020) 'The rise of market power and the macroeconomic implications', The Quarterly Journal of Economics 135(2) pp561-644.

Demertzis, M. and N. Viegi (2020), 'Low interest rates and productivity in the EU and the US: One Trend, Two Stories', MICROPROD deliverable, D6.1.

Deng L., P. Krishna, M.Z. Senses, J. Stegmaier (2020) 'Imports, Exports and Income Risk', MICROPROD deliverable D5.3.

Di Mauro F., F. Hassan and G. Ottaviano (2020) 'Financial Markets and the Allocation of Capital: The Role of Productivity', MICROPROD deliverable D4.2.

Furman, J. (2018) 'Market Concentration', Hearing on Market Concentration, OECD, 7 June.

Gropp R., S. Ongena, J. Rocholl, V. Saadi (2020) 'The Cleansing Effect of Banking Crises', MICROPROD deliverable D4.3.

Hsu, P.-H., X. Tian and Y. Xu (2014) 'Financial development and innovation: Cross-country evidence', Journal of Financial Economics 112(1): 116–135.

Kaus, W., Slavtchev, V., and Zimmermann, M. (2020). Intangible Capital and Productivity. Firm-Level Evidence from German Manufacturing. IWH Discussion Paper No 1/2020. MICROPROD deliverable D1.5b.

Lindner A., B. Muraközy, B. Reizer, R. Schreiner (2020) 'Technological Change and Skill Demand in Non-Competitive Labor Markets', MICROPROD deliverable D5.4.

Philippon T. and N Véron (2008) 'Financing Europe's Fast Movers', Bruegel Policy Brief, n° 2008/01.

Müller S., Neuschäffer G. (2020) 'Worker Participation in Decision-making, Worker Sorting, and Firm Performance', IWH Discussion Papers No. 11/2020, MICROPROD deliverable D5.1

Slavtchev V. (2020a) 'Import competition and allocative efficiency', MICROPROD deliverable D4.1.

Slavtchev V. (2020b) 'Import Competition and Firm Innovation: Evidence from German Manufacturing', MICROPROD deliverable D3.4.

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

Smeets V. and F. Warzynski (2020) 'ICT, Firm Growth and Productivity', MICROPROD deliverable D3.2.

Summers, L.H. (2013) 'Speech at the IMF 14th Annual Research Conference in Honor Of Stanley Fisher', International Monetary Fund, 8 November

Van Reenen J. (2018) 'Increasing Differences between firms: Market Power and the Macro-Economy', San Francisco Fed, mimeo, August 31.

