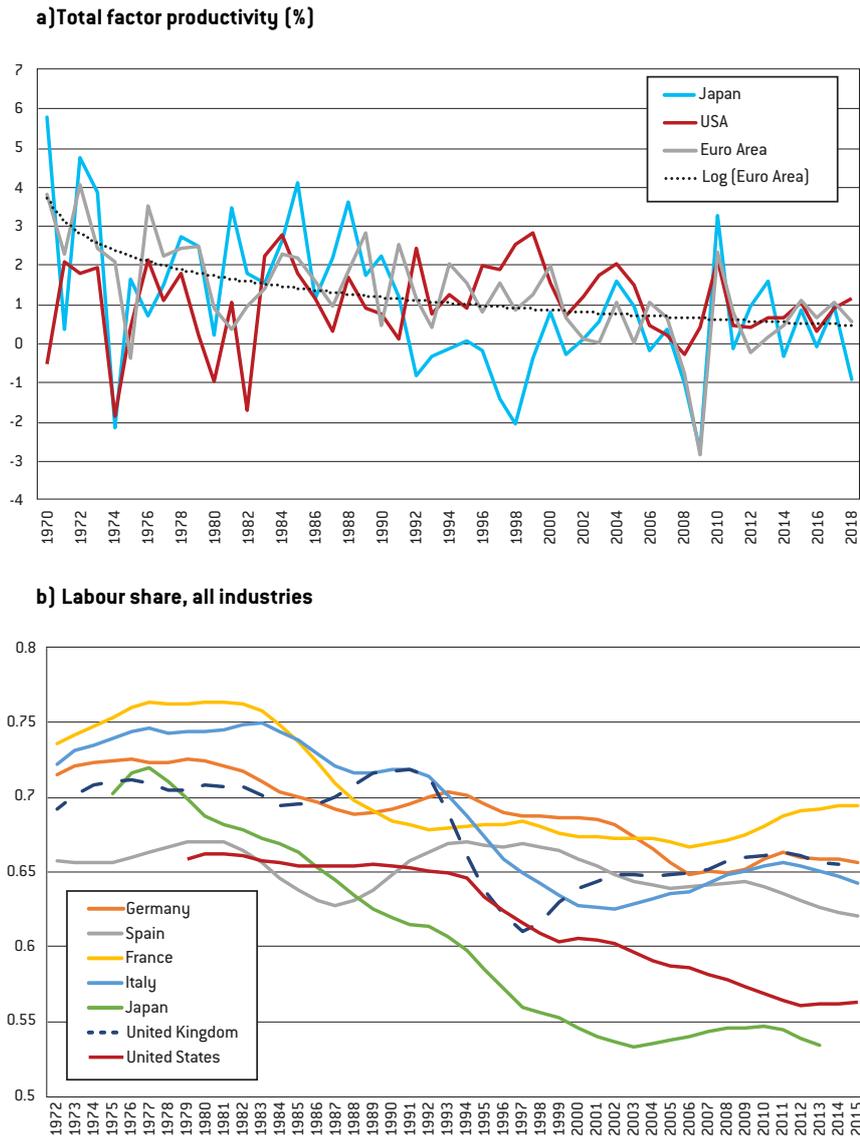


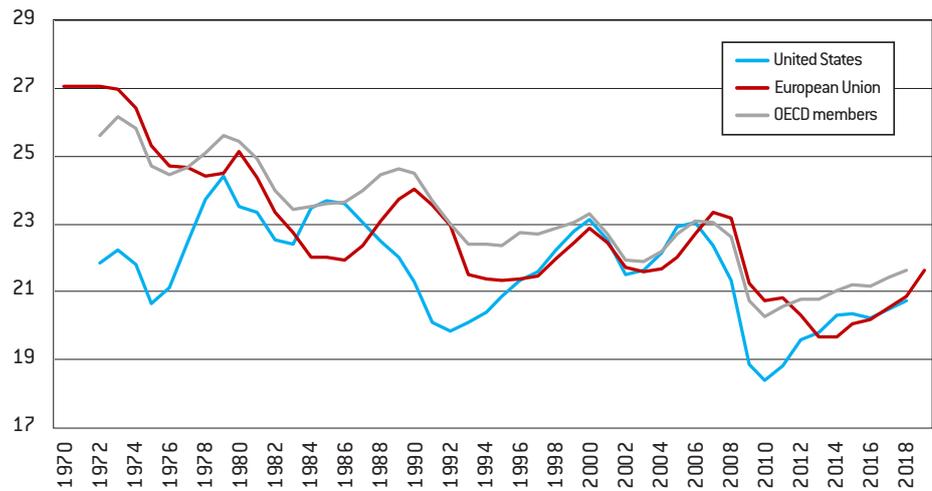
Figure 3: Structural trends: total factor productivity



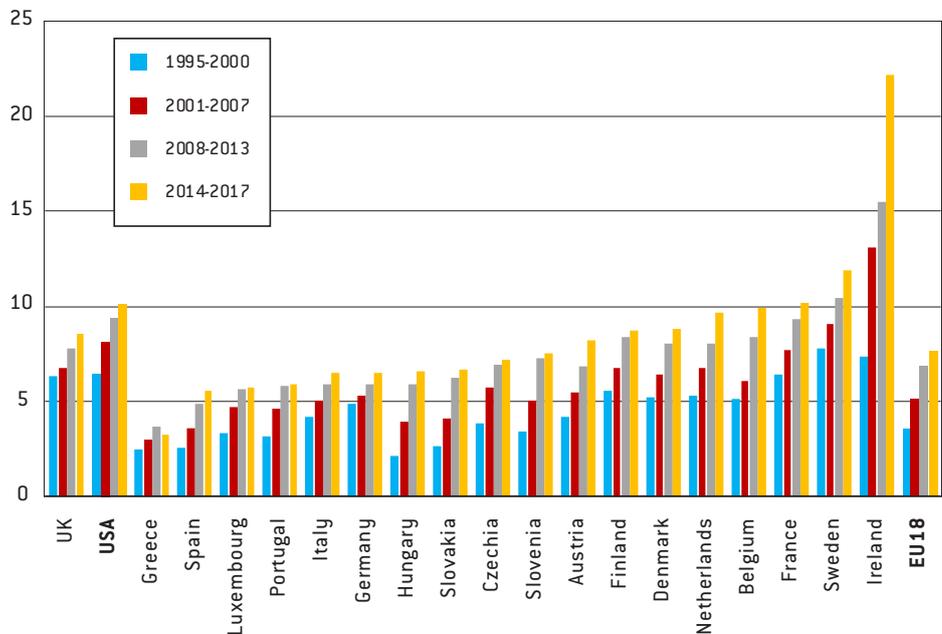
Source: Bruegel based on Bergeaud *et al* (2016) (left panel); Bruegel based on EU-KLEMS (right panel). Note: Bergeaud *et al* (2016) database updated in 2019, available at <http://www.longtermproductivity.com/>. Right panel: smoothed using a moving-average with equal weights and a five-year window.

