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Creative Destruction and US Economic Growth

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Abstract

This paper argues that the growth of large, efficient but anticompetitive superstar firms is responsible for the recent slowdown in US economic growth. The argument is based on the growth theory that we have previously developed and tested, which is based on the concept of creative destruction.

Keywords: Economic Development, Innovation, Technological Change, and Growth; Antitrust Issues and Policies; Institutions and Growth.

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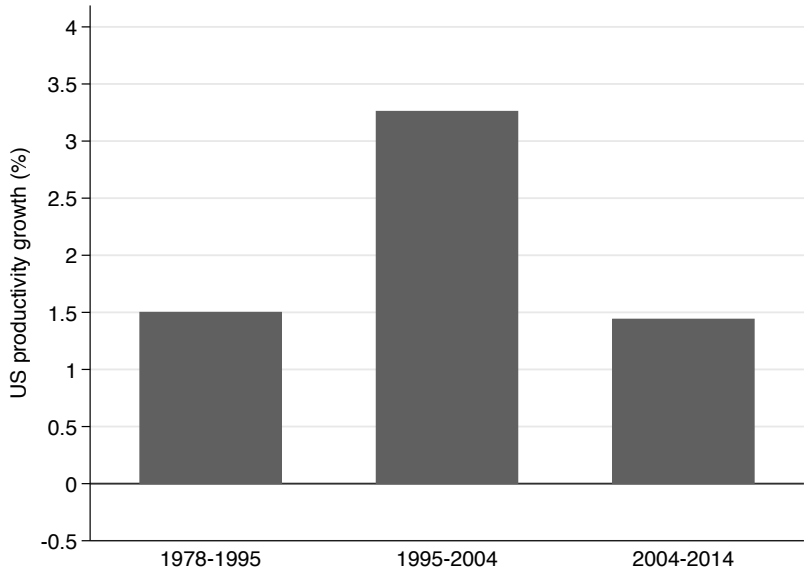
For the past 35 years, the two of us have worked developing, testing, and refining a theory of economic growth that we think has a lot to say about the current slowdown in US economic growth. The theory is based on Joseph Schumpeter's "creative destruction," the celebrated idea that the technological progress needed for sustained growth in a dynamic capitalist economy needs to be continually renewed with waves of innovations that render previous technologies obsolete. Creative destruction sets up a conflict between the disruptive outsiders who gain from creative destruction and the entrenched incumbents who are threatened by it and therefore try to suppress it. This conflict is further complicated by the fact that the disruptive innovators will, if they succeed, eventually become reactionary incumbents themselves. Indeed, the more successful they are at innovating, the better positioned they will be to suppress future innovations by outsiders. So, the very same rents whose prospect induces innovations and growth can later be used to finance the suppression of innovation and growth.

We believe that this is now happening in the US economy. The very firms whose innovations have brought us great benefits, including the IT revolution, have become so successful—and have grown so large and powerful—that they are becoming a formidable force opposing further technological progress. This paper elaborates on these ideas and discusses possible policy remedies.

Secular Stagnation?

As Byrne et al. (2016, 111) show, there was a burst in US productivity growth from the mid-1990s to the mid-2000s, but since then productivity growth has been very disappointing (see fig. 1). Clearly there has been a drastic slowdown in the process of creative destruction.

Figure 1. Rise and Decline in TFP Growth



There are of course other attempts in the literature to account for this slowdown. Gordon (2012) has argued that all the low-hanging fruit of technical change has already been picked off. Bloom et al. (2020) have claimed that this view is supported by the decline in the

productivity of US R&D. But as Joel Mokyr (2014) and others have argued, the enormous potential of artificial intelligence is only beginning to be exploited. And as one of us has contended in a recent book (Aghion, Antonin, et al. 2021), the empirical work in Bloom et al. (2020) depends on a narrow definition of R&D productivity.

Varian (2016) and others have claimed that the slowdown in productivity is largely a measurement issue arising from the difficulty of measuring technology services. Likewise, Aghion, Bergeaud, et al. (2019a) have argued that overstatement of inflation arising from our failure to account for the quality improvement implicit in the replacement of obsolete goods subject to creative destruction implies that the available statistics are understating output and, hence, productivity growth. But as various authors have argued, these measurement issues are not large enough—or widespread enough—to account for much of the slowdown.

So we think there is room for different explanations. Our idea is that the behavior of productivity has a lot to do with what David Autor and his coauthors (2020) have called the rise in superstar firms in the US economy: highly productive firms that operate with large profit margins and relatively little labor input, which have come to dominate their industries in many sectors of the economy. We tend to think of Google, Amazon, Apple, Facebook, and Microsoft (GAAFM) in the IT sector, but Autor et al. show the phenomenon exists across all major sectors of the economy. Our thesis is that these superstar firms have managed to choke off the process of creative destruction in a great number of US industries.

