

# The long wait for a productivity resurgence

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June 12, 2018

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### Opinion Innovation

Improvement in living standards depends almost entirely on rising output per worker

Martin Wolf



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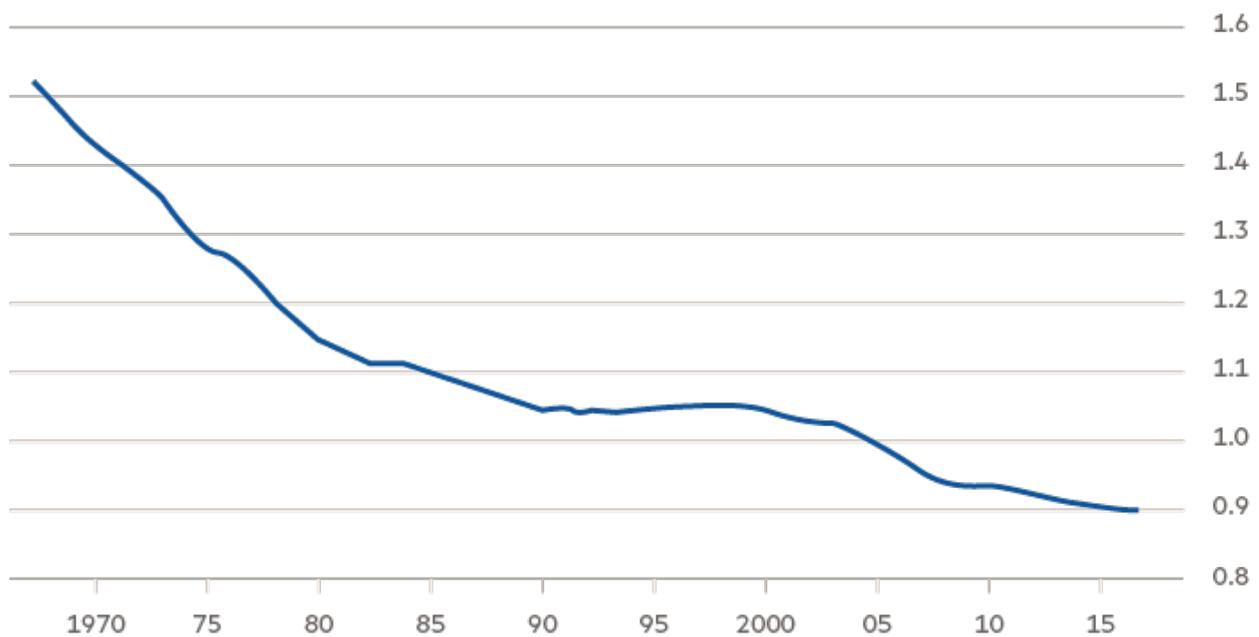
You can see the computer age everywhere but in the productivity statistics.” Today, we could repeat this celebrated 1987 statement by Robert Solow, Nobel laureate founder of modern growth theory, with the substitution of “technology” for “computer”.

We live in an age judged to be one of exciting technological change, but our national accounts tell us that productivity is almost stagnant. Is the slowdown or the innovation an illusion? If not, what might explain the puzzle?

The slowdown, if true, matters. As Paul Krugman, also a Nobel laureate, argued, “Productivity isn’t everything, but in the long run it is almost everything.” Improvements in standards of living depend almost entirely on rising output per worker.

## The long slowdown in productivity growth

Trend growth in US total factor productivity (% pa)