Figure 4: Structural trends: tangible versus intangible investments

a) Gross capital formation



b) Investments in intangible assets



Source: Bruegel based on World Bank (World Development Indicators), INTAN-Invest. Note: Intangibles include computer software and databases, entertainment, artistic and literary originals, mineral explorations, design, new product development costs in the financial industry, research and development, branding, organisational capital and training.

These trends look similar in the US and in EU countries. It is important to understand however if the reasons for the trends are also similar and therefore similar policy responses are required.

Our literature review seeks to explain why interest rates are coming down quite so persistently, and to answer whether macroeconomic policy can reverse this, or if deep structural movements are underway, requiring structural policies.

The first strand in the literature asks whether the low interest rate trend is the result of too much saving and/or too little investment. The increase in savings is attributed to aging, and also to an overall strengthening of the motive for precautionary savings due to risk. We discuss a little more in detail what explains this, but whatever the source of this imbalance, evidence shows that it cannot be eliminated, at least not in its entirety, by expansionary

macroeconomic policy. Fiscal and monetary policies have tried but the secular downward trend continues. Some parts of the literature tell us that monetary policy is not only unable to reverse the trend but underlying structural changes inhibit its role even more.

It is perhaps not surprising then that the search for reasons to explain the secular downward trend has focused on how the two main global shocks of the past decades, digitalisation and globalisation, have changed market structures. This second strand in the literature tells us that three structural factors have contributed to the downward trend: the rise of intangible capital in relation to tangible capital, market concentration and macroeconomic risk.

There is then a third strand of the literature that shows that lower rates themselves further reinforce the increase in market concentration, generating a vicious circle of low productivity and low real rates.

The literature that has looked at data from the US, where the digital shock originated, tells us that, of the three factors, the main driver is market concentration that has led to monopoly power. This has made markets uncompetitive and has therefore discouraged investment. Importantly, this literature also says that highly concentrated markets are not the type of markets that will generate the next disruptive types of innovation. There is a paradox in this, as an undoubtedly very disruptive innovative shock, digitalisation, has led to those market conditions that are no longer conducive to the next wave of disruptive innovation.

Since market concentration in the digital era has implied that the dominant firms are really global, the negative effects of market concentration also affect the dynamism of domestic markets elsewhere, including in the EU.

However, the story in the EU is not quite the same as in the US. First, markets are lot more fragmented. Coupled with a much stricter anti-trust regulatory framework than in the US, the possibility for acquiring monopoly power is much smaller in the EU. New evidence even shows us that to the extent that there is an increase in market concentration, it is actually a good thing because it is the most efficient firms that gain greater market shares. Therefore, the other two structural reasons account for the downward pressure on interest rates in the EU. We argue that the unifying factor of relevance to the EU behind the increased relevance of intangible capital and macroeconomic risk is finance, or rather the lack of finance that is suited to risk. Intangible capital is not easy to finance through banks because it cannot serve as collateral. And Europe lacks risky finance (namely equity finance) which can accommodate greater macroeconomic risk. If the future of productivity is to come from the 'knowledge' economy, then the lack of suitable finance will thus be a major obstacle. Initiatives like the EU's Capital Markets Union would have to accelerate, not only for reasons of financial stability but also to promote productivity through innovation.

2 Why are interest rates so low?

The literature on the determinants and consequences of low real interest rates has grown exponentially in the last decade, and has pursued different avenues. We provide a summary of the rich landscape of alternative views and evidence, in order to isolate the drivers behind the low interest rate environment.

2.1 A savings/investment imbalance

The literature on "*secular stagnation*" (Summers, 2015b) focuses on a chronic demand deficiency driven by both a reduction in investment and an increase in savings. There is a long list of possible determinants.

Ageing and increasing macroeconomic risk have increased the global demand for safe assets in the developed world (Caballero *et al*, 2017). Also, this demand for safe assets is arguably the result of increased inequality, with the concentration of wealth implying a greater

The solution to a low savings/investment equilibrium driven by private sector behaviour is for the public sector to intervene through policy

propensity to save, distorting the demand for investment (Mian *et al*, 2020).

But also, there has also been a greater propensity to save in emerging markets. Having witnessed the very distortionary effects of sudden and big capital-flow reversals, these countries have pursued policies of increased reserve accumulation to maintain competitive exchange rate levels and to boost exports (Bernanke, 2005).

Meanwhile, a reduction in the relative price of capital (Sajedi and Thwaites, 2016) has reduced the amount of savings needed for any given amount of investment. The global financial crisis reinforced these trends by increasing macroeconomic risk, thereby increasing the cost of financial intermediation and financial constraints on investment. All these have fuelled demand for safe financial assets (Del Negro *et al*, 2017).

The solution to a low savings/investment equilibrium driven by private sector behaviour is for the public sector to intervene through policy. Fiscal policy, through public borrowing, can then be used to increase infrastructure investment, which can increase the marginal productivity of private-sector investment, overall productivity and real rates themselves (Eggertson and Summers, 2016). This policy, the argument goes, would have no consequences for the government's fiscal solvency, when nominal interest rates are at the zero lower bound (Blanchard, 2019).

What about the role of monetary policy? Could it be that it is low policy rates that have caused real rates to decline so persistently? This appears at first sight a bit odd, not least because it reverses the causality from monetary policy following changes in the real economy, to actually causing changes to the real economy. However, such attempts justify this reversal through "hysteric" types of effects. Borio *et al* (2019) argued that easy monetary policy interacts with financial frictions to generate financial cycles of excessive risk taking and credit bubbles that, when they implode, generate long-term output losses. Brunnermeier and Koby (2018) argued that low interest rates on safe assets hurt bank profitability by reducing banks' interest rate margins, especially if deposit rates do not decline accordingly. This damages their ability to issue credit, which in turn prevents growth. The ability of banks to be profitable and create credit is hindered even more at the zero lower bound (Claessens *et al*, 2018). In fact, as the returns on capital and savings drop, consumers feel compelled to save even more in order to meet their future consumption needs, a fact that puts further downward pressure on today's rates.

Others have argued that the efficacy of monetary policy is seriously hindered. Sablik and Trachter (2019) argued that in the United States, this is the result of structural changes, namely increased concentration and market power, which have led to an imperfect pass through of efficiency gains to wages, generating deflationary pressures.

