Macro Picture

CAN PRODUCTIVITY REVIVE GOLDILOCKS?

Dario Perkins

Productivity growth was chronically poor in the 2010s, the result of persistently sluggish demand and poor technological diffusion (beyond the "superstars"). COVID-19 could be the catalyst for a secular revival, by accelerating the adoption of new digital technologies. But macro policy must provide a supportive environment, by encouraging a "high-pressure" economy.

Chart 1: From secular slump to secular revival?

Sources: Bank of England, MeasuringWorth.com, TS Lombard estimates.

SUPPLY PESSIMISM

There is growing pessimism about the supply side of the global economy, as COVID disruption threatens to interact with longer-term threats from climate change and deglobalization. But productivity is the potential *deus ex machina* that could keep Goldilocks alive in the 2020s. The last decade produced one of the weakest periods for productivity since the mid-19th century.

TECHNOLOGICAL DIFFUSION

Technological diffusion slowed in the 2010s, with a small group of "superstars" catching most of the productivity gains. While this was partly due to new digital technologies, the macro climate of weak demand and low interest rates compounded the situation. Productivity laggards had no incentive to boost their efficiency, relying instead on cheap labour and low borrowing costs.

COVID TRANSFORMATION

COVID-19 has accelerated the adoption of digital technologies. Businesses have increasingly digitized their supply lines, customer interactions and workforce. Not all these changes will produce immediate efficiency gains – it takes time for economies to adjust – but they could boost productivity over time, particularly in combination with a more supportive policy regime.

CAN PRODUCTIVITY REVIVE GOLDILOCKS?

There is no doubt supply-side weakness has soured the global macro environment in 2021, producing an uncomfortable mix of rising inflation and weaker growth. This, in turn, has forced a hawkish pivot from central banks, especially those that think growing inflation expectations threaten their "credibility". Should COVID disruptions linger, they could even interact with longer-term supply risks, particularly those posed by deglobalization and climate change. Yet we should be careful not to become too pessimistic about how the supply capacity of the global economy has shifted during the pandemic, especially as there could be a *deus ex machina* that keeps Goldilocks alive – a productivity revival. The last decade was, after all, one of the weakest periods for productivity in modern history, comparable only with the Great Depression episodes of the 1930s and late 19th century. While economists have struggled to understand this weakness, it reflects mainly two important features of the post-2008 macro economy: (i) persistently subdued demand (part of a policy regime that ran the economy "too cool"); and (ii) a deterioration in technological diffusion, with a relatively small group of "superstar" companies increasingly capturing the efficiency gains from new digital technologies. The possibility of a post-COVID productivity revival rests ultimately on whether the pandemic can reverse these trends.

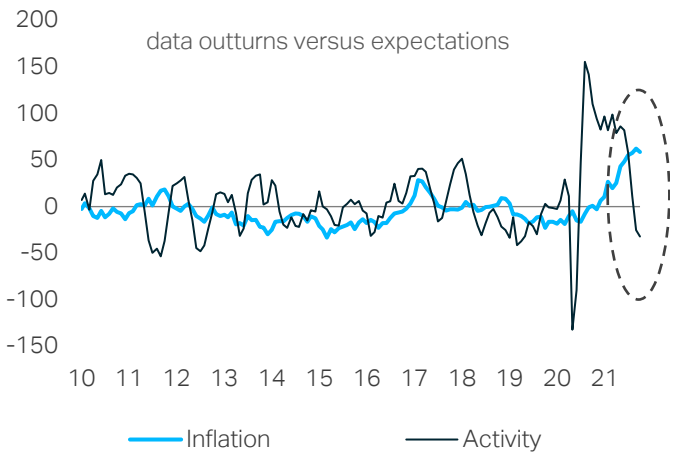
In recent years, there has been a vigorous research effort to understand the slowdown in technological diffusion and to explain the dominance of the superstars. While some blame lax anti-trust regulation (especially in the US), most highlight the underlying nature of digital technologies, which naturally encourage superstar-type dynamics. Productivity leaders have invested heavily in intangible capital, especially proprietary IT software, which tends to have high fixed costs and low (often zero) marginal costs. These technologies strengthen their market dominance while simultaneously inhibiting technological diffusion to the wider economy. Yet there is also evidence that the productivity gap between the superstars and the corporate laggards feeds on itself, especially in an environment of chronically weak demand and low interest rates. When low-tech companies believe they have less chance of catching up with the superstars, they invest even less in new technologies, which amplifies the downward pressure on interest rates and further widens the productivity gap. Worse still, this environment of weak demand and low rates – which disproportionately benefits the superstars – makes the laggards more reliant on easy funding conditions and low wages. COVID-19 could be the shock that finally breaks these dynamics, shifting the economy onto a better productivity trend.

There is no doubt that COVID-19 has pushed many businesses to adopt new technologies that were available – but underutilized – before the pandemic. These long-overdue improvements to the way firms operate could generate significant productivity gains. Many companies have digitized their supply chains, their interactions with customers, and even their workforce. In some sectors, such as healthcare, construction and retail, the gains could be large (McKinsey, 2021). Yet the ultimate impact of the pandemic on productivity is not just a question of how the crisis influences tech investment and worker efficiency. COVID-19 could also affect the allocation of resources – both across businesses and between sectors. This is more difficult to assess, since permanent structural shifts cannot yet be distinguished from lingering COVID disruption. While there are signs that business dynamism is improving in some countries, there are also offsetting forces, such as: (i) persistent mismatch in labour markets; (ii) generous policy support that kept some unviable businesses in operation; and (iii) the impact of the pandemic on health and education. Overall, we see reasons to be optimistic about a post-COVID productivity revival, but the story would be more compelling in a sustained "high-pressure" economy. In this respect, current supply strains are a mixed blessing. They provide an incentive for firms to become more efficient, but they undermine the case for continued expansionary macroeconomic policies.

1. SUPPLY PESSIMISM

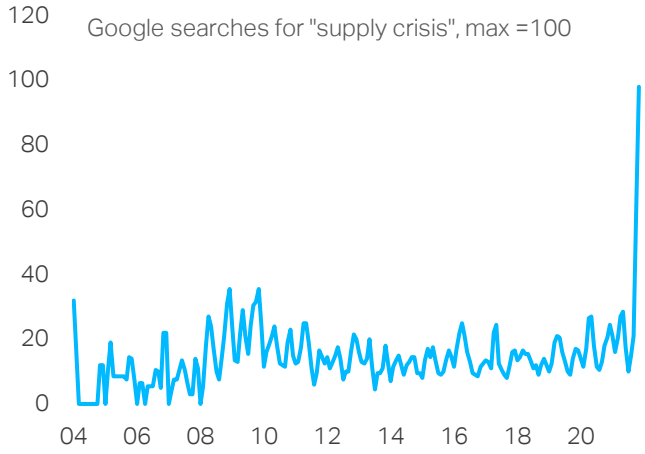
Global supply strains have hit the mainstream: the evening news stories are dominated by the "supply-chain crisis" amid worries about shops running out of toys and electrical goods in the run-up to Christmas. Investors, meanwhile, face uncertainty about how these issues will affect financial markets. While the "supply crunch" a big theme in the recent earnings season – a record number of companies blamed input shortages for missed revenues and lower margins – there is a great deal of concern about how monetary policy will respond. As we explained in our previous Macro Picture, the evidence is now growing that supply pressures are feeding through into a broader range of consumer prices and lifting inflation expectations, which is making central banks more hawkish. For officials in some countries, the inflation story is now less "transitory" than it was a few months ago, which warrants faster monetary tightening.

Chart 2: Hint of stagflation in global data



Sources: Bloomberg, TS Lombard.

Chart 3: Guess what people are worried about



Source: Google.