The productivity paradox: drawing lessons from MICROPROD to inform policy

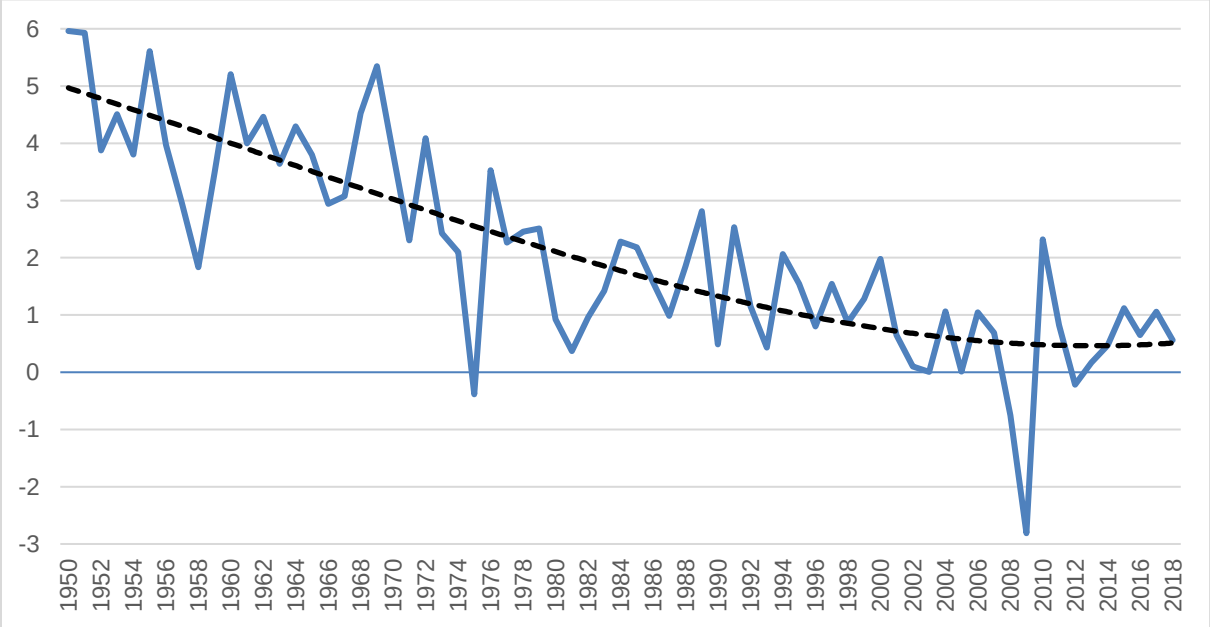
Grégory Claeys, Maria Demertzis
Bruegel

22 December 2020

1. Introduction

The yearly measure of total factor productivity (TFP) growth in what is now the euro area has been on a clear downward trend from around 5 percent per year in the early 1950s to as low as half a percent in recent years (Figure 1). Technological progress has continued and GDP growth has not fallen as much as productivity, so this constitutes a paradox and is the main motivation behind this stream of research.

Figure 1: Euro-area total factor productivity (TFP) annual growth and trend (in %)



Source: Bergeaud et al (2016), database updated in 2019 available at http://www.longtermproductivity.com/.

Productivity growth is a crucial source of output growth, particularly in an aging society like the European Union. In the face of this slowdown, three main policy questions arise. First do we know that the slowdown is really happening, or are there measurement issues that lead to underestimation of the underlying potential? Second, what drivers have put a secular downward pressure on productivity during the past 70 years? Third, what are the main consequences of this slowdown for our economic model and for citizens' welfare?

Alternative theories attempt to explain the slowdown. The secular stagnation hypothesis explains the current slowdown as a savings-investment imbalance caused by various factors (including demographics and the rise in inequality), which have led to a global savings glut and

underinvestment. Macroeconomic policies, both fiscal and monetary, have been prescribed as the cure for this imbalance (Summers, 2013). However, the past decade has seen very active macroeconomic management that has not reversed the secular productivity trend. This means that it is also crucial to deal with the underlying structural issues. In particular, we need to understand fully how digitisation has changed underlying market structures. In digitalised sectors, the much-reduced need for physical capital, alongside first-mover advantage, have led to some firms claiming significant market shares. The resulting concentration and monopoly power have implied less competition and the extraction of rents. And as globalisation has also removed barriers to foreign markets, domestic dominance has also allowed firms to expand their market shares globally. A large part of the literature that studies the trend shown in Figure 1 tells us that all of this is reinforced in an environment of low and declining interest rates. As interest rates are expected to be low for a long time, banks will continue to find it difficult to do maturity transformation. At the same time, zombie firms will survive longer therefore slowing down the process of creative destruction and market leaders will manage to exploit strategic advantages even more to sustain their market power.

Some of these explanations are global in nature, and therefore can be used to explain movements in all countries. But there are also significant differences in country structures that need to be accounted for before policy prescriptions can be made. The objective of MICROPROD, a research project involving researchers from multiple European research institutions and national statistical institutes, is to contribute to this debate by using data from various European countries to study the microeconomic mechanisms behind these macroeconomic phenomena. The aim is to understand the challenges posed to Europe by the fourth industrial revolution and its impact on productivity in a context of globalisation and digitisation, and to provide policy options to address these challenges. Importantly, a number of MICROPROD papers aim to understand distributional aspects of both digitisation and globalisation and point to the policy trade-offs that may arise between maximising efficiency and achieving sustainable distributional societal outcomes. Last, MICROPROD has put substantial resources into collecting and measuring firm-level micro data at the EU level, which can be used across and between countries. This is a very important step in order to obtain accurate and comparable data that can guide policies at national and EU levels.

Broadly speaking, MICROPROD has studied the two main productivity shocks of the last 20 years: digitalisation and globalisation. This MICROPROD midterm policy brief reviews 20 project papers[1] that cover four broad issues: the measurement and effects of intangible capital; globalisation, international trade and the integration of global value chains (GVCs); factor allocation and allocative efficiency; and some of the social consequences of these two broad shocks. This paper summarises the main conclusions of the MICROPROD papers submitted so far, and how these inform current policy debates.

But the mid-point of the three-year MICROPROD project coincided also with the start of the COVID-19 pandemic, which has accelerated some trends and possibly reversed others. At the macro level, we are experiencing a very serious global recession that in the EU translates into GDP falls between 4 percent and 12 percent in different countries. Initially, the hope was that this sharp recession would be short lived. At the time of writing however, an increasing number of regions in Europe are going into second lockdowns, making a V-type recovery less likely. In

[1] The papers are listed in the references section.

the concluding section, we therefore discuss three issues that relate directly to how the COVID-19 shock may affect productivity and how some of the messages of MICROPROD research may contribute to our understanding of the current crisis and its aftermath. The papers delivered so far appear in the reference section to this paper.