We do not believe that monetary policy is the cause of such a sustained effect on real long-run rates. If policy rates were continuously 'pulling' the equilibrium rate from below (in other words a permanent negative interest rate gap in the Taylor rule), there would be an excess demand for investment, leading to inflation. Neither investment nor inflation has been increasing, let alone excessively, as the figures in section 1 show.

But there is also another reason. Macroeconomic policies have not been the same in the US and the euro area. The US attempted to move away from the zero lower bound and/or used the fiscal instrument with different intensity. This difference in policies, however, has not led to significant differences in expected real interest rates (section 1). So, we argue that macroeconomic policies explain these trends only partly. For other explanations, we need to look at structural factors, the nature of technological innovation and the evolution of market structures.

2.2 Productivity slowdown as the cause of low interest rates

This literature focuses on the long-term supply trends underlying productivity growth and long-term growth as an explanation for the secular fall in real interest rates. It has identified three structural shifts as the main drivers:

- The pervasive reduction of competition, through greater concentration;
- The increasing importance of intangible capital; and
- The increase in overall macroeconomic risk.

A good part of the literature starts by attempting to explain two empirical regularities: the long-term decline of the labour share of income (Elsby *et al*, 2013) and the reduction in the price of investment goods (Sajedi and Thwaites, 2016). Karabarounis and Neiman (2014) argued that the reduction in the relative price of investment, driven by underlying technological change, has led to capital substituting for labour. So, the fall in the quality-adjusted price of capital equipment, brought about by technological change, has led firms to replace people with cheaper machines.

But this 'automation' argument is not enough to explain the reduction in the labour share. The substitution of labour by capital has been intrinsic to the process of technological change and economic growth from the time of the spinning jenny. However, in previous instances of technology leaps, the labour share remained stable because technological change brought about an overall increase in productivity, which generated demand for labour for new tasks (Acemoglu and Restrepo, 2019). What is different this time is that the introduction of labour-saving technology has not generated a sufficient increase in productivity. In fact, there is both a reduction in the labour share and in capital stock and investment (Figure 4). These developments, together with a distinct increase in profits, indicate that this type of innovation is accompanied by an increase in market concentration and a decline in competition (Barkai, 2020).

And indeed, a seminal part of this literature tries to explain what is intrinsic to this type of innovation: the digitalisation process, which affects market structures. Autor *et al* (2020) observed two parallel processes: a technological process that favours increasing returns to scale, and a globalisation process that increases the returns for those who have a dominant position, leading to winner-takes-all firms. Similarly, Gutierrez and Philippon (2017) discussed a reduction in competitive pressure, which leads to the movement of resources from wages to rent extraction, especially through regulatory capture.

This potential for increasing returns to scale has been strongly reinforced by the contribution of intangibles in total production (Crouzet and Eberly, 2019), and also helps understand the observed investment gap. Corrado *et al* (2005) identified three main categories of business intangibles: computerised information, innovative property and economic competences (eg management practices and processes). Intangible capital, as non-physical capital, is more readily scalable and less excludable. For example, a piece of software can be more easily replicated than a piece of equipment. However, ownership of intangibles requires patent and copyright protection. So, investments in branding and business processes may be readily scalable, but they need to be protected by trademarks.

These distinct economic characteristics potentially allow intangible capital to play a different role to traditional capital in generating revenue and profits. For example, these properties may promote economies of scale, while the protection afforded through intangibles patents and copyrights may exclude competitors and lead to market concentration. Giglio and Severo (2012) went as far as to say that an increase in investment in intangibles can be at the root of asset price bubbles and macroeconomic fluctuations, thus partly explaining the increase in risk premium analysed by Farhi and Gourio (2018).

The third strand of the literature looks directly at the long-run evolution of asset prices and links this to underlying structural transformation. The reduction in the labour share is matched by two other observations: an increase in the return on private capital and an

The automation argument is not enough to explain the reduction in the labour share; this time, the introduction of technology has not generated a sufficient increase in productivity

For companies such as Walmart and Amazon, innovation is not only new products, but critically, it is new processes

increase in the spread between the returns on risky and risk-free assets. Farhi and Gourio (2018) decomposed the increase in spread into what is attributed to: 1) technological change, 2) increases in rents, and 3) an increase in macroeconomic risks. They exploited the observation that there has been a sustained increase in the spread, namely a reduction in the natural interest rate matched by a slight increase in the return on private capital that did not lead to an investment boom. Their results indicated that increasing rents, linked to an increase in market concentration, and increasing risk premiums – ie macroeconomic risks – are the main cause of the increase in spread. Interestingly, introducing investment in intangible capital into their framework absorbs part of the market concentration effect. There appears therefore to be a correlation between increasing market concentration and investment in intangibles, at least for US data.

The literature makes two broader sets of relevant arguments. First, Jorda *et al* (2019) argued that “*secular stagnation*” is essentially a measurement problem because the true value of innovation has not been accounted for (yet) in our evaluation of productivity. Nakamura *et al* (2020) made a similar point, showing an increase in the mismeasurement of growth and prices in the twenty-first century.

A second set of authors argues that this type of innovation is ‘too destructive’. Komlos (2016) argued that new products are close substitutes for old products and thus the contribution component of innovation is lower than its destruction component. For example, Amazon has introduced a new distribution method that has effectively substituted for countless local bookstores and global distribution chains. Smart phones replace traditional cell phones and cameras, making a whole industry obsolete. While these innovations are certainly disruptive to the economy, they do not generate the same advantage in terms of growth and welfare as innovation waves in previous eras (Gordon, 2017). Similarly, Aghion *et al* (2019b) showed that this type of innovation reduces production costs for the most productive firms. For companies such as Walmart and Amazon, innovation is not only new products; critically, it is about new processes, which increase efficiency and mark-ups for the winner-takes-all firms. Amazon’s and Walmart’s process advantage gives them a competitive advantage that close rivals cannot counteract. The innovative firms will expand, absorbing an increasing number of close products, increasing concentration and mark-ups, reducing the economy labour share and ultimately reducing competition and innovation, after an initial burst of growth. The model shows how an innovation wave can be followed by a lull in innovation because of the market structure that the first wave has created.

2.3 The consequences of low real rates on productivity: a vicious circle

After seeking to understand the drivers behind declining interest rates, a substantial part of the literature then attempts to explain the distortionary consequences for growth and productivity of persistently low interest rates. This therefore emphasises the existence of a low productivity-low interest rate vicious circle, which reinforces the stagnation path.

There are three consequences of a low interest rate environment:

- Inefficient firms survive longer, giving rise to zombie firms;
- Bank profitability credit creation are reduced;
- Innovation reduces through increased market concentration and market power.