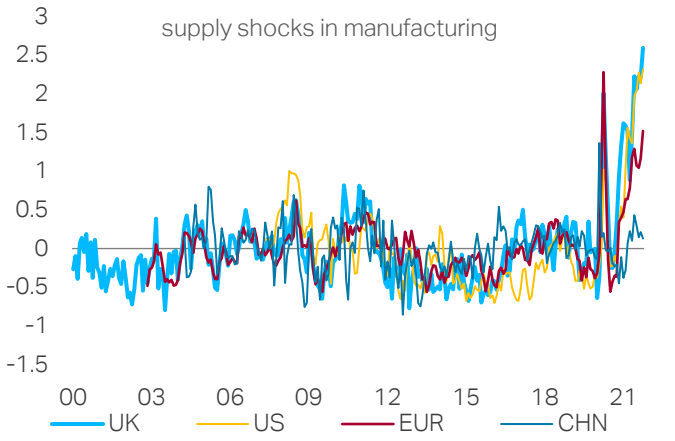
Supply vs demand

Some commentators blame "excessive demand" for this situation, especially after the massive policy interventions of the past 18 months. They want central banks to raise interest rates in an effort to squeeze inflation out of the system before it becomes entrenched. But the true story is more complicated than that. While there is no doubt we would not be worrying about inflation if the authorities had not supported their economies during the pandemic, the real problem is excess demand for goods, i.e., a relative demand shock. Meanwhile, there are severe problems in global supply chains – including acute reflexivity and cascading shortages/logistical issues – which are amplifying the inflation consequences of this new COVID-induced spending pattern.

We can use simple econometrics to illustrate the crucial role these supply pressures are now playing in the global inflation story. Chart 4 shows our measure for negative "supply shocks" across the major economies, based on the latest manufacturing PMI surveys. To separate out the impact of demand and supply, we take those components of the PMI that best capture current supply strains – namely delivery times, input prices, inventories and stocks of purchases – and run a regression of each individual component on new manufacturing orders. In principle, the residuals from these regressions provide an estimate of manufacturing activity net of demand, which we then combine into a single "supply shock" metric for each country. Our analysis shows two waves of acute supply disruption during the pandemic: one during the initial

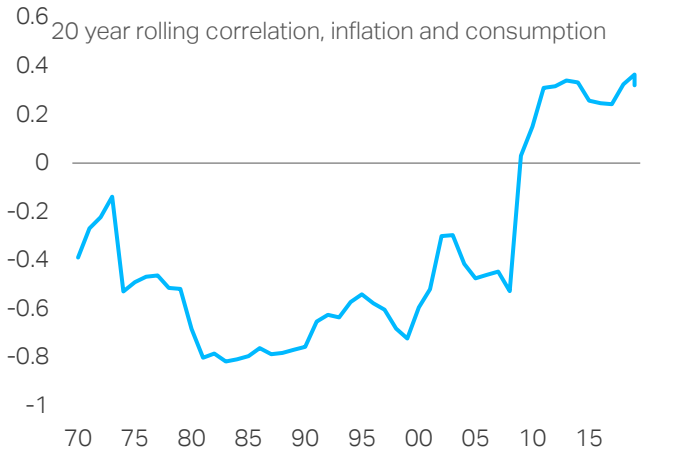
lockdown period and another, more recent and persistent episode. It is this second phase of supply tensions that is providing the more difficult test for the "transitory" inflation view.

Chart 4: This is supply, not demand



Sources: Markit, TS Lombard. Note: see text for explanation.

Chart 5: Demand shocks dominated in 2000s

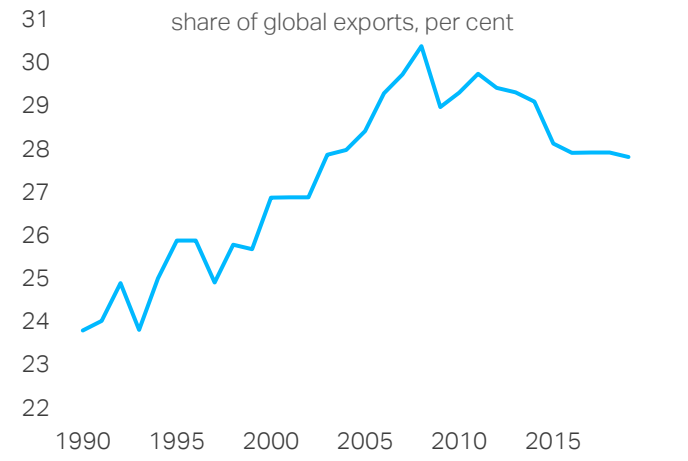


Sources: BEA, BLS, TS Lombard.

A taste of a new regime?

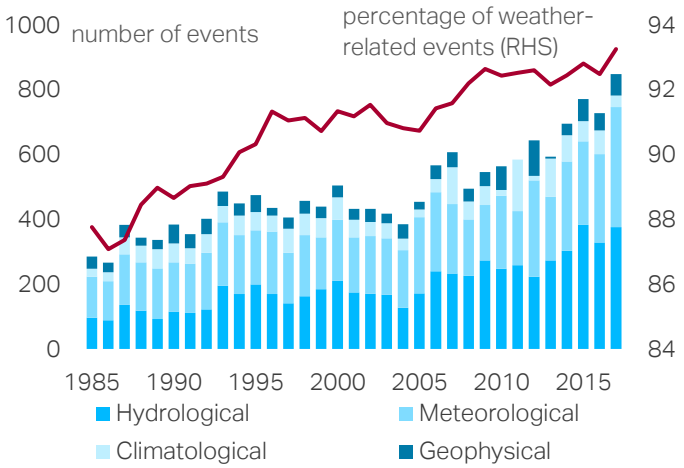
While the current problems in supply chains will eventually settle down as consumer spending patterns shift back to services and the logistical problems in global trade unwind, this latest episode of disruption has highlighted the possibility of a new macroeconomic regime – namely, a world in which negative supply shocks are more frequent and pervasive than in the past. Some of the supply problems associated with the pandemic might linger and perhaps even interact with other sources of disruption, such as climate change and deglobalization. It is easy to see, for example, the potential interaction between COVID-19 and deglobalization. The pandemic has shown that complex international supply chains can be inherently unstable and, over time, this could encourage governments and businesses to push for shorter, more stable trade linkages, even if this means new inefficiencies compared with the pre-COVID regime. ("Just-in-Case" supply chains replace the "Just-in-Time" model.) Combine this with more frequent episodes of extreme weather and we could be facing a radically different macro environment from the one that has prevailed over the last 40 years. This would be a world in which negative supply shocks dominate swings in demand – the exact antithesis of the 2000s "Goldilocks" economy.

Chart 6: Supply chains to shrink in 2020s?



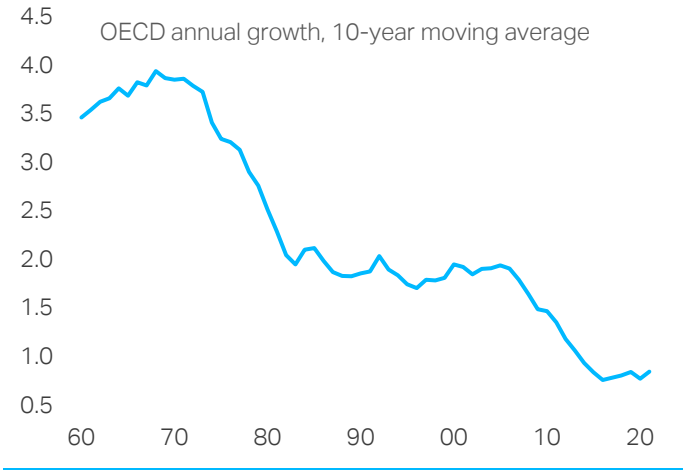
Source: United Nations.

Chart 7: Climate change another supply shock



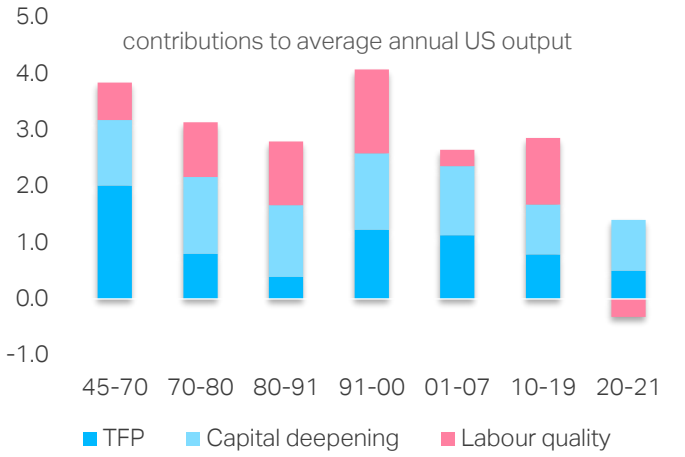
Source: ECB.