2. Intangible capital

What we have learned so far

As noted by Robert Solow[2], despite the ubiquity of computers in our lives (and of smartphones today), the rise of information and communications technologies (ICT) has not produced the expected boom in productivity growth at the aggregate level. More generally, the rapid rise in recent decades of intangible assets – i.e. assets without physical substance (for a detailed taxonomy see Table 1) – does not seem to have spurred a productivity boom, at least at first sight.

Table 1: Intangible asset categories

Computerized info.	Innovative property	Economic competencies
purchased software	R&D	advertising
own-account software	design	marketing research
databases	financial innovation	own-account organizational capital
	mineral exploration	purchased organizational capital
	artistic originals	training

Source: Bisztray et al (2020), inspired by Corrado et al (2005).

However, when looking at the micro level, the story is not the same. MICROPROD has looked at the level of production – the firm – to really explore how this intangible form of capital has led to higher productivity and value added. At the firm level, it appears that investment in intangible capital is an important factor in the production process and a strong predictor of higher productivity (Kaus *et al*, 2020, using data from Germany; Bisztray *et al*, 2020, using data from Hungary; and Smeets and Warzynski, 2020, using data from Denmark). Also, we learn that different types of intangible assets (Table 1) might affect the production process differently. There is value therefore in accounting for them separately when measuring the contribution of intangibles.

Another significant result is that intangible capital investments are concentrated in a few firms: many firms invest nothing or very little in intangibles, while a few firms have very large intensities of intangible capital (Kaus *et al*, 2020). And while it is true that investment in intangibles is beneficial for firms' productivity, it is also true that concentration implies that only a few firms benefit from the boost in productivity provided by intangible investments. This might explain why the effect is less visible at the aggregate level (interestingly, this could also mean that the positive externalities of these investments are not as large as sometimes thought).

[2] Solow (1987): *"what everyone feels to have been a technological revolution, a drastic change in our productive lives, has been accompanied everywhere, including Japan, by a slowing-down of productivity growth, not by a step up. You can see the computer age everywhere but in the productivity statistics."*

Many factors explain why firms differ in terms of how much they invest in intangible assets (size, sector, location). One MICROPROD paper (Altomonte *et al*, 2020) explores a particular potential reason why investment might be concentrated in a few firms only (using data from France). According to Altomonte *et al* (2020), easier access to finance leads to higher levels of investment in (cost-reducing) intangibles, and thus to higher mark-ups over marginal costs. Financial capability is thus a source of competitive advantage for firms. And given the differences in financial capability in different firms and countries, this explains in part the different levels of firms' investments in intangibles.

Finally, intangible capital can be defined broadly to encompass human capital and business organisation more generally. Müller and Neuschäffer (2020) explored how a specific German labour market institution, namely worker participation in decision-making through work councils, impacts firm performance in terms of their productivity, wages and profits. They show that firms with work councils have higher levels of productivity, wages and profits, in part, though not only, because they attract the best workers.

Relevance for policy

The distinction between intangible and tangible capital is of great importance in identifying new sources of value added. We observe that both the level of global tangible investment (gross fixed capital formation) and the real cost of capital, the real interest rate, have been on a secular decline. In other words, less and less tangible capital is installed, even though the value added produced is still increasing, while lower demand for funds thus reduces its price.

This indicates that value added is more and more generated by intangible capital. Therefore, the better we understand what constitutes intangible capital and how it generates value added, the more effective we can be in stimulating productivity.

But beyond measurement, understanding how intangible capital contributes to production will help policymakers in the EU understand our real investment needs and how to direct industrial policy in a shifting global context. Compared to South Korea, Japan and even the United States, European firms are clear laggards in terms of investment in intangibles, in particular in research and ICT. The MICROPROD results could also imply that differences in mark-ups between the US and the EU could be attributed to differences in intangible investments (as suggested by the results of Altomonte *et al,* 2020).

That alone is an essential contribution to the current discussion about industrial policy, as it could justify incentives for R&D and other forms of intangibles in general (in small and medium-sized companies in particular). Promoting R&D is not easy, but some policies appear to work, including tax incentives and grants, training workers in relevant fields and supporting skilled migration. But other policies, such as patent boxes, have failed and can even be counterproductive because they lead firms to move their patents to different jurisdictions to minimise taxes (Bloom *et al*, 2019).

In particular, policies to deepen the single market and to further the digital single market strategy could also prove crucial to generate the economies of scale that firms need if they are to invest in intangibles in a significant way.