Bergeaud *et al* (2019) argued that an exogenous shock that reduces the real interest rate, such as a demographic shock, will allow less productive projects to be sustained, thus reducing aggregate productivity and pushing the real interest rate lower. This observed co-determination of real rates and productivity is best exemplified by the ‘zombie firms’ literature, starting with Caballero *et al* (2008) who studied the effect of credit extension to unproductive firms during the long Japanese depression. After the global financial crisis, attention moved to the effects of unconventional monetary policy and negative policy rates on the misallocation of capital and the survival of unproductive firms (Adalet McGowan *et al*, 2018; Acharya *et al*,

2019; Gopinath *et al*, 2017).

Liu *et al* (2019) showed that low interest rates give industry leaders a strategic advantage over followers, and this advantage becomes more dominant as the interest rate approaches zero. Consequently, as the interest rate declines, market structure becomes more monopolistic, and, at sufficiently low interest rates, productivity growth slows. This provides a single explanation for why the fall in long-term interest rates has been associated with rising market concentration, reduced dynamism, a widening productivity-gap between leaders and followers, and slower productivity growth.

Last, most of the literature that focuses on the US also shows that as concentration increases, the incentive for disruptive innovation reduces. Greater concentration prevents the entry of the young, innovative firms that provide dynamism in any given market, leading to an environment that is less conducive to innovation and therefore less demand for investment and growth.

3 Pressure on interest rates: US vs Europe

The process we describe is global in nature, but there are significant local variations. In the US, the main focus is the connection between innovation and concentration. In Europe, the focus is rather on the connection between risk and innovation.

How has the US experienced the process of digitalisation, the starting point of the process we have described? This type of technology shock has two characteristics: it needs relatively little tangible capital, therefore generating strong increasing returns to scale, and it leads to winner-takes-all firms. The consequence of these two characteristics is that those winner firms expand rapidly, and use the resources accumulated to defend and expand their dominant positions, leading to concentration and market power. In addition, globalisation means that market power gained domestically can also be scaled globally, which increases exponentially the gains from incumbency.

But this is not necessarily a bad thing. An increase in concentration could very well be a signal of a well-functioning competitive environment in which the most efficient and innovative producers end up naturally capturing a greater market share (Van Reenen, 2018). However, if market concentration is not limited, it results in barriers to entry and uncompetitive practices that do not contribute to productivity and have little to offer in terms of innovation (De Loecker *et al*, 2020).

Furman (2018) argued that for the US, had concentration been the result of innovative firms capturing the biggest share of the market, an increase in productivity growth across the economy would have been seen. However, as our figures have shown, productivity growth is on a declining path, in line with global trends. Furman (2018) therefore joined all the others cited in section 2 in arguing that market concentration has not resulted in greater dynamism in the US market. Furman also took the view that policy has also contributed to the reduction in competition by reducing antitrust enforcement, an argument that Philippon (2019) made when he talked about “capture”.

The lack of competition and the preservation of star firms raise barriers that prevent other more innovative companies from entering, discourage investments and reduce interest rates. So, the digital shock has played out paradoxically in the US. Although an undoubtedly major innovation shock, it has also led to major concentration effects, creating monopolies that have less incentive to innovate and preventing others from entering. An innovation shock has thus led to conditions less favourable for future disruptive innovation.

Furthermore, the second part of the literature argues that the resulting low interest rate environment then promotes zombie firms, reduces the ability of banks to create credit and enhances the strategic advantage held by such superstar firms. These, in turn, accelerate

concentration and further suppress productivity and interest rates. This creates the vicious cycle between low interest rates, productivity decline and the prospect of innovation.

3.1 Understanding market dynamism in the euro area

Do the factors that apply in the US also apply in the euro area? Can the even stronger downward pressure on interest rates in the euro area (Figure 1) also be attributed to changing market structures?

Digitalisation is a global process and so US star firms operate also in the euro area. And indeed, they are capable of exerting market power, distorting competition not only in the US but in all markets where they operate, including in the euro area.

But have domestic conditions also affected market concentration? The euro area has seen increases in intangible investment to levels similar to those observed in the US (Figure 4b). Has that led to a similar concentration of power?

The evidence on market concentration in the euro area and what it might mean for productivity and innovation is both scarce and inconclusive. Furman (2018) argued that European policy choices visibly diverged from those in the US, leading to less market concentration. Cavalleri *et al* (2019) broadly confirmed a slight decline in mark-ups, leading to broadly stable concentration ratios, in four big euro-area countries.

Bighelli *et al* (2020) reached a very different conclusion, this time based on data for 19 European countries for 2000-2017. They found that market concentration has actually increased, at least since 2008, and that this is associated with increased productivity in the respective sectors. In other words, more efficient firms do manage to capture increasing market shares. This is quite different to the way concentration effects are understood to have played out in the US. But while it is good to see an increase in productivity in a number of sectors, it is at odds with the unequivocal decline in total factor productivity growth shown in Figure 3. At the very least, it is difficult to argue that it is the more concentrated markets in Europe that are putting downward pressure on interest rates.

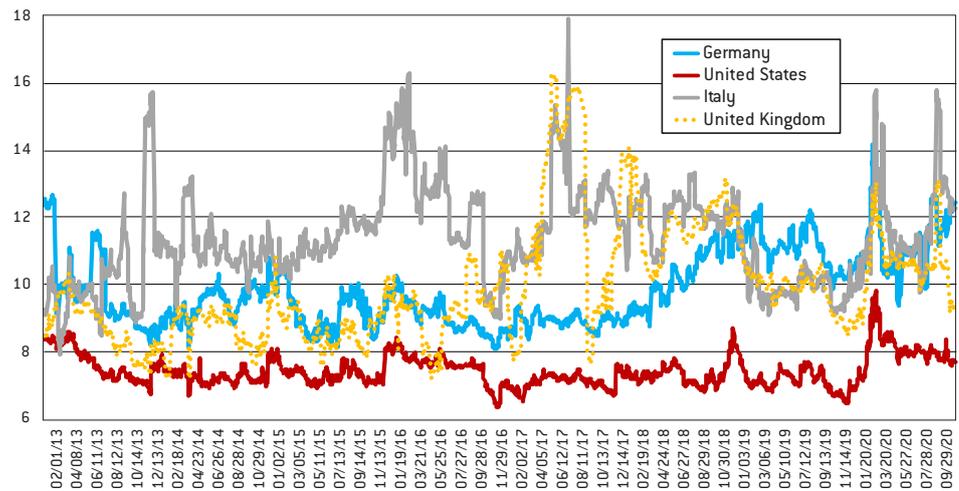
Similarly, it is not easy to argue that this monopoly power puts pressure on innovation. If anything, the improvement in the allocation of resources that Bighelli *et al* (2020) found should encourage new entrants, at least into the sectors for which this is the case. We should be able to see an increase in innovation as a natural consequence of more efficient and productive markets. And according to Furman (2018), as noted above, Europe has implemented policies that have been effective in encouraging competition. All this however is counter to the evidence on the future of real interest rates. So where does this pressure come from?