Chart 8: The long productivity slump



Sources: Conference Board, TS Lombard.

Chart 9: Decomposition of US GDP growth

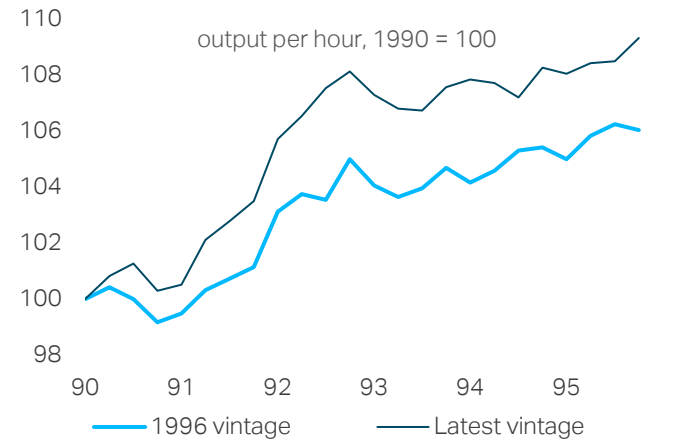


Source: San Francisco Fed.

Productivity as the *deus ex machina*

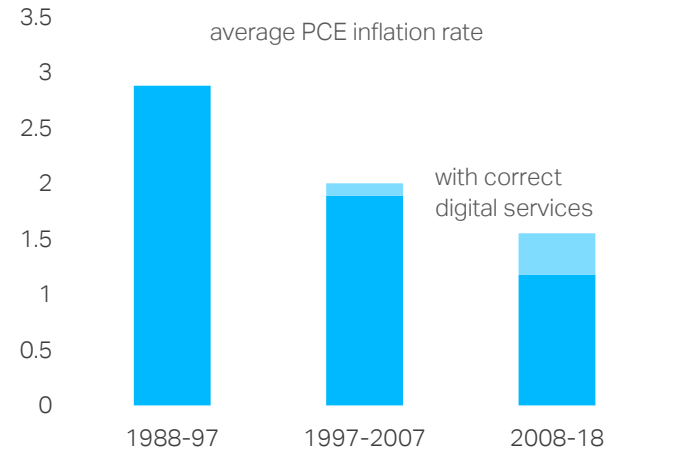
Yet before we become too pessimistic about the post-COVID supply potential, it is important to remember that there is also a possible *deus ex machina*, which Google defines as "an unexpected power or event saving a seemingly hopeless situation". In this case, productivity. A measure of the amount of output one unit of input generates (usually the number of workers in employment or the total number of hours they work), productivity has been alarmingly weak since the global financial crisis in 2008. Looking at long historical data, in fact, the 2010s was one of the weakest decades on record – comparable to the 1930s (the Great Depression) and the late 19th century (the Long Depression). And this weakness took economists by surprise, so much so the "productivity puzzle" has all but become a cliché among international policymakers. But if economists are struggling to understand why productivity has been so poor, why should they expect this weakness to continue indefinitely? A secular revival in productivity would have profound macro implications – it is, in fact, our best chance of keeping Goldilocks alive.

Chart 10: Mismeasurement in the 1990s



Sources: ALFRED, TS Lombard.

Chart 11: Some mismeasurement today



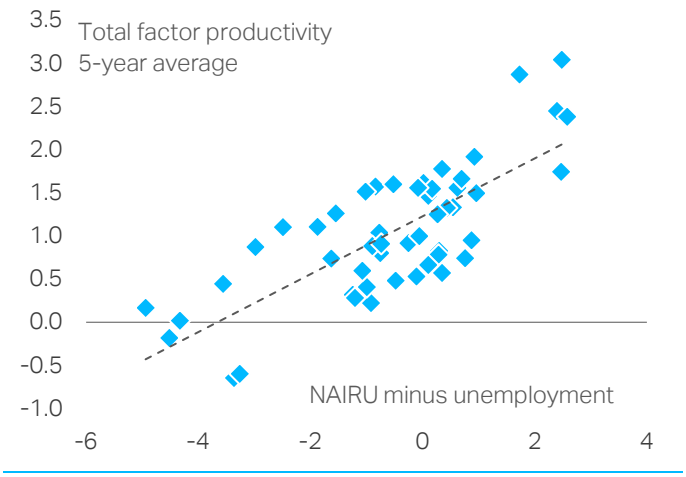
Source: Byrne and Corrado (2019).

Reasons for weak productivity

The most optimistic view of the "productivity puzzle" is that it reflects data mismeasurement. Similar to what happened in the mid-1990s, the statisticians may be under-recording the impact

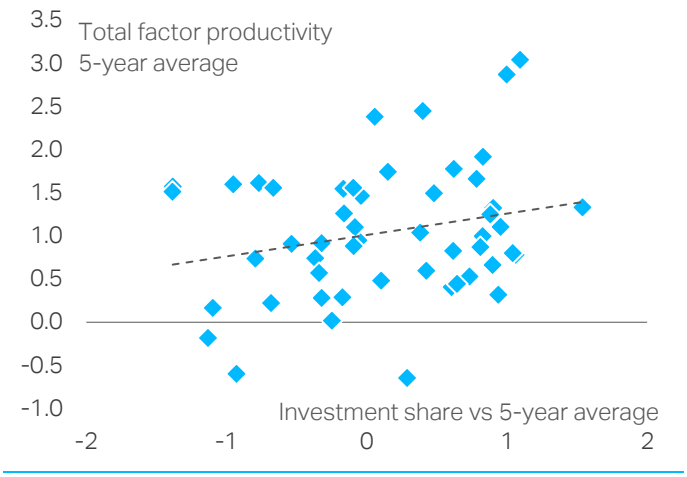
of new technologies. In 1987, Robert Solow famously remarked: "You can see the computer age everywhere but in the productivity statistics", a paradox that was eventually resolved with big revisions to official data (Chart 10). We have a lot of sympathy for the idea that there are similar distortions today. The digital economy is inherently difficult to measure, an issue we have examined in detail elsewhere (see here). And, in fact, the statisticians are continuously updating their methods to identify new sources of output (such as business spending on intangible capital and cloud technologies). But it is unreasonable to blame the entire post-2008 productivity slowdown on data mismeasurement. There have been other important factors, namely persistently sluggish demand and weak technological diffusion. In fact, there are reasons to think these two factors interact, creating a "bad equilibrium" for productivity.

Chart 12: 'High pressure' boosts efficiency



Sources: BEA, San Francisco Fed, TS Lombard.

Chart 13: Link to capital ratio is weaker



Sources: BEA, San Francisco Fed, TS Lombard.

Weak demand hurts efficiency

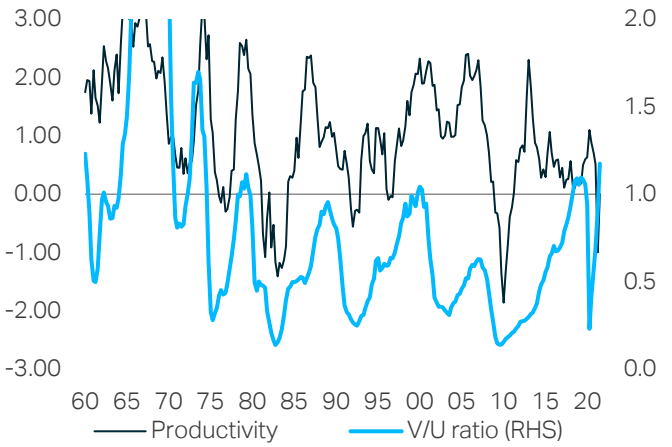
Most developed economies experienced only tepid economic growth during the 2010s. The private sector remained cautious even after the initial "balance-sheet recession" was over, and an unsatisfactory policy mix compounded the resultant disinflationary pressure. While central banks kept interest rates low, the stimulative impact of monetary policy had clearly diminished and the authorities could not offset the effect of relatively tight fiscal policy. Wages remained subdued and interest rates were low, which meant neither companies nor workers had any incentive to seek big efficiency gains. Investment ratios were low, too (outside China). Charts 12 suggest this "low-pressure" economy contributed to the weak productivity trend. "Total factor productivity" (TFP), the combined efficiency of labour and capital, is strongly correlated to the unemployment gap, the difference between unemployment and the NAIRU. This seems intuitive – when the labour market is tight and wages are rising, workers tend to work harder and companies feel more pressure to find new efficiency gains, using their capital and workers more intensively. Firms may invest more, though the link with capital ratios is weaker (Chart 13).