Innovation Blocking as an Alternative to Creative Destruction

To get an idea of how superstar firms might thwart creative destruction, we need to pay heed to the basics of Schumpeterian growth theory. The first thing to note is that focusing on creative destruction forces us to take account of something that economic historians have long realized: There are losers as well as winners from economic growth. Each act of creative destruction creates losses for those who have invested in assets tied to the technologies that are rendered obsolete. More generally, our theory makes room for different industries with different competitive situations, with leaders and followers, incumbents and outsiders, all of whom have different incentives to innovate and who are affected differently by the innovation process. This heterogeneity has allowed us to make use of large microdata sets for testing and estimation, instead of having to rely on aggregate data sets like the Penn World Tables. It also means that the process of economic growth is affected by economic actors with a variety of conflicting interests, and a country's growth prospects depend very much on how those conflicts are resolved.

Because of this, we have come to believe, as did Schumpeter, that creative destruction is a process that contains within it the potential seeds of its own destruction: the disruptive innovators whose creations are needed to keep the growth process alive eventually turn into entrenched incumbents with an interest in avoiding competition from the next generation of disruptive innovators. Aversion to competition is not in itself bad; indeed, the threat of being displaced provides incumbents with an incentive to innovate in order to stay ahead, and anything that generates more innovation is generally good for growth. But the theory points to two broad classes of mechanisms by which incumbents desirous of avoiding competition from their followers can slow down the growth process or even bring it to an end.

The first mechanism is one that we discovered with the step-by-step version of our theory developed with Christopher Harris and John Vickers (Aghion, Harris, et al. 2001) and

tested with firm-level data in two consecutive papers with Richard Blundell, Rachel Griffith, and others (Aghion, Bloom, et al. 2005; Aghion, Blundell, et al. 2009). According to this theory, the incentive to innovate in any industry depends not just on perceived technological possibilities but on the competitive conditions in that industry. We find that the biggest incentive to innovate exists in industries where firms are competing vigorously and are technologically neck and neck, with no single dominant firm. In such industries, the incentive to innovate in order to escape competition is generally very powerful. On the other hand, the least incentive to innovate occurs in an industry where a small number of dominant firms share the market and have a large technological lead over their followers. In that case, the leaders don't face any effective competition that they need to escape, and the followers are so far behind that the prospect of catching up and effectively competing is too remote to make entry or innovation profitable. We call this the automatic mechanism, because incumbents don't need to take any active measures to suppress innovation in their industries; it happens automatically.

The second mechanism is where a successful incumbent escapes competition from potential rivals by using its wealth and power to block or nullify innovation by those rivals through various economic and political means. We call this the strategic mechanism.

There are several different methods involved in this mechanism. The first is preemptive mergers, as when Facebook acquired WhatsApp and Instagram or when Google bought Applied Semantics and YouTube. The distinctive feature of preemptive mergers is that they do not make the acquiring firm more productive but instead take control of a firm that had the innovative potential to replace or at least cut into the business of the acquiring firm. Evidence of the extent of preemptive mergers is presented by Molnar (2007), who showed that horizontal mergers tend on average to harm the acquiring firm, something that would not happen if mergers were aimed solely at making the acquirer more productive. The result is a decrease in innovation.

Another method is strategic innovations and patent thickets, which put legal difficulties in the way of rivals that threaten the incumbent firms with new patentable innovations. Bronwyn Hall et al. (2021) provide evidence that patent thickets raise the cost of entry to high-tech sectors in the UK. Akcigit and Ates (2021) show that, in the US, there has been a big surge since the mid-1980s in the share of reassigned patents held by the largest 1% of patent buyers. Moreover, large firms frequently buy the patents of potential competitors early, before the competitors have realized the full benefits of their research. Such strategic use of innovations and patents is also one possible explanation for the recent slowdown of US R&D productivity. That is, perhaps firms continue to engage in R&D even when it has little direct effect on their own productivity because it at least helps to put roadblocks in the path of potential rivals.

A third method is lobbying and political contributions, which help to put legislative and regulatory barriers up against potential rivals. There is evidence that, as firms age and grow large, they engage more in these activities relative to their R&D expenditures. In the US, Forbes top 100 firms spend about $2 billion per year on lobbying, and about twice that on political contributions. Aghion, Akcigit, et al. (2019) find that across states there is a negative correlation between lobbying expenditures per capita and patents per capita, as well as between lobbying expenditures per capita and the share of new firms. Bertrand et al. (2014) show that the share of "connected" US lobbyists has risen between 1998 and 2008 while the share of

"specialized" lobbyists has fallen to less than a quarter, indicating that lobbyists are increasingly being hired for who they know instead of what they know.