If market concentration is not the culprit, what about the growth of intangible capital? Evidence at country level shows investment in intangible capital is an important factor in the production process and a strong predictor of productivity growth¹. But while though this might be true at the firm level, Figure 3a shows that such advantages have not aggregated at the macro level as total factor productivity has consistently declined.

What about macroeconomic risk then? Figure 5 shows countries' risk premiums. This is the additional risk that an investor faces if they want to invest in a private firm relative to the risk of investing in the country's safe asset (ie government debt).

¹ See Kaus *et al* (2020) using data from Germany; Biztray *et al* (2020), using data from Hungary; and Smeets and Warzynski (2020), using data from Denmark.

Figure 5: Country risk premiums



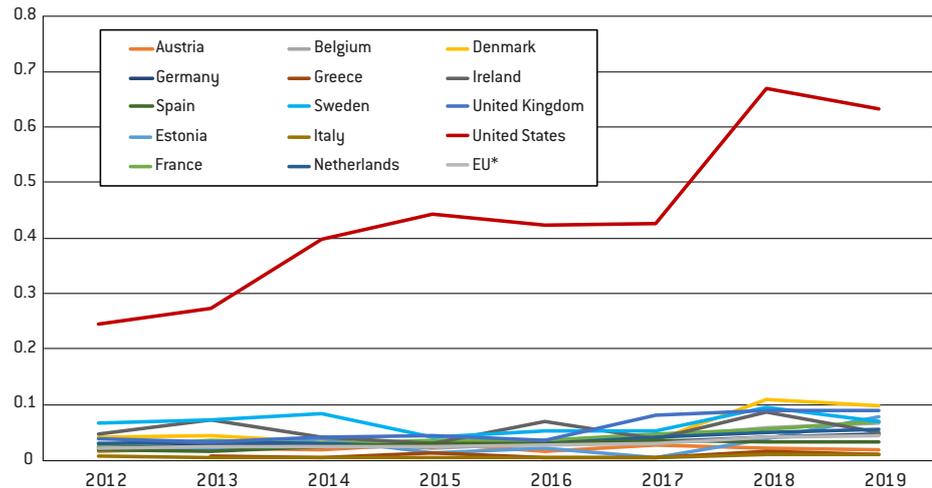
Sources: Bruegel based on Bloomberg. Notes: Country risk premium is the additional risk associated with investing in an international company, calculated by: market return (VM108) minus the risk-free rate. Where the market return (VM004) is the Internal rate of return (VM004) weighted by the market cap of each index member (forward looking estimate of market return) and the risk-free rate (VM103) is the yield on a local 10y treasury security.

Any rise in the risk premium is not only associated with an increase in the market return; it is also the result of a reduction in the return on the country's risk-free asset. This can be seen in the numbers for Germany, where there has been a steady and sizeable increase in the country risk premium. The market premium for all countries in the EU has been persistently higher than in the US. Even for Germany, deemed the safest in the EU, the risk premium has been higher than in the US, by an average of 4 percentage points since 2018.

The EU is thus a much riskier environment than the US for investors, which by itself should explain the decline in the demand for capital. But there is also the absence of suitable finance in the EU, which constrains the domestic supply of capital. Financial constraints and high indebtedness have been identified as constraints to productivity in the EU, particularly since the financial crisis (Abele *et al*, 2020). The EU's broader financial model stands in the way of growth in the era of digitalisation. A bank-based financial system is becoming increasingly unwilling (because of regulation) and is also unable to finance digital growth that relies on intangible assets. Finance can carry more risks if it is shared among stakeholders. We discuss this next.

Figure 6 shows the amount of venture capital (VC) available in the US and in selected EU countries and the United Kingdom. We include just venture capital because it is a very specific type of equity finance that aims to pick winners: investors provide it to start-up companies that are perceived to have very good long-term potential. In fact, based on German data, Engel and Keilback (2007) argued that even if venture capital does not lead to firms becoming 'winners', it certainly has an ability to pick them. So, by implication, the absence of VC implies the loss of an important instrument to sift through risks and select winners from losers. The data shows that the amount of VC capital available in the US is more than ten times what is available on average in the EU.

Figure 6: Venture capital investment, EU and US



Source: Bruegel based OECD Entrepreneurship Financing Database, Notes: Entrepreneurship Financing Database. In the OECD Entrepreneurship Financing Database venture capital is made up of the sum of early stage (including pre-seed, seed, start-up and other early stage) and later stage venture capital. As there are no harmonised definitions of venture capital stages across venture capital associations and other data providers, original data have been re-aggregated to fit the OECD classification of venture capital by stages. Korea, New Zealand, the Russian Federation and South Africa do not provide breakdowns of venture capital by stage that would allow meaningful international comparisons. * EU includes Austria, Belgium, Denmark, Estonia, Finland, France, Germany, Hungary, Ireland, Italy, Luxembourg, Netherlands, Poland, Portugal, Spain and Sweden. For other EU countries, full data was unavailable.

However, the issues of lack of finance and the need to develop appropriate types of financial markets are broader concerns for European growth, as there are also real effects on the economy. Arcand *et al* (2015) showed that the creation of credit by banks promotes growth through investments in tangibles only. But as high-income countries rely increasingly on intangible assets, it is not surprising to see an insignificant relationship between liquidity creation and economic growth in advanced countries. Beck *et al* (2020) pointed to the limited role of banks in the “*knowledge economy*” compared to other types of financial intermediaries and markets. Hsu *et al* (2014) found that industries that are more high-tech intensive are disproportionately more innovative in countries with better-developed equity markets, consistent with the established theoretical argument made by Allen and Gale (2000). Developing credit markets can even discourage innovation in these industries. With its almost exclusive dependence on banks for financing growth, the EU is not well prepared to meet the challenges of the knowledge economy.

What other ways are there for young firms to grow?

An approach often discussed is employee stock option plans (ESOP), through which entrepreneurs remunerate employees through share options rather than wages. ESOP are considered effective as a means to attract and retain talent by creating strong incentives for employees to stay committed to the firm. “*Co-ownership*” also aligns incentives better between owners and workers by rewarding value creation and encouraging long-term thinking that is more conducive to growth (Jones and Pliskin, 1997). Unfortunately, the evidence again shows that such plans are underdeveloped and fragmented in the EU. It is estimated that the share of capital held by the employees of a late-stage start-up averages 10 percent in Europe compared to 20 percent in the US (Index Ventures, 2017). This is further evidence of a lack of an appetite in Europe for risk sharing, which inhibits firm growth.