At the same time, understanding how investment in intangible capital might lead to concentration effects could have wide-reaching implications. Most of the literature (admittedly focusing on the US) finds an increase in concentration effects, leading to monopoly power. Monopoly power in turn, in the absence of strict regulation (Furman, 2018), increases the capture of market shares and, in a low interest rates environment, simply reinforces itself in a vicious circle to the detriment of productivity (De Loecker *et al,* 2020). Consequently, US competition policy needs to be rethought, not only for productivity reasons but also because the lack of competition is not conducive to new waves of 'disruptive' innovation. However, the emerging evidence on Europe might point in a different direction. The increase in market concentration is not necessarily detrimental. It could just be the result of higher productivity and greater allocative efficiency, as more efficient firms are rewarded with higher market shares. Van Reenen (2018) and Bighelli *et al* (2020) showed this to be the case. This is good news for productivity at the firm level, but unfortunately, as Figure 1 indicates, has not been translated to the aggregate level, where total factor productivity continues to decline.

Moreover, there are macroeconomic consequences that hinder the smooth application of macro policies. We discuss these in more detail in the dedicated macro working package (WP6) (Abele *et al,* 2020, and Demertzis and Viegi, 2020), but the main issue is that, if continuous digitisation implies that the ratio of tangibles to intangibles reduces, and if intangible investment is less costly, the downward pressure on the real interest rate will be sustained. And sustained low real rates are both the result of unfavourable growth conditions, and the cause of continuing lower productivity and hence growth.

Finally, there are clear implications for the financing of growth. Intangible assets do not provide physical collateral for banks to lend against. The EU relies primarily on bank lending for financing growth, which means that production that relies on intangibles – the knowledge economy – could lack financing. Banks tend to focus on mature companies that take fewer risks, while financial markets finance the growth of new, more innovative and riskier companies (Allen and Gale, 1999). Young firms are also the most heavily dependent on external financing, while long-established firms can rely on their own cash flow to finance growth and can use their physical assets as collateral to facilitate financing (Philippon and Véron, 2008). Demertzis and Viegi (2020) showed that the amount of venture capital available in the US is more than tenfold the corresponding average EU level. Given the distinct absence of risk capital, it is not surprising that there are no European firms among the world high-tech companies: GAFA (Google, Amazon, Facebook and Apple). This is yet another argument for making progress on the capital markets union, as Demertzis and Viegi (2020) argued, because a purely bank-based financial system is not conducive to high-tech intensive industries and future innovation (Beck *et al,* 2020). Even worse, evidence shows that developing credit markets discourages innovation in these industries (Hsu *et al*, 2014).

3. Globalisation and the integration of GVCs

What we have learned

MICROPROD papers provide some nuance on the consensus view that globalisation, free trade and increasingly integrated global value chains increase efficiency and lead to productivity gains in participating countries.

Some MICROPROD papers confirm that this is true at the aggregate level. For instance, import competition, on aggregate, increases efficiency. Faced with import competition, the increase in average productivity arises both from a reallocation of resources between firms and from optimisation of resource use by some firms. Unproductive firms unable to adapt and reallocate internally shrink or even exit the market, while productive firms continue to operate. In the absence of frictions (in the labour market in particular), positive welfare effects can be obtained if the productive firms can use the resources freed-up by uncompetitive firms (Slavtchev, 2020a, using data from 13 European countries).

However, the empirical evidence from MICRPROD research also emphasises that it is crucial to take the type and origin of import competition into account (Braeuer *et al,* 2020, and Slavtchev, 2020b, both using German data).

In particular, these papers show that imports from low-income countries are typically relatively simple, produced with 'standard' technologies and low-wage labour. As a result, R&D cannot compensate for the cost disadvantages faced by high-wage domestic producers of such products, and import competition is associated with reductions in output and employment (and at the limit with firm exits or outsourcing). Meanwhile, products imported from high-income countries are typically relatively capital- and knowledge-intensive. In that case, import competition from high-income countries spurs R&D, leads to productivity gains and is not associated with a fall in sales or employment.

The idea that there might be possible adverse medium-term side-effects on productivity from import exposure was also established by Altomonte and Coali (2020, using data from France, Italy and Spain). In particular, they found evidence that regions that were more exposed before the global financial crisis to import competition – mainly from low-wage China – have experienced slower productivity growth since the crisis.

Finally, the formation of relationships between firms in global value chains can lead to innovation efforts mainly on the supplier side, but supported by the buyer through technical advice and technology or asset transfers (Békés *et al*, 2019, using data from Hungary, Romania and Slovakia). Knowledge transfers from buyers to their foreign suppliers are particularly crucial in enhancing their performance. This can take the form of foreign direct investment, with buyers bringing suppliers within their firm boundaries, although not necessarily if intellectual property rights are well protected (Bolatto *et al*, 2019, using data from Slovenia). Interestingly, larger and foreign-owned companies are more likely to innovate than small domestically-owned companies, when starting to supply an important partner. This means that less-productive firms do not investment in innovation to upgrade their technological level, while the most-productive firms customise their production processes and products to fit better the demand from buyers (Békés *et al*, 2019).

