

Missing the Juice: What's Happening with U.S. Productivity Growth?



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Takeaways

- Productivity is the key to achieving long-run economic growth and wage gains. It measures how effectively an economy uses a given amount of capital and labor.
- In general, U.S. productivity gains have slowed in recent decades.
- There are competing economic theories about why U.S. productivity growth has slowed and whether this shift is permanent.
- These theories run the gamut from a misallocation of workers to fewer new business starts to flagging public investment to a slowdown in new technology to the rise of income inequality.

- Each explanation leads to different policy solutions.

What is productivity?

Productivity is the juice that makes an economy grow. *Its most basic form, known precisely as labor productivity, measures the value of goods and services generated by the average hour of labor in an economy.* If the entire economy were made up of 50 workers in an auto plant each working 2,000 hours for the year, and they produced 100 luxury cars that sold for \$40,000 each, the productivity of this economy would be as follows:

$(\$40,000 \times 100 \text{ cars}) / (50 \text{ workers} \times 2,000 \text{ hours}) = \$40 \text{ per hour worked.}$

The formula is pretty simple: total output (or GDP) divided by labor hours equals productivity.

One way this tiny economy could achieve higher economic growth is to increase the size of its labor force, perhaps by bringing immigrants into the country. But if a larger workforce were no more efficient—if twice the number of workers produced twice the number of cars selling for the same price—then productivity hasn't changed, neither has GDP per capita nor average living standards.

To raise living standards, this tiny economy really needs to boost productivity—to get each individual worker to produce more value per hour. *There are three different ways an economy can improve productivity:*

1. **Boost productivity through labor quality.** This plant could train workers in more advanced manufacturing techniques or motivate employees to work harder. If those efforts yield 104 cars that sell for the same price, the economy's productivity is now \$41.60 and its *productivity growth* that year is a solid 4.0%. Because the number of workers held steady, GDP per capita also grew by 4.0% (assuming there's no inflation). Alternatively, the plant could make the same number of cars for the same price but of a higher quality— better airbags and new satellite radio (this productivity gain may be harder to measure).
2. **Boost productivity through capital investment.** Capital can be invested to make workers more productive by, for example, giving the auto workers higher-tech machines to work with. The investments of individual savers into companies through the purchase of stocks and bonds, the investments of company profits into research and development, and the use of tax dollars to improve infrastructure are all capital investments.
3. **Boost total factor productivity.** The real world is messier than the ideal world and that's where *total factor productivity*—or TFP—comes in. In a way, TFP is the dark matter in the economy. It was discovered in the 1950s by Nobel Laureate Economist Robert Solow, who saw that some growth in the economy could not be attributed to increases in labor, labor quality, capital, or capital efficiency. *That extra boost he dubbed TFP, which measures how efficiently an economy uses given amounts of both labor and capital together.* In our tiny economy example, TFP could rise if the car plant were to rearrange its existing workers and machines to run more efficiently, or if new software were invented that allowed the workers to get more out of the machines.¹

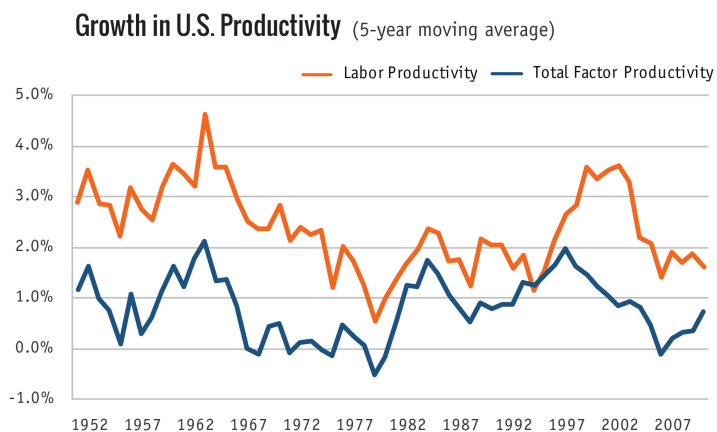
Solow argues that TFP is the primary source of long-run economic growth. And his position remains widely respected.

That is why innovation and technological gains—like new software—are so coveted by economists.

Ideally, these productivity gains—whether owed to labor quality, capital investment, or technology—filter down to the assembly line worker through improved wages. That is why most economists see productivity as the central source of long-run economic growth.