The other way for start-ups to scale up is through mergers and acquisitions. These enable firm growth but also change the nature of that growth. Merging with or being acquired by bigger firms that capture greater shares does not allow for smaller firms to carve out a piece of existing markets. Table 1 shows that many EU young firms (less than 10 years old) ends up being acquired by US firms, particularly in the IT and financial sectors. This implies that US market developments will also influence the way market dynamism develops in Europe,

which remains a very open market for global firms.

Table 1: M&A, origins of firms that acquired young EU and US companies (under-10 years of age)

Acquisition targets: EU										
Country	Technology		Healthcare		Energy		Financials		All	
	Freq.	Share	Freq.	Share	Freq.	Share	Freq.	Share	Freq.	Share
EU	117	38.0	84	41.6	98	51.3	293	58.5	1639	56%
United States	81	26.3	53	26.2	22	11.5	96	19.2	450	15%
Switzerland + UK	24	7.8	15	7.4	14	7.3	51	10.2	262	9%
Japan	43	14.0	30	14.9	11	5.8	11	2.2	233	8%
Canada	11	3.6	2	1.0	7	3.7	6	1.2	56	2%
China	9	2.9	5	2.5	11	5.8	8	1.6	76	3%
South Korea	5	1.6	0	0.0	4	2.1	3	0.6	28	1%
Other	18	5.8	13	6.4	24	12.6	33	6.6	206	7%
TOTAL	308	100.0	202	100.0	191	100.0	501	100.0	2950	100%

Acquisition targets: US										
Country	Technology		Healthcare		Energy		Financials		All	
	Freq.	Share	Freq.	Share	Freq.	Share	Freq.	Share	Freq.	Share
United States	692	72.4	449	68.5	473	83	578	77.2	3912	71%
EU	71	7.4	69	10.5	20	3.5	34	4.5	441	8%
Japan	63	6.6	49	7.5	28	4.9	27	3.6	403	7%
Canada	30	3.1	12	1.8	20	3.5	29	3.9	175	3%
Switzerland+ UK	30	3.1	43	6.6	8	1.4	30	4	223	4%
China	14	1,5	10	1.5	2	0.4	6	0.8	58	1%
South Korea	10	1	1	0.2	4	0.7	4	0.5	49	1%
Other	46	4.8	22	3.4	15	2.6	41	5.5	230	4%
TOTAL	956	100	655	100	570	100	749	100	5491	100%

Source: Bruegel based on Bloomberg, MA Dataset. The table presents the origin of firms that acquired young companies (under 10 years of age) by geographical origin from the EU (US) between 2010 and 2020. We present only four sectors, but the data includes ten sectors which include: Materials, Industrials, Communications, Consumer Discretionary, Consumer Staples and Utilities (and are included in the last column 'All').

Table 1 shows that many more US young firms than EU young firms (5491 versus 2950) have been acquisition targets. This is consistent with the US being a more fertile entrepreneurial environment for the creation of young firms. But US firms are also much more active in terms of buying up firms as a way of expanding, contributing to market concentration. Table 1 shows that US firms acquired more young firms from the US itself than the total of all EU young firms acquired during this 10-year period (3912 versus 2950). Interestingly, US firms bought as many EU firms as EU firms bought US firms (450 versus 441). But in terms of shares, US M&A activity in the EU is double that of EU M&A activity in the US (15 percent versus 8 percent). US firms have a preference for acquiring European firms in technology, financials and healthcare. An important difference shown in Table 1 is that US firms are mainly acquiring domestic firms (1639 versus 3912, or 56 percent versus 72 percent).

The fact that technology start-ups (though not only) are being acquired in large numbers, as highlighted in Table 1, has negative implications for the dynamism of markets, explained by the theory of harm. Parker *et al* (2021) reviewed very recent literature on the impact of M&A activity, particularly of acquisitions by big technology firms. They argued that high levels of M&A activity create a “kill zone” effect, by reducing market entry by other firms (hence dampening innovation) and decreasing the supply of venture capital funding and invest-

ment. Furthermore, they argued that while there is a very strong first-mover motive, which generates incentives for many firms to enter the market, it is not good for the development of full markets. In the presence of first-mover advantage, start-ups aim to grow enough and to be acquired by big technology firms. But as soon as one firm is bought there is little space for other acquisitions, which effectively kills all others in that particular market.

Other factors might account for the reluctance in Europe to take risks, ranging from cultural attitudes to debt to how insolvency and bankruptcy laws are organised in each country. Coupled with the lack of appropriate finance and much lower M&A activity compared to the US, European young firms do not have the same opportunities as US firms to grow. So, downward pressure on interest rates is the result of higher macroeconomic risk that, coupled with greater inherent risk aversion, leads to much less dynamism in markets.

4 Discussion

The equilibrium real interest rate is a very important concept because it tells us something about the structure of the economy. But because it is unobservable, we can only look at the direction of travel of the real interest rate and how it is expected to evolve, to evaluate where this equilibrium is.

Much of the literature on the drivers of the productivity slowdown – the main reason behind the pressure on the equilibrium rate – has tried to explain how the US has experienced the two main global shocks digitalisation and globalisation. Factors including the savings glut, demographics and the increase in uncertainty explain some of this reduction in the demand for capital, which in turn explains the downward pressure on its price. Macroeconomic policy, whether fiscal or monetary, has not been able to abate this pressure, at least not in full. These are factors that go beyond explaining just the US experience and are considered to have made some contribution also to productivity decline in Europe.

However, as the ‘host’ of the digitalisation shock, and given existing domestic market conditions, the US may have experienced the effects of these global shocks differently to Europe. To start with, the need for less and less tangible capital for big and quick scale ups has led to the very quick development of star firms, which have become not only US champions but also global giants, given the elimination of borders (certainly digitally speaking) and the easy access to global markets. The conclusion that this strand of the literature has drawn is that the emergence of concentration power has been able to disrupt many ‘physical’ sectors of the economy and to capture market share and extract profits.

The literature is also clear that these giant, US-based, global firms will continue to extract rents, reinforced by the environment of low interest rates. However, this gives them limited incentives to innovate, at least in terms of drastic new inventions, and also encourages them to build up barriers that prevent other, perhaps more innovative, firms from entering the market. These developments indicate that the US market is not the competitive force it was back in the 1980s, as argued by Philippon (2019). Consequently, the US will not necessarily be the driver of the next wave of innovation, unless competition policy proactively aims to dilute the high degree of concentration that has built up.

The evolution of relevant variables in Europe, from the productivity slowdown to the increase in intangible investments, is not dissimilar to what has been seen in the US. But the underlying factors are not necessarily the same as in the US. To begin with, the EU is a fragmented market (certainly when it comes to the digital market). This implies that, all things being equal, it is more difficult for a company in Europe to acquire market share, and certainly hard to achieve the scale that might be possible in the US. In addition, digital innovation did not find the fertile ground in Europe that it did in the US. New European digitalised firms are fewer to start with, lack access to finance that allows them to take risks, and end up

being acquired by US firms in significant numbers. This is one way in which US firms continue to expand their market shares.