Relevance for policy

MICROPROD results contribute actively to the current debates about globalisation. They confirm that free trade can, on the whole, enhance productivity, in line with theoretical predictions. And they also point to the relevance of trade deals between high-income countries, as productivity is boosted by good trade relationships between countries that compete in similar markets. The same is true for trade deals that intend to increase competition in knowledge-intensive sectors. Governance of such trade deals is just as important and therefore, evidence of the benefits of trade fit into the ideal of having a strong multilateral system, which in the last few years has been in danger of collapse.

However, the papers also shed light on how globalisation is not always equally beneficial for all. The debate in this respect has many aspects, spanning a variety of issues. MICROPROD papers show that sector differences and the level of country development both matter to the end result. So, imports from developing countries, in particular in labour-intensive sectors, lead to more ambiguous results. It is indeed possible that the closing down of unproductive firms, as a result of import competition, increases overall productivity. But the results hinge on ensuring that the resources freed-up are reemployed in productive sectors so that there are no net job loss and resources are fully utilised. This reallocation of resources does not take place automatically and smoothly, and therefore import competition is not always beneficial to all.

In this regard, local labour market composition matters greatly in response to trade shocks: the outcome will be positive in regions where specific skills can be transferred easily. But if workers do not have transferable skills, this will not be the case. This highlights the importance of education policy, and in particular how active labour market policies (life-long learning, retraining, promoting mobility) are crucial to ensuring that workers are able to find new jobs, particularly in the digital era.

Finally, some of the results point to the importance of integration within GVCs as a means of transferring knowledge. There is a trade-off between efficiency and resilience, and the current push to shorten the length of GVCs and repatriate production will carry costs. While the issue of resilience of GCVs is understandably gaining momentum in current policy discussions, policymakers should acknowledge the relevance of knowledge transfers as in important aspect in the process of innovation.

4. Finance and resource allocation

What we have learned

MICROPROD papers have highlighted the important trade-off between the short- and long-term effects of financial and monetary policy, in particular during crises, which can impact productivity growth.

First, on bank supervision, one paper showed that the restructuring of distressed banks during a crisis can have a positive long-term effect on productivity (Gropp *et al*, 2020, using data from the US). During crises, the priority for policymakers is to avoid the potentially systemic consequences of a bank default: a potential credit crunch and the negative impact on firms and employment. But the results of Gropp *et al* (2020) show that keeping distressed banks

alive, while less destructive in the short-term, can also have a negative impact on long-term productivity growth by maintaining inefficient lending relationships between weak banks and unproductive firms. The paper also shows that, in fact, regions with less supervisory forbearance are more dynamic and experience higher productivity growth with more firm entries, job creation, and employment, wages, patents and output growth after the crisis.

Second, as far as monetary policy is concerned, another MICROPROD paper explored how central bank purchases of assets held by banks have impacted the firms that have relationships with the banks that benefit from the central bank intervention (Cycon *et al,* 2020, using German data). The paper shows that these firms experienced lower growth in employment and sales than companies financed by unaffected banks, but that they also experienced higher levels of investment and productivity. This seems to imply that monetary policy has significant long-run real effects that need to be taken into account in central banks' decisions, as accommodative monetary policy can result in a shift from labour to capital**.**

Finally, some MICROPROD papers explored how financial constraints affect productivity. We have already seen that differences in access to finance influence the level of investment in intangible assets and can in this way influence productivity growth (Altomonte *et al*, 2020). Another paper (Di Mauro *et al.*, 2020, using data from Italy, Germany and France) examined how the elasticity of productivity growth to credit growth can help measure the efficiency of the allocation of capital. This novel measure allowed them to show that credit is better allocated in Germany and France than in Italy, and also that, while the allocation of capital has become more efficient in Germany since the global financial crisis, the opposite is true for France (and there has been no change in Italy). Last, Abele *et al* (2020) looked specifically at the financial crisis and how the double dip affected productivity in France, Italy and Spain. They showed that financial constraints do not constrain highly leveraged firms, except in Italy – pointing to the importance of identifying country-specific factors.

Relevance for policy

This group of papers looked at the intersection between finance and productivity. The objective was to learn how financial infrastructure and policies may lead to less or more productive outcomes. It is not only the organisation of production that leads to more or less productivity; the way production is financed may also have real economic consequences.

MICROPROD papers point to the trade-off between the short and the long terms when it comes to bank resolution, in terms on how they affect the viability of their customers'. Identifying the optimal point of this trade-off at the efficiency frontier is a relevant input for the design of bank-resolution schemes.