Why has U.S. productivity slowed?

In recent years, U.S. productivity growth has been consistently lower than its levels in previous decades. The fall in productivity began well before the Great Recession and has not recovered to anywhere near the level of previous eras. Why? Below we explore five theories relating to the U.S. slowdown in productivity.



Source : Feenstra, Robert C., Robert Inklaar and Marcel P. Timmer, "The Next Generation of the Penn World Table," 2013. Available for download at www.ggd.net/pwt.

What's going on:

Labor productivity measures all the economy-wide gains in output-per-worker and includes contributions from improved labor quality, new capital investment, and Total Factor Productivity, or TFP. Largely representative of technological innovation, TFP tracks closely with overall labor

*productivity growth and has been a huge contributor to it, particularly during the 1980s and 1990s. Yet TFP growth has been volatile and difficult to sustain. This chart also illustrates a key finding from economist John Fernald: that TFP growth began a downward trend before the 2008 financial crisis.*²

Theory 1: It's the labor force

Some believe that slower productivity growth has to do with the misallocation of labor. That is to say, people aren't doing the most productive work they could be doing given their abilities.

For example, not too long ago limited opportunities for highly skilled women and minorities held back U.S. economic growth potential. Then we saw an explosion of women entering the labor force at all skill levels and greater opportunities for minorities. The point here is not simply that women's movement into the workforce grew the economy by expanding the labor pool—that is a long accepted fact. It's more than that. When women and minorities were able to more fully utilize their talents across a broader range of occupations, they made the entire workforce more productive: between 15% and 20% of growth in aggregate output over the past half century can be attributed to these groups.³

But while women and minorities are still short of parity in different occupations, there is the law of diminishing returns. The representation of women and minorities in certain occupations could—and should—continue to rise, but maybe not at the same rate as was seen in earlier decades.

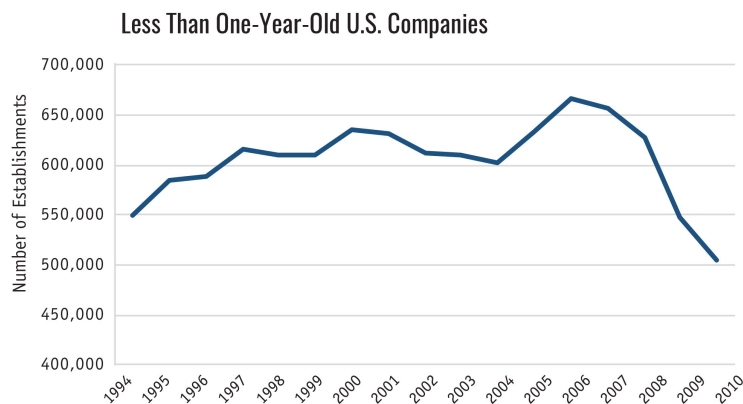
Another type of worker misallocation in the U.S. is geographic. People are stuck living in the wrong place, according to economists Chang-Tai Hsieh and Enrico Moretti. They argue there are simply too few workers in America's high-productivity city centers like New York, San Francisco, and San José, and too many in places that have low

productivity.⁴ Others have also argued that because of the mortgage crisis, many people are underwater on their homes and do not have the mobility to chase opportunities.⁵

Theory 2: It's the companies

While our economy feels dynamic with new tech firms like Twitter exploding onto the scene, the reality is that business startups have declined and old companies are hanging on longer.

Leigh Buchanan, editor at large for Inc. Magazine, writes that the downfall of corporate dynamism and entrepreneurship is crippling productivity growth.⁶ In a dynamic economy, businesses are constantly evolving. They grow, they shrink, they die, and new firms are born—often. This causes jobs to be created and lost. It reshuffles resources from old industries to new. And it allows workers to more fluidly shift to their productive potential. When death and birth rates of businesses slow, it's a problem for any economy and slows productivity.