These arguments, and indeed preliminary evidence, indicate that concentration power in the EU has not been the source of the downward pressure on interest rates. If anything, it is probably US giants operating globally that have put pressure on the EU through M&A activity. Demographic developments and the overall increase in uncertainty, coupled with more conservative EU attitudes to risk, account for more of the decline in interest rates. But also, importantly, the EU has a finance system that does not favour risk sharing. And the lower the degree of risk sharing, the fewer risks are taken. A primarily bank-based system is very poorly placed to finance the digital economy that relies primarily on intangible, and therefore non-collateralised, investments.

The EU will also lose out from the second part of the vicious circle, which will sustain zombie firms and challenge bank profitability, factors that will reduce productivity and increase the pressure on interest rates.

4.1 What can policy realistically do?

Can policy afford to stay within national borders or does it really need global cooperation? The first problem to tackle is the increase in market concentration. But identifying this is not easy in digital markets that are multi-sided by nature, where prices are often zero or negative for big proportions of consumers. The European Commission's 2020 proposal for a Digital Markets Act (DMA) is the first legislative initiative that attempts to deal with this.

As shown by emerging evidence in Europe, market concentration is not really a domestic problem. To the extent that the distortions arising from market concentration are also present in European markets, they are generated by US digital 'gatekeepers.' The DMA attempts to deal with the scale of these gatekeepers and the distortions they might cause to the degree of competition in the EU.

The European Commission aims to do two things with the DMA initiative. The first is to define scale in terms of both economic worth and actual numbers of users, helping the Commission identify the 'gatekeepers' that need to be monitored. Second, and in recognition of how difficult it is to establish excessive power in the market, the DMA would be preventive in character. Rather than waiting to identify monopoly power, it aims instead to constrain digital platforms in the range of activities in which they can engage, so they do not become monopolies. For example, one constraint would be that Google, an identifiable big player, should not direct shopping queries to the Google Shopping platform, but should give equal access to all shopping platforms. This should limit how the big gatekeepers use their dominance in one activity to promote some of their other commercial activities.

How well this initiative, when it becomes legislation, manages to identify and reduce the degree of concentration will need to be tracked. As we have argued, a similar initiative would have to follow in the US if the issue of market power is to be effectively tackled. However, global coordination efforts to curb excess market power can be tackled with other instruments beyond regulation. G20 and Organisation for Economic Co-operation and Development initiatives on digital taxation or even base erosion and profit shifting strategies (known as BEPS) are intended to tackle issues of equity and fairness and can also disperse power with a view to increasing market dynamism. Globalisation and digitalisation have both increased the importance of global tax coordination.

The second problem of relevance to the euro area is manifested in increased macroeconomic risk. While some of it is, no doubt, due to a fragmented financial system, the euro-area risk premium is high, at least by comparison to the US, even for the 'safest' countries in Europe. Why is there so much more additional risk in investing in a German international company rather than in a German government bond, compared to the additional risk in the US? How much of this is due to differences in preferences, such as ownership preferences, and how much of this is due to frictions that perhaps policy could help remove?

To answer this, we need to look at deeper factors that describe the European financial

system. The story of declining interest rates in the euro area is not only of a reduction in demand for capital. It is also a story of a lack of the appropriate supply of capital. Banks, the main suppliers of investment funds in the euro area, do not typically lend without collateral. In the age of intangible investments this would imply that a banking-based finance model is not the right model for financing growth. The prospect that digitalisation will be the defining model of growth implies that Europe lacks finance, despite EU attempts since the banking crisis to facilitate alternative means of finance through the Capital Markets Union initiative, on which little concrete progress has been made. So, a clear priority for ensuring more demand for capital (therefore increasing its price) will be availability of other forms of capital supply, particularly more risky capital.

Last, our analysis inevitably has implications for macroeconomic policy and its limits. If the equilibrium real interest rate is falling, policy rates cannot deviate from it by much or for long periods. Monetary policy then becomes constrained in terms of how much it can stimulate aggregate demand. But equally, if the lack of demand for investment is indeed due to concentration power that prevents private investment from picking up, then there is also not that much that fiscal policy can do to correct for subdued demand. The effectiveness of macroeconomic policy may therefore be determined by how well structural policies that affect market conditions are applied, rather by how active macroeconomic policy is.

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
- Acemoglu, D. and P. Restrepo (2019) 'Automation and new tasks: how technology displaces and reinstates labor', *Journal of Economic Perspectives* 33(2): 3-30
- Acharya, VV, T. Eisert, C. Eunger and C. Hirsch (2019) 'Whatever it takes: The real effects of unconventional monetary policy', *The Review of Financial Studies* 32 (9): 3366-3411
- Adalet McGowan, M., D. Andrews and V. Millot (2018) 'The walking dead? Zombie firms and productivity performance in OECD countries', *Economic Policy* 33(96): 685-736
- Aghion, P., P. Askenazy, N. Berman, G. Cette and L. Eymard (2012) 'Credit constraints and the cyclical nature of R&D investment: Evidence from France', *Journal of the European Economic Association* 10(5): 1001-1024
- Aghion, P., A. Bergeaud, T. Boppart, P.J. Klenow and H. Li (2019a) 'Missing growth from creative destruction', *American Economic Review* 109(8): 2795-2822
- Aghion, P., A. Bergeaud, T. Boppart, P.J. Klenow and H. Li (2019b) *A theory of falling growth and rising rents*, Technical report, National Bureau of Economic Research
- Aghion, P., A. Bergeaud, G. Cette, R. Lecat and H. Maghin (2019c) 'The Inverted-U Relationship Between Credit Access and Productivity Growth', *Economica* 86(341): 1-31
- Allen, F. and D. Gale (2000). *Comparing Financial Systems*, Cambridge: MIT Press
- Arcand, J.L., E. Berkes and U. Panizza (2015) 'Too much finance?' *Journal of Economic Growth* 20(2): 105-148
- Autor, D., D. Dorn, L.F. Katz, C. Patterson and J. Van Reenen (2020) 'The fall of the labor share and the rise of superstar firms', *The Quarterly Journal of Economics* 135(2): 645-709
- Blanchard, O. (2019) 'Public Debt and Low Interest Rates', *American Economic Review*, 109(4): 1197-1229
- Barkai, S. (2020) 'Declining labor and capital shares', *The Journal of Finance* 75(5): 2421-2463