But other MICROPROD results highlight the importance of understanding the real long-run effects of unconventional monetary policy, e.g. for the labour share. At the zero-lower bound, central banks are struggling to find instruments to stimulate the economy. Central banks around the world have resorted to buying assets, primarily government assets, to reduce long-term rates and ease financial conditions further. While circumstances have required these actions, the effects, particularly the unintended effects, are not yet fully clear. This is true of the discussion on bank profitability, but it is also true of increasing savings in an environment

of very low appetite for risk taking. One of the papers contributes to our understanding of the real effects of measures that will increasingly become more conventional.

Finally, these new results show that it is crucial to revive the European Commission's capital markets union initiative to try to alleviate the financial constraints that prevent the efficient allocation of resources in Europe.

5. Social implications of globalisation and technological change

What we have learned

Import and technology shocks may be associated with high productivity growth at the aggregate level. However, this effect can be asymmetric**,** with a concentrated group of firms collecting most of the benefits from globalisation and automation, while most firms see compressed margins, passed through to wages and/or working conditions.

In particular, Deng *et al* (2020) looked at the impact of international trade on individual income risk, using data from Germany. They found that higher imports result in higher levels of income risk for workers, while higher exports result in lower levels of risk. This means that, in theory, the increase in income risk from high imports could be compensated for by decreased risk from high exports from a region. Diversified regions with both importing and exporting industries might thus be protecting their workers, at least partially, against income risk. The exact geographical location of production plays an important role in determining the overall impact of trade on income risk.

In addition, Altomonte and Coali (2020) showed that import and robotic shocks are associated with a rise in productivity because competition forces firms to invest in cost-reducing new technologies. However, these shocks are also associated with falls in manufacturing employment, which can have negative welfare implications.

Finally, Lindner *et al* (2020) used data from Hungary and Norway to investigate whether innovation is skilled-biased, which could result in an increase in worker inequality. Their main result suggests that, at the firm level, technological innovation is positively associated with an increase in the share of college-educated workers and in their wage premium. This indicates an increasing need for a well-educated workforce to deal with the effects of technological innovation.

These results matter not only from an economic perspective but also from a social and political perspective, as individuals more exposed to automation and to a decline in manufacturing employment are substantially more likely to vote for radical-right/nationalist parties (Anelli *et al,* 2020, using data from 14 western European countries).

Relevance for policy

This part of MICROPROD focused on the potential losers from globalisation and technological change by looking closely at distributional outcomes.

The results offer insights on the need for import and export mixes to ensure income stability. This highlights the need for a more balanced growth model in which the economy relies on a combination of domestic demand and export-led demand. Results also show that while digitalisation and globalisation might have led to an overall increase in productivity, they are not neutral in the way they create and destroy value. It is necessary to design transition policies to help regions and sectors restructure, not unlike the Just Transition Fund created in the EU to address the negative social consequences of climate policies (Cameron *et al*, 2020).

MICROPROD results also have implications for the skilling of workers. As technology becomes increasingly important, there is a need for appropriate education and training to meet future needs, as discussed in the previous section. And if technology leads to increased wage inequality, welfare systems must be adapted.

Lastly, MICROPROD papers provide some insights about the wider societal implications of these big economic shocks of the past 20 years. The absence of proper policies for reskilling and upskilling workers can lead to greater political polarisation that might even result in a negative feedback loop in which fringe parties coming to government apply policies that ultimately are not really beneficial for workers, leading in turn to further polarisation, all to the detriment of inclusive growth.

These MICROPROD papers feed into current debates about societal adjustment in the age of transformation. From the future of work, to the extreme political outcomes, policies should ensure both that skills meet future needs and that major segments of the population are not left behind in the process. Technological development maybe inevitable, but its negative effects do not have to be.

6. Concluding remarks: MICROPROD and COVID-19

Overall, MICROPROD papers shed light on the effects on productivity of the two main structural changes over the past 20 years: first, globalisation and the opening of China, and second the increasing digitalisation-automation of the economy. MICROPROD has identified how these changes affect productivity, and highlights that there are distributional effects that are important for good societal outcomes.

But how can the results also inform the future of productivity after the pandemic? We discuss three issues that relate directly to productivity, how the COVID-19 shock may have 1) accelerated digitisation, 2) put a hold, or possibly reversed globalisation and, 3) what to make of the massive state interventions that we have seen in response to collapse in economic activity. We discuss how some of the messages from MICROPROD research may contribute to our understanding of the current crisis and its aftermath.

As physical economic activity came to a halt because of COVID-19, there was an increase in digital activity. In *The Hype Machine*, Sinan Aral (2020) wrote: "*The day the offline world stood still, the online world ignited like a digital forest fire. Demand for social media skyrocketed.*

Facebook Messenger, WhatsApp and Facebook Live saw 50 percent increases in usage overnight. […] *As movie theatres closed* […] *Netflix crashed under the weight of the surge.*" The world learned to live online and to rely on going about its business online. An average of 35 percent of all employees started to work from home as a result of lockdowns. It is inevitable that this adjustment, forced though it was, will not reverse fully when the COVID-19 pandemic ends[3].