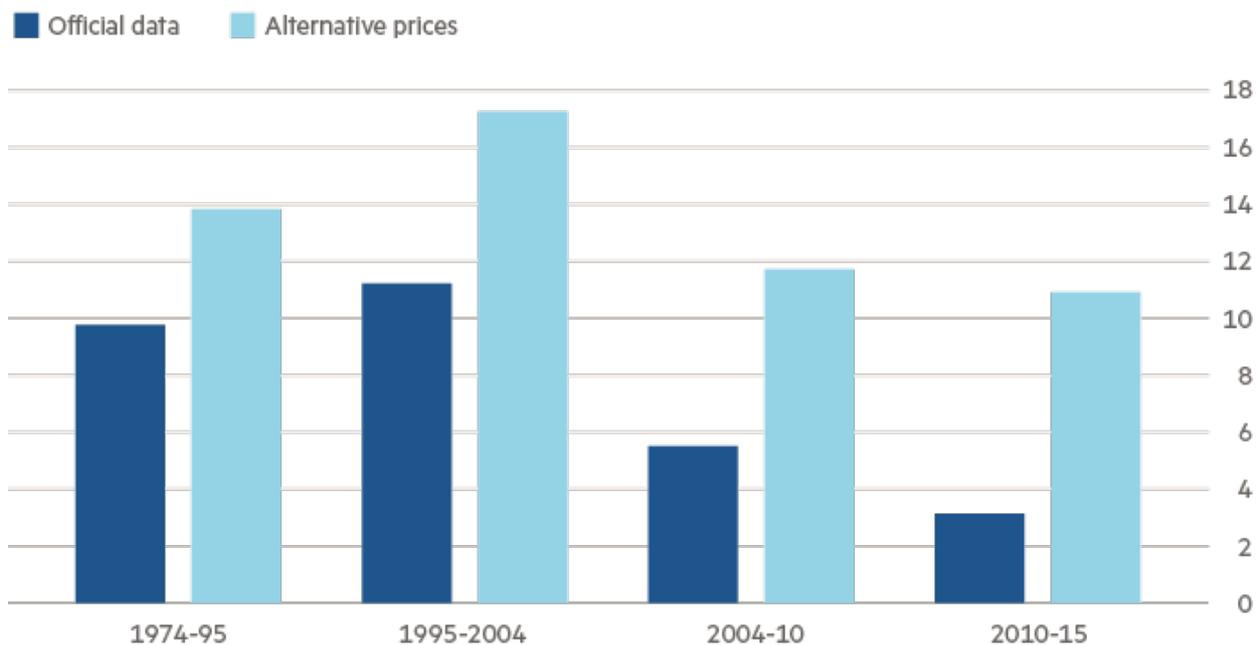
Source: N Crafts, T Mills (CEPR, July 2017)

The productivity slowdown is a major explanation for the stagnation in real incomes and the pressure for fiscal austerity in high-income countries. [Gene Grossman](#) of Princeton and three co-authors even argue that the marked slowdown in the growth of incomes per head also explains the decline in labour's share of national income in wealthy countries.

No economist has done more to promote the revolutionary implications of information technology than MIT's Erik Brynjolfsson, above all in books co-authored with Andrew McAfee, also of MIT. But, in an [interesting recent paper](#) with two co-authors, he, too, recognises the "productivity paradox". The paper does not resile from a belief in the transformative power of recent technological advances, particularly artificial intelligence. On the contrary, it emphasises it, notably in image recognition and translation. Yet the productivity slowdown, the paper admits, is real.

## Mis-measurement gives to the tech sector

Growth In US total factor productivity In the high-tech sector (% pa)



Source: D Byrne, D Sichel (CEPR, Aug 2017)

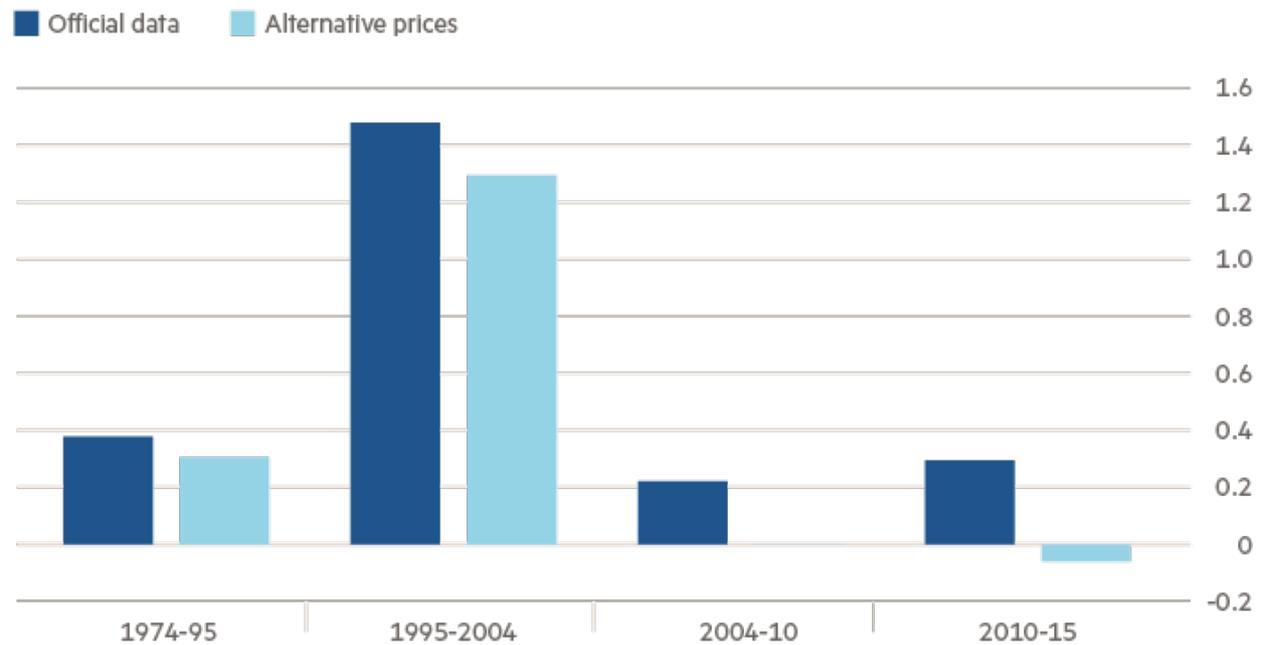
High-tech sectors include the production of computers, communications equipment, software and semiconductors