A fourth method is public relations campaigns aimed at influencing the political process indirectly by trying to sway the public to identify with and take pride in large firms. A prime example of such activities is the energy sector. ExxonMobil started to spend money on climate denial research many years ago. Now that belief in climate change has become widespread, their tactics have changed, and they are part of the American Petroleum Institute's ongoing Energy for Progress campaign that paints the oil industry as the being in the forefront of the fight against climate change. This is a clear attempt to convince the public to support their incumbent position in the production of energy sources and their fight against competition from renewable energy sources.

Both the automatic and the strategic mechanisms permit incumbents to suppress innovation. Both mechanisms are likely to be especially active after a wave of innovations that has left many industries dominated by a small number of highly productive firms. In such a situation, followers are discouraged from innovating by the large technology gap they need to cover, while the leaders face relatively little pressure to undertake further drastic innovations. Meanwhile the more wealth and power their success has brought the leaders, the easier and more tempting it is for them to embrace measures to suppress innovation and entry by potential rivals.

Evidence That Superstar Firms Are Becoming Entrenched

There is considerable evidence that many industries have settled into that kind of low-innovative state of which our theory warns, with one or a few dominant firms in a position to block innovations by rivals. Much of what follows has been collated by Akcigit and Ates (2021).

First, there is evidence of increased concentration: Autor et al. (2020) show that the share of US employment in firms employing 5,000 or more workers has increased from 28% in 1987 to 34% in 2016. The share of sales for such firms has become even more concentrated than shares of employment. Grullon et al. (2019) show that the Hirschorn-Herfindahl Index of sales is up in 75% of three-digit US industries in the past 20 years, by an average of 65%. Akcigit and Ates (2021) show a similar trend in the concentration of patenting.

Second, markups have increased. Jan De Loecker et al. (2020) show that the average markup in US industries has risen from 21% over marginal cost in 1980 to 61% in 2020. The increase is broad-based across industries and reflects changes in the highest markups (there has been no significant change in median markups). Moreover, the increase in average markups is positively correlated with the increase in concentration across industries. It is largely a composition effect, with market shares shifting to what were already high-markup firms.

Third, labor's share of value added has decreased in many industries. Karabarbounis and Neiman (2014) show that labor's share fell from over 67% around 1980 to less than 60% in 2012. Autor et al. (2020) show that this phenomenon, too, is widespread across broadly defined sectors.

Fourth, the share of profit in value added has increased. Akcigit and Ates (2021) show that the share of profit in US national income has risen from around 8% in the late 1990s to around 12% by the mid-2010s.

Fifth, Autor et al. (2020) show that concentration and labor shares are negatively correlated across industries.

These tendencies are all broad-based across most sectors of the US economy but especially in IT-intensive sectors (Aghion, Bergeaud, et al. 2019b). Also, they are mainly composition effects (Autor et al. 2020; Aghion, Bergeaud, et al. 2019b) not just a general decrease in competition. Large more productive firms with low labor shares and high markups are gaining an increasingly dominant position in industries across the entire US economy.

Evidence That Superstar Firms Have Reduced Business Dynamism

There is also considerable evidence that the rise of superstar firms has contributed to a drop in business dynamism over a similar period.

First, the productivity growth of firms that are productivity laggards in their industry has fallen increasingly behind that of firms who are leaders. Andrews et al. (2015) has shown that the average labor productivity of the top 5% of global firms went up 30% in the period from 2001 to 2013 while that of the remaining 95% went up by less than 10%. This is evidence that one or both of the mechanisms is working to suppress innovation by the superstar firms' potential rivals.

Second, the entry rate of firms is down. Decker et al. (2016) show that new entrants each year in the 1980s made up about 14% of the total number of firms whereas they fell steadily since then until they reached only 8% by 2012. This is evidence that the superstar firms' potential rivals are being increasingly discouraged from entering into competition with them.

Third, the employment share of young firms has decreased. Decker et al. (2014) show that the share employed by firms younger than five years old was about 16% in the 1980s and had fallen steadily to 8% by 2012. Again, this is evidence that new challengers to the status quo are increasingly discouraged from competing.

Fourth, job reallocation is down. Decker et al. (2014) show that the annual rate of job creation and destruction fell from about 34% of total employment per year in the 1980s to 25% by 2012. This constitutes direct evidence of a diminished rate of creative destruction.

Fifth, Decker et al. (2014) have also shown that the dispersion of firm growth has fallen, especially post-2000. They attribute this to the slowing down of young-firm activity in high-tech sectors. That is, dispersion in firm growth is usually attributable to the fact that there are many large established firms that are not growing rapidly and many young firms that are growing very rapidly.