A number of issues arise from this with a direct impact on our understanding of productivity. First, what investments are needed to enable businesses to go digital as much as possible? This pertains directly to the discussions on intangible capital and how it contributes to value added. Second, transferability of skills will be crucial as work becomes more digital, and as global value chains become shorter (see below). Third, the digital divide will manifest itself in distributional outcomes. Those with more and better access to digital services (such as digital education) will have weathered lockdowns better. Also, those in jobs that cannot be done digitally are typically also those in lower wage brackets[4]. They are also those that have been most at risk from the virus. Home confinement has also affected women's productivity differently to men's (Del Boca *et al,* 2020). Distributional differences will have increased as a result of the virus, with lasting detrimental effects on productivity because of less sustainable outcomes.

And while COVID-19 might have had an acceleration effect on digitalisation, it will, in all likelihood, have a dampening effect on globalisation. Protectionist tendencies that have been increasing over the past few years found fertile ground during the pandemic, primarily in relation to vital goods such as medical supplies.

The length of GVCs is now measured directly against their resilience. Should we repatriate goods and shorten our integrated GVCs to ensure greater robustness to outside shocks? But if the length of value chains is linked to economic efficiency gains, any attempt to boost robustness will necessarily come at a cost. There are also worries about these costs increasing prices, an issue that could lead the European Central Bank to tighten monetary policy and hike rates earlier than would otherwise be expected, with potential negative repercussions for public and private debt sustainability. Understanding this trade-off requires an understanding of the benefits of long integrated GVCs. MICROPROD has attempted to map how, when and to whom global trade is beneficial. As this process of retreating from global production speeds up, the MICROPROD analysis will help understand the implied costs, and hence the pressure on productivity.

Last, the immediate need to close down economic activity has required decisive state intervention. Fiscal responses have been both immediate and massive. In the EU this has meant three major policy changes: the lifting of state-aid rules, the suspension of fiscal rules, and the previously hard-to-imagine issuance of significant common debt to finance transfers between countries. All in all, the EU, and its institutions have offered ample instruments and funds to deal with the pandemic. These measures have enabled the fiscal response to help sustain economic value in both households and firms. At the time of writing the state aid and fiscal rule changes are still in place.

[3] See https://www.eurofound.europa.eu/data/covid-19.
[4] See for instance anecdotal evidence for the United Kingdom: https://www.economist.com/britain/2020/03/26/how-covid-19-exacerbates-inequality.

An increased role for the state was no doubt necessary to help viable (i.e., productive) firms survive the pandemic and workers keep their jobs and preserve their human capital, with a no-doubt positive impact on productivity in the long run. However, state intervention of this scale comes at the cost of slowing down the process of creative destruction. State support applied bluntly to all may save viable firms, but it also sustains unproductive zombie firms, reducing productivity in the long run. To be fair, there are arguments that go the other way: the COVID-19 crisis and lockdowns have forced some of these firms to digitalise and to increase efficiency and productivity. Therefore, the shock could also increase productivity in some ways. As we learn more in the coming years about the exit of firms and the transformation of those that survive, we will gain a better understanding on the aggregate effect on productivity.

Finally, not all countries had the same fiscal space when the shock hit. Inevitably, direct intervention to subsidise firms has been more robust in countries with healthier fiscal positions. This is natural but runs the risk that a great many productive firms will be eliminated in fiscally vulnerable countries, possibly changing the landscape of the single market.

References

Abele C., A Benassy-Quéré and L. Fontagné, (2020) 'One Size Does Not Fit All: TFP in the Aftermath of Financial Crises in Three European Countries', MICROPROD Deliverable 6.6

Allen F. and D. Gale (1999) 'Diversity of Opinion and Financing of New Technologies', Journal of Financial Intermediation, vol. 8, pp. 68-89.

Altomonte, C., D. Favoino, M. Morlacco, T. Sonno (2020) 'Markups, Intangible Capital and Heterogeneous Financial Frictions', MICROPROD deliverable D1.4.

Altomonte, C. and A. Coali (2020) 'Employment, Productivity and Import Shock: Evidence from the European Manufacturing Industry', MICROPROD deliverable D5.2

Anelli M., I. Colantone, P. Stanig (2020) 'We Were the Robots: Automation and Voting Behavior in Western Europe', MICROPROD deliverable D5.5

Beck, T., R. Dottling, T. Lambert and M. van Dijk (2020) 'Liquidity creation, investment, and growth', CEPR Discussion Paper 14956, June.