Slower technological diffusion

The prospects for productivity could depend on the extent to which the post-pandemic environment delivers a "high-pressure" economy. This, in turn, will require new secular growth drivers or, at a minimum, a new policy regime whereby the authorities are prepared to use fiscal and monetary stimulus (especially fiscal stimulus) to run their economies "hotter" than in the past. An attempt to "Build back better" from this crisis will be essential. And it turns out that such a policy regime could help to reverse the second force that has contributed to weak productivity

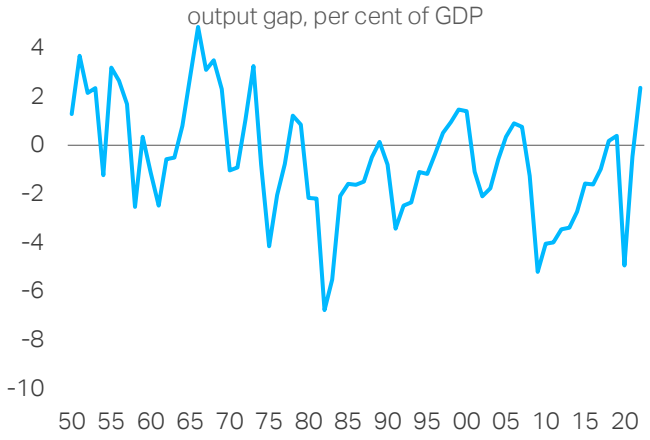
since the global financial crisis – poor technological diffusion. While new digital technologies have generated significant efficiency gains over the last decade, these have been concentrated among a relatively small number of "superstar" companies. This was partly due to the inherent nature of these technologies, but it also reflected the prevailing macro climate.

Chart 14: Tight labour – better productivity



Sources: FRED, TS Lombard.

Chart 15: The perma-lukewarm economy



Sources: CBO, TS Lombard.

2. TECHNOLOGICAL DIFFUSION

As with Robert Solow's "productivity paradox" in the 1980s, we can see the impact of digital technology all around us – except in the statistics. This time, however, the explanation is more complex than a case of mistaken data. The issue is not whether these new technologies have delivered efficiency gains – they have – but rather how their benefits have been concentrated in a narrow part of the economy. Whereas in the 1990s computers and the Internet were clearly general-purpose technologies (GPTs) and transformed the entire economy, this has not (yet) happened with the latest wave of digital advancements. Some companies have harnessed these inventions, allowing them to secure big efficiency gains and outsized profits, but most have not. The corporate sector has become polarized, with a gap between the superstars and a fat tail of laggards (dependent instead on cheap labour and low interest rates). As Andy Haldane put it: "The forces of secular innovation and secular stagnation have both been operating powerfully, with the two [corporate] productivity poles acting like magnets pulling the economy in opposite directions." How will this conflict be resolved? And could COVID spread the gains from digital technology more widely? The answers will have profound macro consequences.

Explaining slow diffusion

Diego Comin and Marti Mestieri (2013) provide a useful framework for thinking about diffusion. Drawing on evidence from a wide range of countries and technologies over many centuries, they highlight four structural factors that have been crucial for technological trickle-down:

(i) External openness – Companies that export typically make better use of tech.

(ii) Technology transfer – There are two distinct forces at work when technology is transferred across countries or companies. First, there is technological adoption – the time it takes a new technology to first reach a country or company. Second, there is

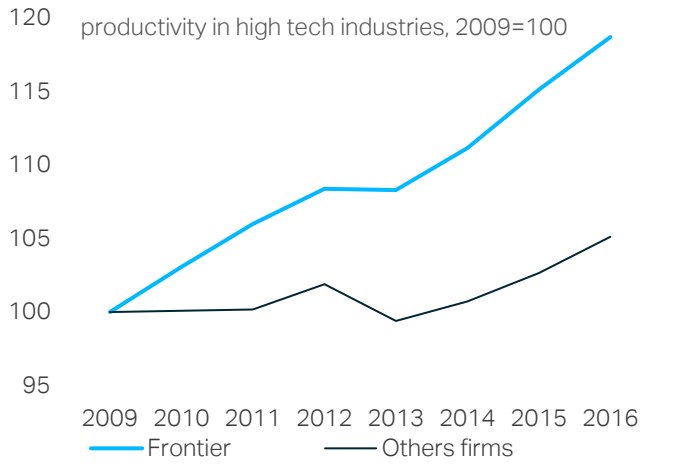
technological penetration – the extent to which these technologies then reshape processes and products in a company or country.

(iii) Human capital – One of the key mechanisms through which ideas and innovations are diffused across countries and companies is, unsurprisingly, people. When workers transition from one company to the next, their expertise and experience is transferred with them. Yet turnover rates have declined over the past decade, both within the most efficient companies and between the frontier and the laggards.

(iv) Institutional differences – Countries with high-quality institutions typically grow more rapidly and have higher levels of productivity and living standards. One of the channels through which institutions support growth is by nurturing capex and innovation. For example, upholding the rule of law and enforcing property rights is typically found to be crucial in supporting business investment and innovation.

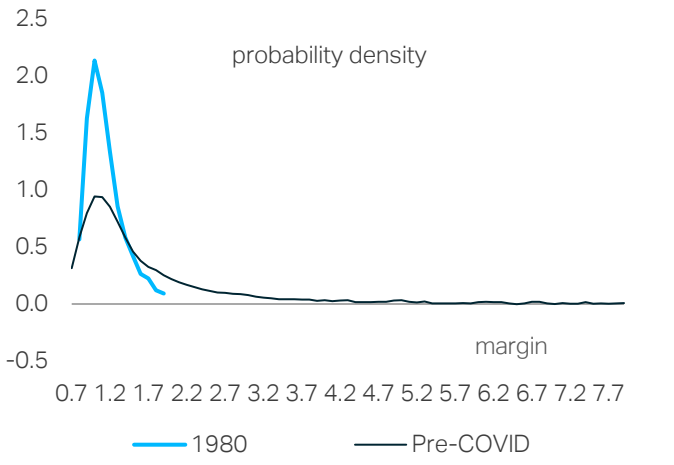
Tech enthusiasts, such as Erik Bryniolfsson, focus on technological transfer, specifically time lags that may have opened up over the past decade. They argue it takes a while – longer than most commentators realize – to reap the benefits. There are two main sources of the delay. First, it is necessary to build the stock of the new technology to a size sufficient to have an aggregate effect. Second, complementary investments are necessary to unlock the full potential of any invention. Paul David (1990) used similar arguments to explain Solow's original "productivity paradox", drawing a historical parallel between the diffusion of the computer in the 20th century and the electrical dynamo in the late 19th century. He was right. For both technologies, there were significant time lags between the initial major invention and its macroeconomic impact. At first, old methods and capital remained more efficient, so few firms had an incentive to switch to the new systems. Eventually, as these technologies improved, the cost-benefit analysis shifted and a critical mass of firms made the switch, transforming the macro economy.

Chart 16: Corporate polarization



Source: OECD (2018).

Chart 17: 'Superstar' profit margins



Source: IMF.

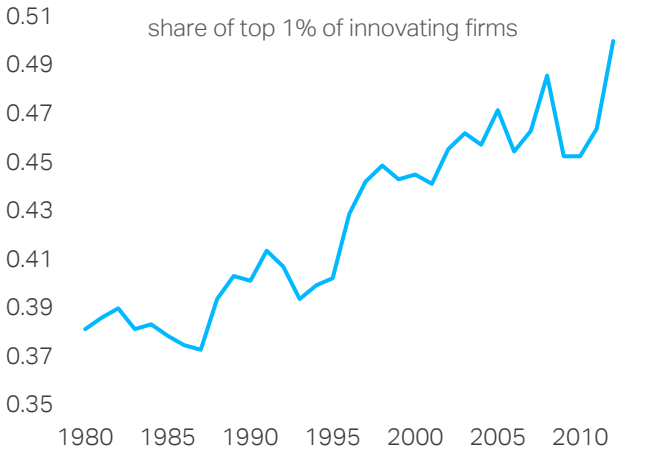
If slow diffusion is just a time lag, this is a reason for optimism – especially as COVID has accelerated the adoption of many new digital technologies (see Section 3). But maybe there is more to the story, with "structural" barriers to productivity diffusion. There has been a huge effort in in recent years to understand these issues, with researchers typically blaming either restrictions on competition (especially in the US) or the nature of the technologies themselves.