All these facts are what you might expect if a small number of highly productive firms had come to dominate in many sectors and had succeeded in becoming entrenched and suppressing competition from start-ups.

Why Superstars?

Our theory has been used in three different ways to explain how this situation has arisen. The first attempt, by Akcigit and Ates (2021), uses an extension of our step-by-step theory. The authors argue that, over the past years, it has become harder for the laggards to catch up with the leaders; one reason is that the leaders have become better at preventing the diffusion of their knowledge, for example, by acquiring patents for defensive purposes. The result is that

the automatic mechanism described above has been triggered: innovation by laggards has been discouraged, hence the growth decline, whereas leaders' rents have increased.

The second attempt, by Aghion, Bergeaud, et al. (2019b), explores another extension of the paradigm where there are two types of firms in the economy: superstar firms and nonsuperstar firms. The superstars have accumulated social capital and know-how or developed networks that other firms cannot emulate. The argument then is that the IT revolution has enabled superstar firms to control a larger fraction of sectors in the economy. This explains the surge in productivity growth between 1995 and 2005. It also explains the surge in rents as superstar firms tend to have higher markups than other firms. The flipside is that, as they became hegemonic, superstars ended up discouraging innovation and entry by nonsuperstar firms, hence the observed decline in growth and entry since the early 2000s.

A third attempt, by Liu et al. (2022), uses a variant of our step-by-step model. They argue that the growth decline is explained by the fall in interest rates, which increases the value to leaders of a bigger technological lead. This in turn encourages leaders to innovate more while making it harder for laggards to catch up.

All of these are possible. And they all lead to one conclusion: there should be a burst of innovation at first followed by a period of slow productivity growth; many industries end up with one or two large, dominant, and efficient firms and followers far behind, with both leaders and followers facing a low incentive to innovate.

Policy

Although we have focused more on diagnosis and prognosis than on prescription, we do think there are a variety of policy actions that could alleviate the situation. For example, more vigorous antitrust could help counteract the power of superstar firms. An antitrust focus on innovation instead of price (see Gilbert 2020) would also help direct policy to the crux of the problem, since it is superstar firms' suppression of innovation by competitors, not their price increases, that has created the problem. Breaking up large firms that suppress innovation and changing patent laws to disallow purely anticompetitive patent applications would also obviously help. But all these measures would be difficult to implement. Moreover, breaking up large firms risks losing the economies of scale that such firms bring, and preemptive mergers can be an incentive for a lot of start-up innovation.

So we think the most promising approach would be an industrial policy aimed at stimulating anti-climate-change innovations. It would use targeted innovation subsidies and direct government-led innovation partnerships with competitive bidding, along with technology transfer to developing countries. All of this would help stimulate decarbonizing innovation.

Such an industrial policy would target some of the biggest and most politically active entrenched incumbents—namely, Big Oil—and it would foster the new entry that has been lacking, especially if done through competitive bidding. Moreover, the viability of such a policy is evidenced by the success of previous green-energy campaigns in the US and Europe that have led to innovations making renewable sources the most privately profitable way to produce electricity in most parts of the world.[1]

[1] See Roser (2020) for documentation of the relative costs of renewable energy and fossil fuels. On the role of government-promoted research in bringing about this transition to low-cost renewable energy, see IEA (2020).

There is ample historical precedent for successful industrial policies in the US: Note, for example, the Department of Agriculture's Experiment Stations that helped bring about the remarkable sustained increase in US agricultural productivity through the mid-twentieth century. Likewise, the IT revolution from which the US has benefited so much was stimulated by various targeted policies of the US government, which built the first electronic computers, subsidized the first operating systems and transferable programming languages, and through DARPA helped set the standards and protocols for the internet.

Moreover, increasing public support for anticarbon policies makes this kind of policy more politically viable than it might seem. The same public support also acts as a spur to private innovation, because firms increasingly want to establish a reputation for helping the environment.

Although we would never claim that by itself this policy could avert the worst consequences of global climate change, it would certainly make a valuable contribution in that direction. But to be effective it would need to be implemented soon. The kind of path dependency evidenced by Aghion, Dechezleprêtre, et al. (2016) implies that the longer we use and develop traditional energy sources, the more locked-in we get and the harder it will be to spur green innovations. The good news is that that very same path dependency implies that it will be easier than usual to phase the policies out, since once green-energy sources get a foothold, privately profitable green-energy innovations will become more and more profitable and hence less in need of subsidies.

Of course, the traditional objection to any kind of industrial policy is that the government is not good at picking winners. But in a world increasingly endangered by climate change, it's clear that to subsidize anything other than green energy would be to pick losers.

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