Source : Bureau of Labor Statistics,
http://www.bls.gov/bdm/entrepreneurship/bdm_chart1.htm

What's going on:

The number of companies less than one year old has declined over the last decade. There are several possible reasons: a sluggish economy, banks' unwillingness to lend to start ups, a decline in

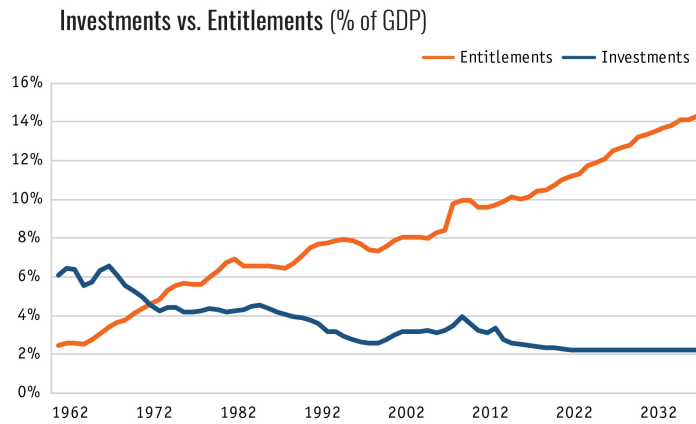
education in fields with high labor demand. That start-ups and entrepreneurs have been on a downward trajectory since 2005 could be behind the U.S. productivity slowdown.

Economists at the OECD point to another link between dynamism and productivity. The OECD authors argue that “global frontier firms” are operating just fine, at a highly productive level. It’s the lesser, “laggard firms,” that are dragging down productivity on aggregate. In the past, when dynamism was higher, the transmission of knowledge and business practices was more fluid. ⁷

Theory 3: It’s the government

The government has a huge role to play in productivity. Education spending makes for a more educated workforce with higher labor quality. Infrastructure spending is a form of capital investment that helps businesses operate more efficiently. And basic research spending helps generate those new inventions so crucial for TFP gains.

While the government raises a lot of money in taxes at the state, local and federal level (36% of total GDP), it spends much of it in a way that doesn’t increase productivity—particularly compared to the past. ⁸ In the 1960s, the federal government spent \$3 on public investments for every \$1 on entitlements. Over the course of decades, this ratio has flipped as we built up a very necessary safety net. Today, the federal government spends \$1 on investments for every \$3 in entitlements. ⁹



Source : Authors' calculations, using Office of Management and Budget and Congressional Budget Office data. For Methodology, see "Collision Course" (2012).

What's going on:

Federal spending on investments contributes to productivity growth, particularly in the areas of education, infrastructure, and research. But the share of our economy made up of federal public investments has plummeted, and only shows signs of falling further. One explanation is the competition it faces from other parts of the budget, particularly mandatory programs that rise along with health costs and an aging population.

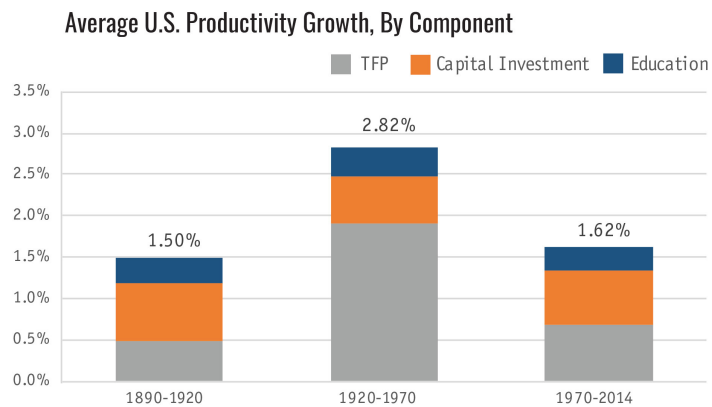
At the state level, the largest areas of spending growth are public pensions and Medicaid. While these, too, are important programs, their increase in spending have come at the expense of public investments in K-12 education, college, infrastructure, and research.

Greater resources devoted to public investment would certainly improve productivity. The question is whether there is a public appetite for the spending necessary to support a vibrant safety net, national defense, and ample public investments. If history is a guide, public investments will continue to draw the short straw.

We would be remiss if we left out the cost of government regulations as a drag on productivity. Over-regulation adds unnecessary costs to business that do nothing to spur the economy. However, balanced regulations that clarify the rules of the road could spur economic gains. This balance, of course, is in the eyes of the beholder.

Theory 4: It's the era

One of the more controversial additions to this debate is economist Robert Gordon's recently released book, *The Rise and Fall of American Growth*.¹⁰ Gordon argues that productivity gains only rise above the 1% level following major technological shocks, such as the invention of the cotton gin, the automobile, and the internet.¹¹ Because such shocks are relatively rare, the days of long-run, sustained gains in productivity are not likely to return any time soon, he writes—unless we take immediate, drastic measures to reshape our workforce.