Weak anti-trust undermines diffusion?

Some economists believe the "superstar" companies benefit from "monopoly power", blaming the dilution of anti-trust laws since the 1980s. Jason Furman, for example, claims the authorities adopted the Chicago School view, wrongly believing that: (i) existing levels of competition were more intensive than previously thought; (ii) the dangers of consolidation were smaller than previously thought; and (iii) remedies that promoted competition would bring greater costs than benefits. Furman thinks this changed the behaviour of enforcement agencies and the courts, leading to more horizontal and vertical integration and thereby eroding the US economy's dynamism. Others make the comparison with Europe, where the Single Market has improved relative EU competitiveness.

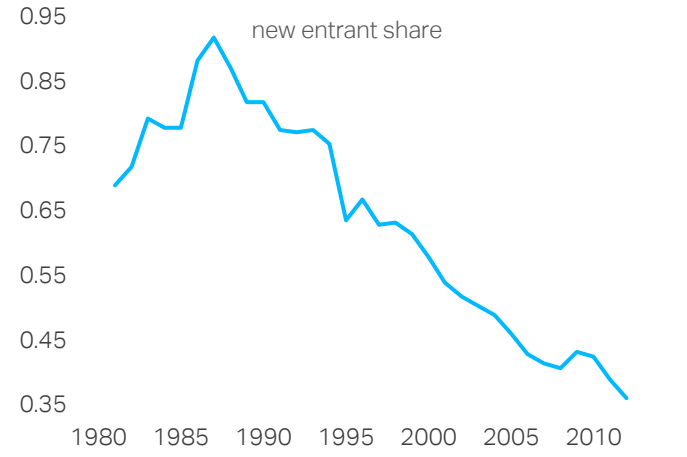
Even staff at the Federal Reserve have expressed concern about the dynamism of the US economy, blaming the dominance of the superstars on their abuse of corporate power – especially through the use of technological patenting. They show there has been a dramatic increase in the share of patents registered by the top 1 percent of innovating firms (those that already have the largest stock of patents). Conversely, the share of patents among new entrants (firms that are issuing a patent for the first time) has trended lower. The reassignment of patents from large to small firms has plunged, too, with large companies retaining their intellectual property. Given that patents are exclusively used to prevent competitors from using the patent holders' technology, these trends show market leaders are inhibiting the spread of ideas.

Chart 18: 'Superstars' doing the innovation



Source: Federal Reserve.

Chart 19: No 'dynamism' here



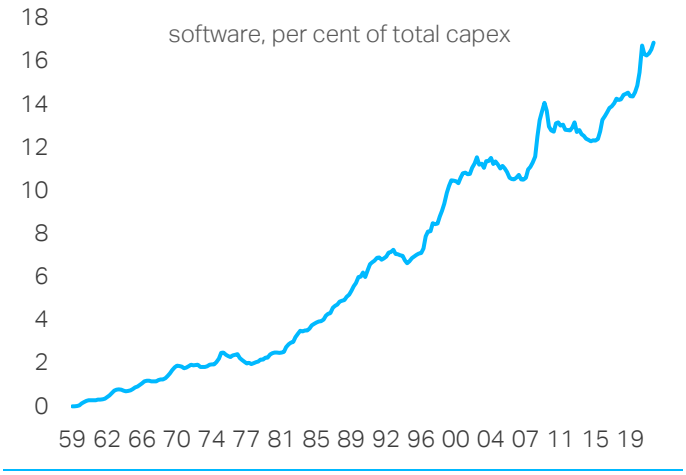
Source: Federal Reserve.

Intangible capital

The rise of intangible capital has been another contributing factor to growing market concentration and the dominance of a few tech superstars. An intangible asset is an asset that is not physical in nature. Goodwill, brand recognition and intellectual property – such as patents, trademarks, IT software and copyrights – are all intangible assets. The rise of intangible inputs has been dramatic over the past 30 years: software alone is now responsible for around 20% of US corporate investments, up from 3% in 1980. The crucial point about intangibles is that they reduce marginal operating costs while raising fixed costs. This naturally gives firms with high-intangible adoption a competitive advantage while deterring other firms from entering the market. And businesses differ in terms of the extent to which they can adopt intangible inputs to reduce their marginal costs. A pre-COVID survey by the European Investment Bank found that more than 40% of US and European manufacturing firms did not use state-of-the-art digital

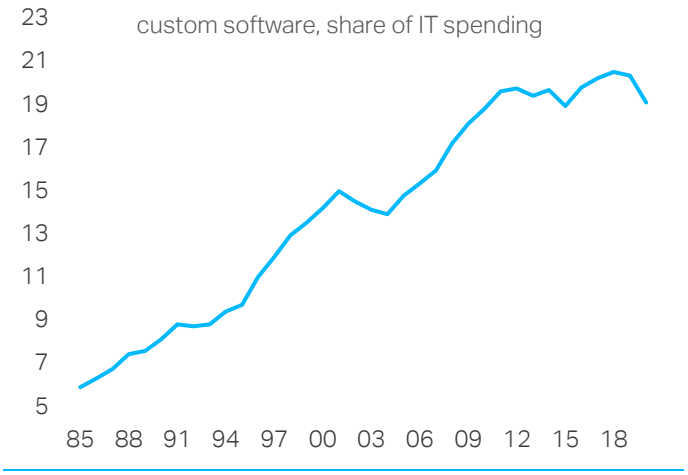
technologies, while less than 15% organized their entire operation around digital technologies. An influential paper by Maarten De Ridder, based on US and French micro data, shows that intangible capital has played a crucial role in recent productivity trends, in terms of both the revival in output per hour during the 1990s and its subsequent slowdown.

Chart 20: Software more important than ever



Sources: FRED, TS Lombard.

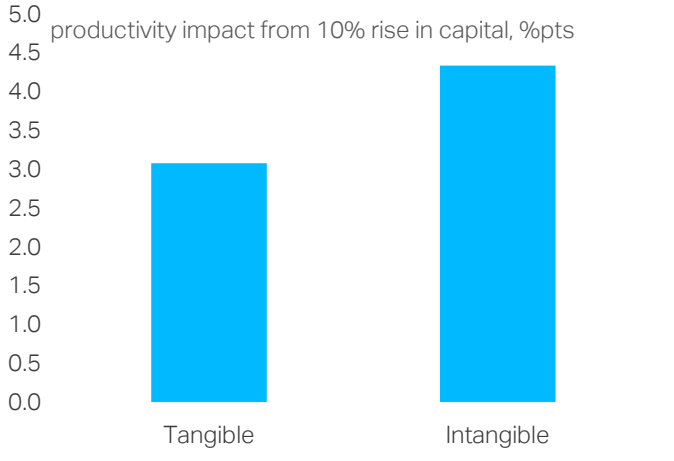
Chart 21: Does this explain weak diffusion?



Sources: FRED, James Bessen.

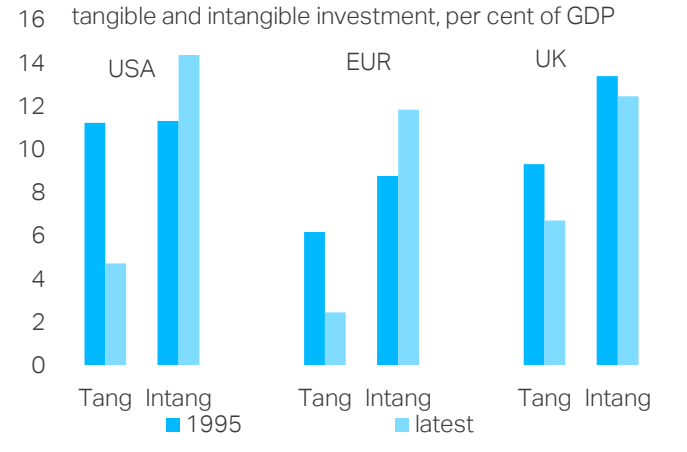
Within the intangible capital space, IT software seems to be a particularly important part of the story. During the Dotcom boom, as James Bessen at Boston University has shown, most companies bought off-the-shelf hardware and software, technologies that were available to everyone. Today, the superstars rely on their own proprietary IT systems. IT spending that goes into hiring developers and creating software owned and used exclusively by a firm is now the key to competitive advantage. Bessen believes propriety IT can explain both the rise in market concentration and the gap in productivity between firms. These new systems are complex; and because it is impossible for rivals to obtain critical technologies, M&A is often the only solution.