Bergeaud, A., G. Cette and R. Lecat (2016) 'Productivity Trends in Advanced Countries between 1890 and 2012', Review of Income and Wealth. vol. 62(3), pages 420–444.

Békés G., M. Koren, B. Muraközy, and A. Telegdy (2019) 'The nature of buyer-supplier relationships: Lessons from the Central European Supplier Survey', MICROPROD deliverable D2.2.

Bighelli, T., F. di Mauro, M. Melitz and M. Mertens (2020) 'Firm Concentration and Aggregate Productivity', Firm Productivity Report, CompNet.

Bisztray M., B. Muraközy, D. Vonnák (2020) 'Analysis of the importance of intangible capital and knowledge for productivity measurement', MICROPROD deliverable D1.5a.

Bloom N., J. Van Reenen, and H. Williams (2019) 'A Toolkit of Policies to Promote Innovation', *Journal of Economic Perspectives*, Volume 33, Number 3, Summer 2019, pp163–184

Bolatto, S., A. Naghavi, G. Ottaviano K. Zajc Kejzar (2019) 'Intellectual Property and the Organization of the Global Value Chain', MICROPROD deliverable D2.4.

Braeuer R., M. Mertens and V. Slavtchev (2020) 'Import Competition and Firm Productivity: Evidence from German Manufacturing', MICROPROD deliverable D2.3.

Cameron, A., G. Claeys, C. Midões and S. Tagliapietra (2020) 'A Just Transition Fund – How the EU budget can help with the transition', prepared for the Committee on Budgets (BUDG) of the European Parliament*,* 2020.

Corrado, C., C. Hulten and D. Sichel (2005) 'Measuring capital and technology: an expanded framework', in *Measuring capital in the new economy*, University of Chicago Press, pp. 11–46.

Cycon L., M. Koetter, B. Meller (2020) 'Tracking the real effects of monetary policy: Evidence from European Central Bank's SMP purchases', MICROPROD deliverable D4.4.

Del Boca, D, N Oggero, P Profeta and M C Rossi (2020), 'Women's work, Housework and Childcare, before and during COVID-19', *COVID Economics: Vetted and Real-Time Papers*, Issue 28: 70-90.

De Loecker, J., J. Eeckhout and G. Unger (2020) 'The rise of market power and the macroeconomic implications', The Quarterly Journal of Economics 135(2) pp561-644.

Demertzis, M. and N. Viegi (2020), 'Low interest rates and productivity in the EU and the US: One Trend, Two Stories', MICROPROD deliverable, D6.1.

Deng L., P. Krishna, M.Z. Senses, J. Stegmaier (2020) 'Imports, Exports and Income Risk', MICROPROD deliverable D5.3.

Di Mauro F., F. Hassan and G. Ottaviano (2020) 'Financial Markets and the Allocation of Capital: The Role of Productivity', MICROPROD deliverable D4.2.

Furman, J. (2018) 'Market Concentration', Hearing on Market Concentration, OECD, 7 June.

Gropp R., S. Ongena, J. Rocholl, V. Saadi (2020) 'The Cleansing Effect of Banking Crises', MICROPROD deliverable D4.3.

Hsu, P.-H., X. Tian and Y. Xu (2014) 'Financial development and innovation: Cross-country evidence', Journal of Financial Economics 112(1): 116–135.

Kaus, W., Slavtchev, V., and Zimmermann, M. (2020). Intangible Capital and Productivity. Firm-Level Evidence from German Manufacturing. IWH Discussion Paper No 1/2020. MICROPROD deliverable D1.5b.

Lindner A., B. Muraközy, B. Reizer, R. Schreiner (2020) 'Technological Change and Skill Demand in Non-Competitive Labor Markets', MICROPROD deliverable D5.4.

Philippon T. and N Véron (2008) 'Financing Europe's Fast Movers', Bruegel Policy Brief, n° 2008/01.

Müller S., Neuschäffer G. (2020) 'Worker Participation in Decision-making, Worker Sorting, and Firm Performance', IWH Discussion Papers No. 11/2020, MICROPROD deliverable D5.1

Slavtchev V. (2020a) ‘Import competition and allocative efficiency’, MICROPROD deliverable D4.1.

Slavtchev V. (2020b) ‘Import Competition and Firm Innovation: Evidence from German Manufacturing’, MICROPROD deliverable D3.4.

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

Smeets V. and F. Warzynski (2020) ‘ICT, Firm Growth and Productivity’, MICROPROD deliverable D3.2.

Summers, L.H. (2013) ‘Speech at the IMF 14th Annual Research Conference in Honor Of Stanley Fisher’, International Monetary Fund, 8 November

Van Reenen J. (2018) ‘Increasing Differences between firms: Market Power and the Macro-Economy’, San Francisco Fed, mimeo, August 31.