Source: Robert J. Gordon, *The Rise and Fall of American Growth*, p. 16

What's going on:

The three drivers of productivity growth (TFP, capital, and labor quality—or education) have had varying effects over time. Since 1970, productivity has grown much more slowly than it did over the previous half century. Economist Robert Gordon argues in his new book that innovations stemming from computing and

robotics generated a shorter, less substantial surge in TFP than did advancements like airplanes and interstate highways.



Gordon maps out three industrial revolutions. The first revolution was in the late 18th Century, when the cotton gin, steam engine, and railroad spurred humans' ability to travel long distances with ease and dramatically improved productivity in agriculture. The second industrial revolution spanned from the end of the Civil War to the 1930s, with the advancement of indoor plumbing, electricity, and the automobile. These innovations, Gordon argues, freed people from the daily grind of manual labor and household drudgery, allowing people to focus their time and attention elsewhere. The third began in the 1960s and reached its climax in the late 1990s, with the invention of computers, the internet, and robotics.¹²

The productivity spike from this third revolution is much smaller than those of the previous two revolutions. Gordon characterizes the productivity spike of the late 1990s as a byproduct of the marriage between technology and the internet at businesses. By 2005, according to Gordon, all the productivity juice had been fully squeezed from web browsers, computer networks, and email.¹³

Other economists say it's not that today's tech innovations are less significant; it's that they are less detectable by economic data. Here's what that means: when the personal computer was the latest innovation, people went out and bought PCs, and all of this consumption registered in GDP stats, as well as productivity stats. But lots of today's tech innovations are free—like new smartphone apps and cloud computing, for example. These innovations increase the amount of utility, or satisfaction, consumers get for a dollar spent on computer hardware. But you don't pay for it, so GDP goes unchanged, as does measured productivity.¹⁴

Theory 5: It's the one percent

Nobel Laureate Joseph Stiglitz argues that inequality is a primary driver of underperforming U.S. productivity. In his 2012 book, *The Price of Inequality*, Stiglitz lays out multiple ways in which the divergence between the poor and wealthy in the U.S. is harming productivity.¹⁵

At the top, the growing economic and political power of the one percent have, according to Stiglitz, led corporations and wealthy individuals to exploit our political and legal systems through rent-seeking. He writes that powerful interests are seeking income “not as a reward to creating wealth but by grabbing a larger share of the wealth that would otherwise have been produced without their effort.” For example, companies can seek rents by lobbying for monopoly power. When they succeed, the good or service they provide becomes more expensive and the quantity consumed drops. Similar to the first theme—worker misallocation—this pushes workers into industries where their productivity is lower than it could have been.

As new wealth has concentrated at the top, wages for the middle and bottom have stagnated, making it harder for the latter groups to build human capital and make themselves as workers more productive. With lower incomes, it is more difficult to finance a college education. And parents, for example, invest less time in their children when they are forced to balance multiple and unstable low-wage jobs. The long-term outcome is a workforce less educated and less productive than it could have been.

Can we lift productivity?

As Robert Solow first observed a half-century ago, the key to sustainable growth is boosting total factor productivity. But improvements to labor quality and capital investment may also play a role. The question is how to do these things, and each of the five theories on why productivity growth has slowed offers clues:

1. Lifting remaining barriers to women and minorities in certain occupations could propel productivity. Increasing immigration, particularly of workers in industries where labor demand is high, would help as well.
2. Helping people become more mobile and chase opportunities in expensive but productivity-rich cities could reduce worker misallocation.
3. By encouraging entrepreneurship, simplifying business taxation, and modernizing old regulations that protect incumbent businesses, we could up the rate of new business creation. This would allow productivity gains to spread more quickly from firm to firm. By increasing collaboration between firms and universities, less productive firms could gain access to productivity-enhancing information.¹⁶
4. A commitment to public investments in education, infrastructure, and research has always boosted productivity in the past and should do so in the future. However, it may involve trade-offs with other government spending.
5. Finding ways to see that average people, and not just the few, realize greater benefits of a vibrant corporate sector would help channel labor quality away from rent-seeking and into TFP-generating activities. Rising incomes for the lower and middle-class families would allow them to make greater investments in their own human capital.

END NOTES

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