Chart 22: Big gains from intangible capital



Source: IMF estimates.

Chart 23: More of the economy is intangible



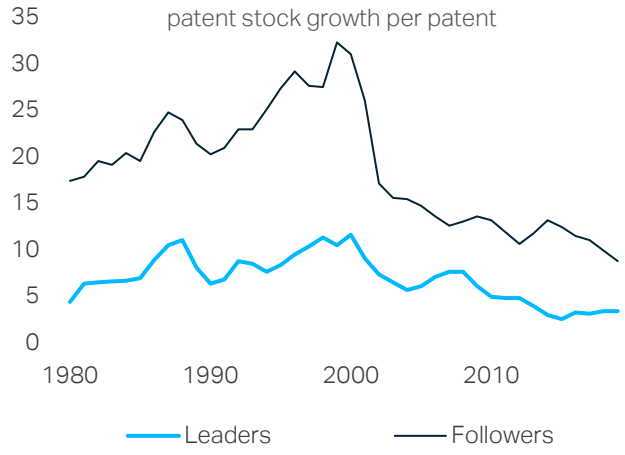
Source: IMF estimates.

Slow tech diffusion feeds on itself

Without the same intangible capital, especially proprietary software, it is harder for the laggards to catch up with the superstars. Worse still, this reduces the former's incentive to invest in even the most basic digital technologies, especially when low wages and cheap borrowing costs offer

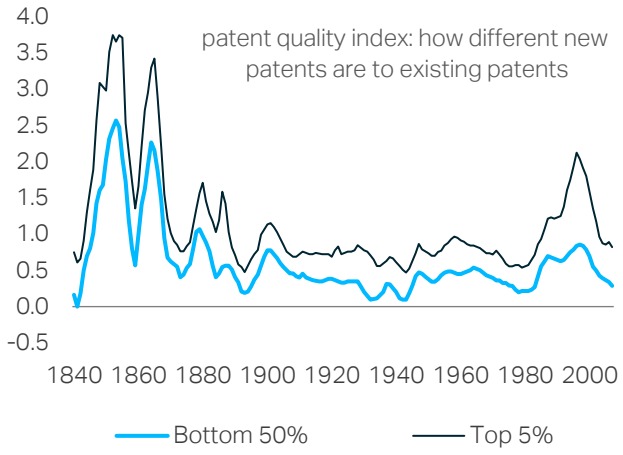
an alternative route to corporate expansion (as has been the case over the past decade). A study by Jane Olmstead-Rumsey (2020) shows, in fact, that there is a powerful "endogenous" component to weak tech diffusion – it feeds on itself! Olmstead-Rumsey finds not only that average patent quality has declined, which means there are fewer "breakthrough" patents (ones that are radically different to previous patents), but that laggard firms respond to this trend by actively investing less in R&D. Meanwhile, firms at the technological frontier are more likely to "rest on their laurels", investing only enough to keep their rivals out of the market. And these "endogenous" effects – caused by bad incentives – are large, accounting for up to 50% of the productivity slowdown.

Chart 24: Recent patents less significant



Source: Olmstead-Rumsey (2020).

Chart 25: Laggards see less chance of catch-up



Source: Olmstead-Rumsey (2020).

Bad productivity equilibrium

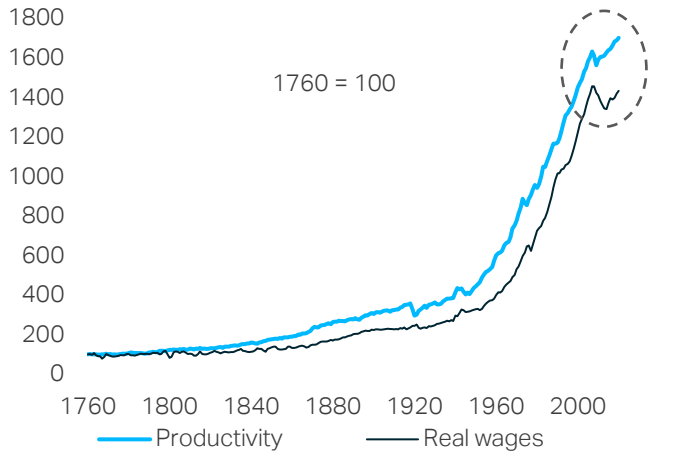
It is easy to see why the combination of persistently weak global demand and slowing technological diffusion has had such a devastating effect on productivity, generating some of the weakest readings in 150 years. We have been in a bad, self-reinforcing equilibrium! Weak diffusion reduces the equilibrium interest rate (r*), which discourages the productivity laggards from investing in new technologies, and this, in turn, puts further downward pressure on interest rates. There is even evidence that superstar companies benefit disproportionately from easy monetary policy, especially when interest rates are close to zero, as a recent paper by Kroen, Liu, Mian and Sufi (2021) explains. They identify several reasons for this advantage: (i) the cost of borrowing falls more for industry leaders; (ii) industry leaders are able to raise more debt, increase their leverage, and buyback more shares; and (iii) capital investment and acquisitions by the superstars are likely to rise more significantly. The question is whether COVID-19 can break these dynamics. Even if the superstars retain their technological edge – which is likely – the pandemic has certainly shifted the incentives for the productivity laggards. And this story becomes even more compelling if "a new policy regime" can end the era of secular stagnation.

3. COVID TRANSFORMATION

There is no doubt the pandemic is changing the way many companies use technology. But to understand the ultimate impact of the pandemic on productivity, we must consider not just the impact of digital technologies on the efficiency of the firms that adopt them but also how the crisis might affect the economy more broadly, including the allocation of resources. Even if there

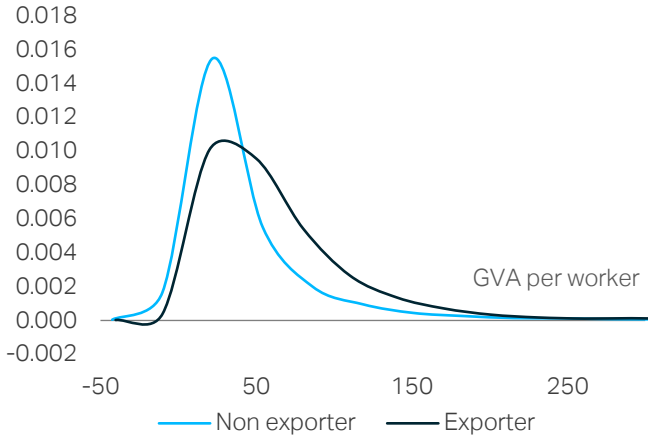
are productivity gains for individual companies/workers, the pandemic may have made our economies less efficient in other ways – for example, by creating "mismatch" in labour markets or through generous policy support keeping "zombie" companies alive. And, of course, the pandemic may have caused lasting damage to human capital, via both the impact of the virus on health (e.g., "long COVID") and lost education/training (e.g., school closures). While it is still too early to make a full assessment, we think there are reasons to be optimistic about productivity in the post-COVID economy, especially following the disastrous performance of the last decade. The superstars will retain their advantage, but there is also scope for broader efficiency gains.

Chart 26: The 2010s were highly unusual



Sources: Bank of England, TS Lombard.

Chart 27: Trade helps productivity



Source: Bank of England.