- Beck, T., R. Dotting, T. Lambert and M. van Dijk (2020) 'Liquidity creation, investment, and growth', *CEPR Discussion Paper* 14956, Centre for Economic Policy Research
- Bergeaud, A., G. Clette and R. Lecat (2016) 'Productivity Trends in Advanced Countries between 1890 and 2012', *Review of Income and Wealth* 62(3): 420-444
- Bergeaud, A., G. Clette and R. Lecat (2019) 'The circular relationship between productivity growth and real interest rates', *VOXEU*, 5 December
- Bighelli, T., F. di Mauro, M. Melitz and M. Mertens (2020) *Firm Concentration and Aggregate Productivity*, Firm Productivity Report, CompNet
- Bisztray M., B. Murakózy and D. Vonnák (2020) 'Analysis of the importance of intangible capital and knowledge for productivity measurement', MICROPROD deliverable D1.5a
- Borio, C., P. Disyatat and P. Rungcharoenkitkul (2019) 'What anchors for the natural rate of interest?' *BIS Working papers* No. 777, Bank for International Settlements
- Brand, C. and F. Mazelis (2019) 'Taylor-rule consistent estimates of the natural rate of interest', *Working Paper Series* No 2257, European Central Bank
- Brunnermeier, M.K. and Y. Koby (2018) *The reversal interest rate*, Technical report, National Bureau of Economic Research
- Caballero, R.J., T. Hoshi and A.K. Kashyap (2008) 'Zombie lending and depressed restructuring in Japan', *American Economic Review* 98(5): 1943-77
- Cavalleri, M.-C., A. Eliet, P. McAdam, F. Petroulakis, A. Soares and I. Vansteenkiste (2019) 'Concentration, market power and dynamism in the euro area', *Discussion Paper* 2253, European Central Bank
- Claessens, S., N. Coleman and M. Donnelly (2018) 'Low-For-Long interest rates and banks' interest margins and profitability: Cross-country evidence', *Journal of Financial Intermediation* 35: 1-16
- Corrado, C., C. Hulten and D. Sichel (2005) 'Measuring capital and technology: an expanded framework', in C. Corrado, J. Haltiwanger and D. Sichel (eds) *Measuring capital in the new economy*, University of Chicago Press
- Crouzet, N. and J.C. Eberly (2019) 'Understanding weak capital investment: the role of market concentration and intangibles', *Working Paper* 25869, National Bureau of Economic Research
- 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): 561-644
- Jones, D. and J. Pliskin (1997) 'Determinants of the Incidence of Group Incentives: Evidence from Canada', *Canadian Journal of Economics* 30(4): 1027-1045
- Eggertsson, G. and L. Summers (2016) 'Secular stagnation in the open economies: How it spreads, how it can be cured', *VOXEU*, 22 July
- Engel, D. and M. Keilback (2007) 'Firm-level implications of early-stage venture capital investment--An empirical investigation', *Journal of Empirical Finance* 14(2): 150-167
- Elsby, M.W., B. Hobijn and A. Sahin (2013) 'The decline of the US labor share', *Brookings Papers on Economic Activity* 2013(2): 1-63
- Farhi, E. and F. Gourio (2018) 'Accounting for macro-finance trends: Market power, intangibles, and risk premia', *Working Paper* 25282, National Bureau of Economic Research
- Furman, J. (2018) 'Market Concentration', Hearing on Market Concentration, Organisation for Economic Co-operation and Development, 7 June
- Giglio, S. and T. Severo (2012) 'Intangible capital, relative asset shortages and bubbles', *Journal of Monetary Economics* 59 (3): 303-317
- Gopinath, G., S. Kalemli-Ozcan, L. Karabarbounis and C. Villegas-Sanchez (2017) 'Capital allocation and productivity in south Europe', *The Quarterly Journal of Economics* 132(4): 1915-1967

- Gordon, R.J. (2017) *The rise and fall of American growth: The US standard of living since the Civil War*, Princeton University Press
- Gutierrez, G. and T. Philippon (2017) 'Investment-less growth: An empirical investigation,' *Brookings Papers on Economic Activity*, Fall
- Holston, K., T. Laubach and J.C. Williams (2017) 'Measuring the natural rate of interest: International trends and determinants,' *Journal of International Economics* 108, Supplement 1 (39th Annual NBER International Seminar on Macroeconomics): 59-75
- Hsu, P-H., X. Tian and Y. Xu (2014) 'Financial development and innovation: Cross-country evidence,' *Journal of Financial Economics* 112(1): 116-135
- Index Ventures (2017) Rewarding Talents, available at <https://www.indexventures.com/rewardingtalent/>
- Jorda, Ò., K. Knoll, D. Kuvshinov, M. Schularick and A.M. Taylor (2019) 'The Rate of Return on Everything, 1870-2015,' *The Quarterly Journal of Economics* 134(3): 1225-1298
- Karabarbounis, L. and B. Neiman (2014) 'The global decline of the labor share,' *The Quarterly Journal of Economics* 129(1): 61-103
- 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
- Komlos, J. (2016) 'Has creative destruction become more destructive?' *The B.E. Journal of Economic Analysis & Policy* 16(4)
- Liu, E., A. Mian and A. Sufi (2019) 'Low Interest Rates, Market Power, and Productivity Growth,' *Working Paper* No. 25505, National Bureau of Economic Research
- Nakamura, L.I. (2020) 'Evidence of accelerating mismeasurement of growth and inflation in the US in the 21st century,' *Working Paper* 20-41, Federal Reserve Bank of Philadelphia
- Parker, G., G. Petropoulos and M. Van Alstyne (2021) 'Platform mergers and antitrust,' *Working Paper* 01/2021, Bruegel
- Philippon, T. (2019) *The Great Reversal: How America Gave up on Free Markets*, Harvard University Press
- Sablik, T. and N. Trachter (2019) 'Are Markets Becoming Less Competitive?' *Economic Brief* 19-06, Federal Reserve Bank of Richmond
- Sajedi, R. and G. Thwaites (2016) 'Why Are Real Interest Rates So Low? The Role of the Relative Price of Investment Goods,' *IMF Economic Review* 64: 635-659, International Monetary Fund
- Smeets V. and F. Warzynski (2020) 'ICT, Firm Growth and Productivity,' MICROPROD deliverable D3.2
- Summers, L.H. (2015a) 'Demand side secular stagnation,' *American Economic Review* 105(5): 60-65
- Summers, L.H. (2015b) 'Have we entered an age of secular stagnation?' *IMF Economic Review* 63(1), 277-280, International Monetary Fund
- Van Reenen, J. (2018) 'Increasing Differences between firms: Market Power and the Macro-Economy,' mimeo, San Francisco Fed
- Woodford, M. (2003) *Interest and Prices: Foundations of a Theory of Monetary Policy*, Princeton University Press