In-firm efficiency – digitization

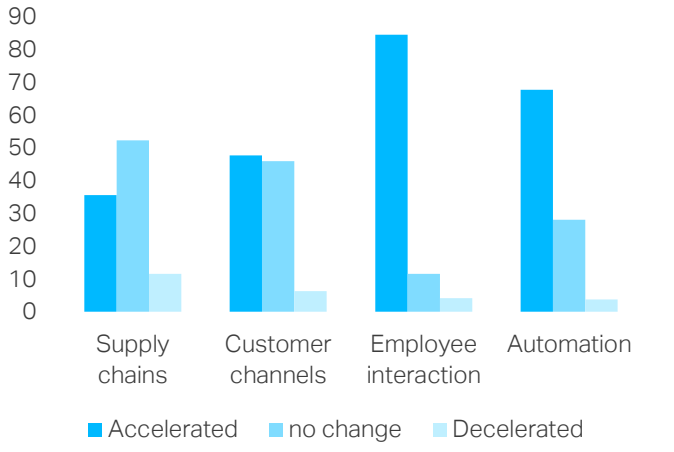
COVID-19 has pushed businesses to adopt process innovations that were technologically possible but underutilized before the crisis. This long-overdue improvement to the way firms operate could yield a substantial productivity dividend, offering hope of a new phase of "economic dynamism". Robert Gordon (2016) pointed to a similar dynamic when explaining the dynamic trajectory of output per working hour after WWII. Business surveys since the start of the pandemic offer a crucial insight into how technological adoption is changing. The McKinsey Global Institute, for example, reports significant digitization across three main channels: supply chains, customer relations (especially e-commerce[1]) and work relations (remote working, video conferencing, etc.). In fact, companies reported that, on average, they had digitized many activities 20 to 25 times faster than they had previously thought possible. While these gains from digitization were widespread (Chart 29), McKinsey analysis found they could be particularly transformative in certain sectors - namely healthcare, education, construction and retail.

More than half of companies in North America and Europe reported an increase in digital capital spending during the pandemic. While official data confirm this story for the US, data for Europe are sketchier and less granular. In aggregate, many countries have suffered a decline in business investment over the past 18 months, a reminder that capital spending outside the high-tech sector – especially in areas such as transport and hospitality – has been weak. The pandemic generated considerable uncertainty about the outlook, which led most companies to postpone their investment plans. This is not necessarily a problem – especially if there is a strong rebound

[1] Before the pandemic broke, e-commerce was forecast to account for less than one-quarter of all US retail sales by 2024; during the first two months of the COVID-19 crisis, the actual share of e-commerce in total retail sales rose from 16% to 33%. One retailer achieved three years' worth of pre-pandemic rates of growth in e-commerce in eight weeks.

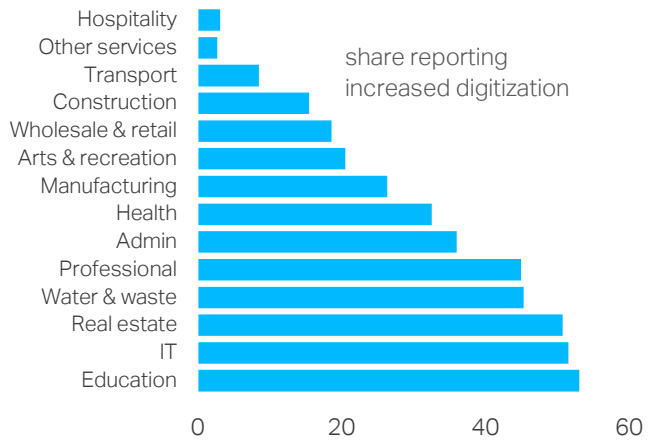
in these areas during the economic recovery; but it is a reminder that the crisis may have left a degree of "capital scarring", which is unhelpful for a secular productivity boost.

Chart 28: COVID digitization



Source: McKinsey Global Institute.

Chart 29: Uneven across sectors

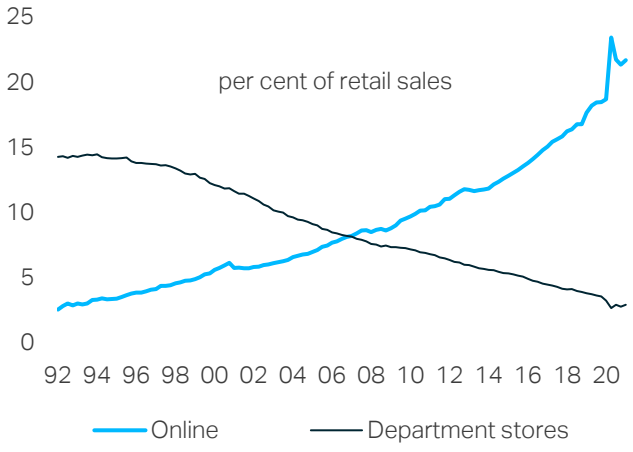


Source: McKinsey Global Institute.

Working from home

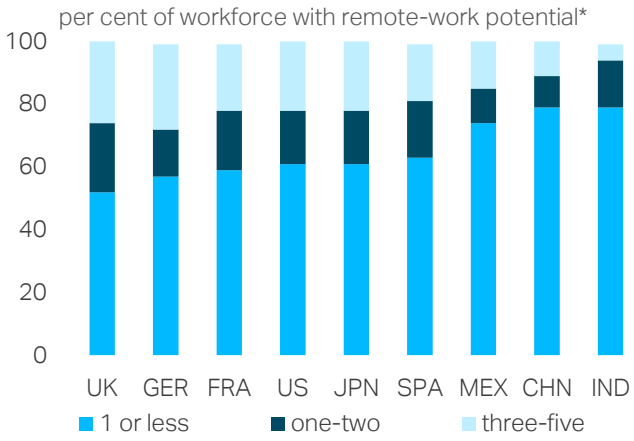
For many, working from home (WFH) has been one of the defining features of the pandemic. Without the facilitating digital technologies, the world would have suffered far larger declines in GDP (see Chart 33). And there is every indication that WFH will continue even after the pandemic has passed, with most companies set to operate "hybrid" work patterns in the future, too. WFH has not altered the capital stock during the pandemic – commercial and residential buildings have not been demolished – but the structure of capital services has shifted. We have used domestic capital (our homes) to substitute the capital services of the desk, computer and internet connection we had in the office for the desk, computer and internet connection we have at home. But is one form of capital more productive than the other? While there is no doubt people are saving time (and money) by not commuting, which is good for well-being, this will not necessarily make us more productive in terms of output per hour. We could be using the time we save for leisure activities or – more likely – for working longer hours. Yet the evidence we have of the impact of WFH on productivity is generally encouraging (with a few caveats).

Chart 30: E-commerce has boomed



Sources: BEA, TS Lombard.

Chart 31: WFH – cross-country patterns

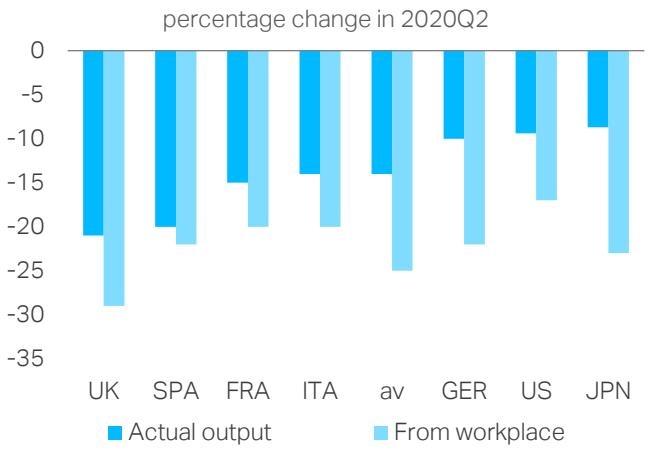


Source: McKinsey Global Institute.

Chart 32: WFH will continue after COVID

Source: Nick Bloom (2021).

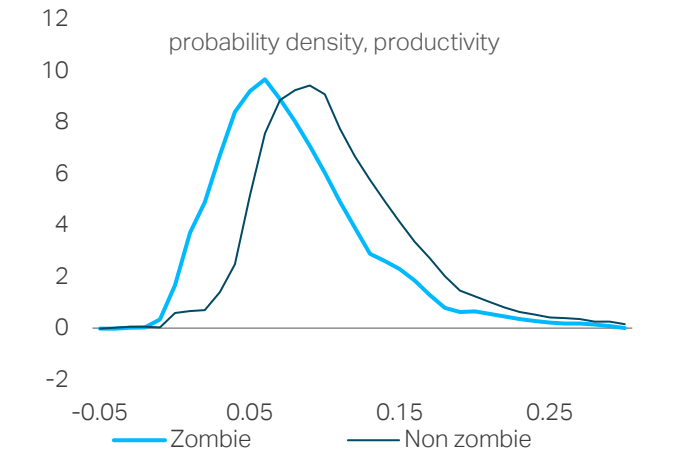
Chart 33: WFH prevented bigger GDP plunge



Source: Eberly, Haskel and Mizen (2021)

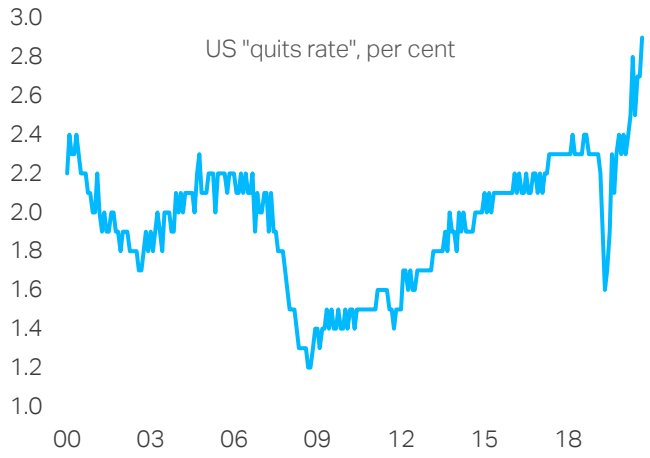
The most famous study on WFH is by Stanford researcher Nick Bloom and his colleagues (2015). They showed that randomly assigned call-workers from China could achieve significant productivity gains (+13%) by working from home rather than operating in an office. After the trial, the company allowed everyone who wanted to work from home to do so; and that improved company performance by 22%. But these productivity effects do not appear to be fixed across different demographics, firms, tasks and sectors. Studies suggest productivity gains from home-working are largest for creative tasks, perhaps reflecting the benefits of a quieter, less distracting home-working environment. Of course, there may be a selection bias here – workers that typically opt to WFH are likely to be able to do so more effectively. And when it comes to measuring the impact of WFH on productivity during the pandemic, the evidence points towards a deterioration in efficiency. Survey evidence for Japan, for example, suggests around a 7% hit to labour productivity from home-working. This is not surprising because in many cases, WFH has been mandatory, rather than optional, and it took time for workers and companies to adjust. Schools being closed was probably another important factor.

Chart 34: Zombie companies are less efficient



Source: BIS (2020).

Chart 35: New-found labour confidence?



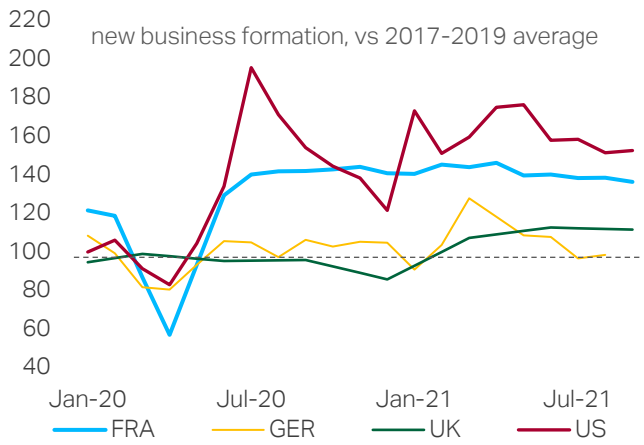
Source: BLS, FRED.

Allocative efficiency

While there are good reasons to think COVID digital adoption will boost the profitability of workers on average, the pandemic has altered the allocation of resources across the economy.

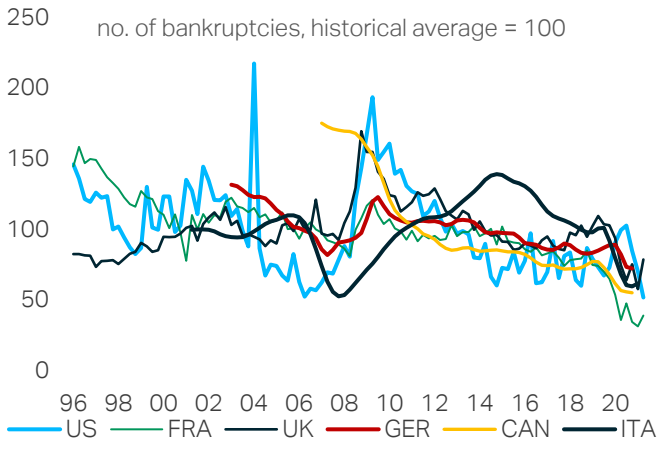
Some commentators, for example, are worried about the "zombification" of the corporate sector, whereby policy support keeps many unprofitable companies alive. Bankruptcies usually rise during a recession, but they have, in fact, declined since the start of the pandemic – an unusual trend historically and one that has happened across the entire developed world. Zombie companies – those who earnings cannot cover their interest expense – are generally less efficient than non-zombies, in part because they invest less in R&D. We suspect, however, that investor anxiety about the zombification of the corporate sector is overdone. COVID policy support was absolutely necessary to prevent an unnecessary wave of bankruptcies (and mass unemployment) owing to large but temporary shifts in consumer spending. This was not a "normal" recession, which usually triggers a permanent reallocation of resources. Moreover, while corporate debt has increased in many countries during this crisis, there is less evidence of financial scarring from corporate borrowing than from other forms of debt, particularly household leverage (which caused the 2008 "balance-sheet recession").

Chart 36: Business formations have increased



Sources: National sources, TS Lombard.

Chart 37: Bankruptcies are down significantly



Sources: National sources, OECD.

Similarly, we are not especially excited by the recent pick-up in new business formation, which is happening in some countries and usually signals a "more dynamic" corporate sector. The US and France are seeing an improvement, but the evidence from other parts of the world (such as Germany and the UK) is more mixed. It is not yet clear whether this reflects a genuinely new entrepreneurial spirit or whether it is a sign of desperation, with some workers registering their own businesses temporarily in an effort to avoid economic hardship caused by the pandemic. New business formation could return to more normal levels once labour markets improve. The flipside of this is that jobs markets seem to be allocating resources less efficiently than they were before the crisis, with widening geographic and skill "mismatches" (the Beveridge curve has shifted outwards, which is usually a bad sign for the supply potential of the economy). Again, we do not know how long these issues will persist – they might fade relatively quickly – but it will be important to monitor such developments as the global economy recovers from COVID.

Current supply 'crisis' is mixed blessing

While we are optimistic about post-COVID productivity, the crucial point is that we are going to need a "high-pressure" economy to deliver those gains. Efficiency is not going to improve if we simply return to the disinflationary "low-pressure" macro environment of the 2010s. Hence, the current strains in global supply chains are a mixed blessing. While they will encourage workers and businesses to seek efficiency gains – which is good for future supply potential – they are a serious headache for policymakers. Central banks are suddenly more hawkish and even proponents of MMT are finding in more difficult to justify large, continuous fiscal expansions

(remember, according to MMT, inflation is the only meaningful constraint on government deficits). Even if the current burst of inflation is "transitory", it could undermine the case for policy support, which, in turn, could leave a lasting impression on post-pandemic economic performance. The prospects for productivity would certainly darken.

Bottom line

We seem to have hit peak pessimism about the supply side of the global economy. Some investors are even worried about a persistent stagflation scenario, where current supply-chain disruption persists and even interacts with longer-term threats from climate change and deglobalization. But there is also a potential *deus ex machina*, in the form of a secular revival in productivity. While officials and investors have been puzzled by the chronic weakness of productivity over the past decade, we suspect this reflects mainly the combination of persistently subdued global demand and slower technological diffusion. In fact, these two forces have interacted to create a "bad equilibrium" for productivity. While some barriers to technological diffusion are likely to persist after the pandemic – especially in the form of intangible capital, such as proprietary software – COVID seems to have accelerated the adoption of many digital technologies that were underutilized before the crisis. This could pave the way for a broader-based improvement in productivity, which is our best chance of keeping Goldilocks alive. But in order to encourage this productivity revival, policymakers are going to need to allow the recovery from COVID to "run hot" for a while, rather than panic about inflation and tighten policy too rapidly.