This seems to reflect weak investment and, above all, declining growth of “total factor productivity”, a measure of output per input of capital and (quality-adjusted) labour. TFP is a measure of innovation, of the ability to produce more valuable output with given quantities of inputs. Without innovation, the rising prosperity of the past two centuries would have been impossible. In truth, innovation, not productivity, is almost everything.

We should also focus our attention on the US, since this large country has been driving the innovation frontier outwards since the late 19th century. A study by Nicholas Crafts of Warwick University and Terence Mills of Loughborough shows a decline in trend growth of TFP in the US from just above 1.5 per cent a year in the early 1970s to 0.9 per cent most recently. Others, notably Robert Gordon of Northwestern University, in his masterpiece *The Rise and Fall of American Growth*, come to similar conclusions about the recent slowdown, from analysis of longer time periods. (See charts.)

## But takes away from the rest of the economy

Growth In US total factor productivity outside of the high-tech sector (% pa)



Source: D Byrne, D Sichel (CEPR, Aug 2017)

One possible explanation is mismeasurement. It is, and always has been, difficult to measure the impact of new technologies, particularly now when many services are free and many are provided, invisibly, from outside the US. Yet it is hard to accept that measurement suddenly became more difficult in 2005, when the US productivity slowdown began.

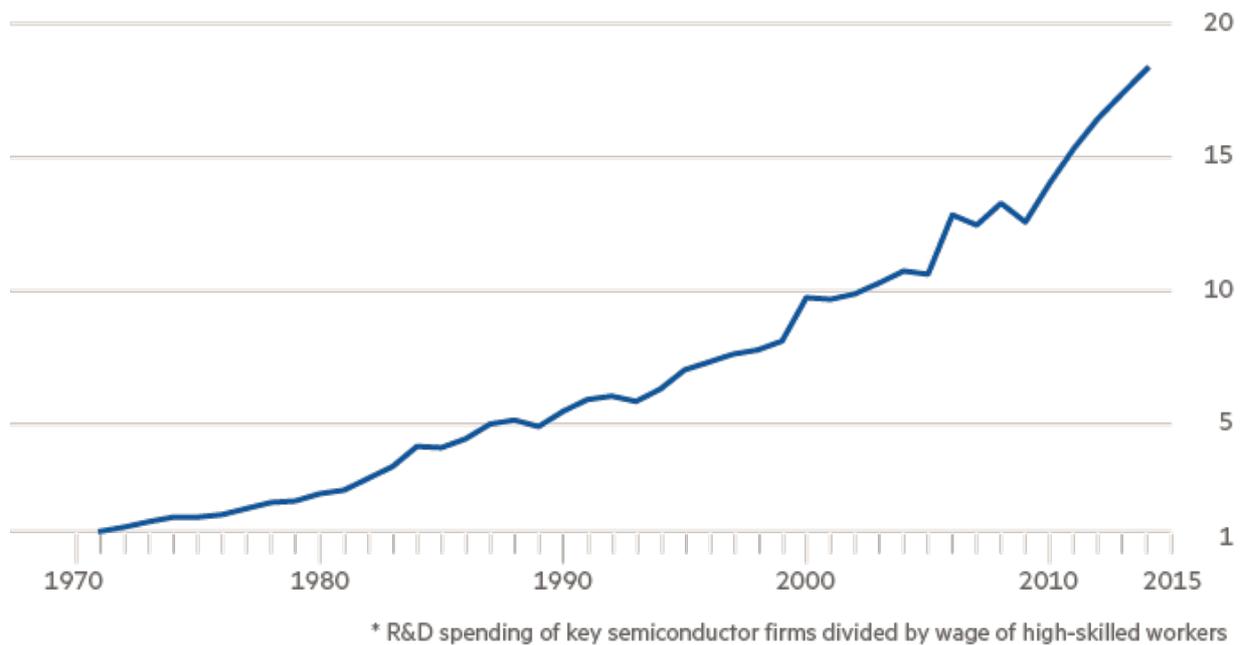
Moreover, even when account is taken of likely mismeasurement, in a study by David Byrne of the Federal Reserve and Dan Sichel of Wellesley College, the result is to raise TFP growth in the tech sector, but lower it elsewhere, with negligible effects on the whole economy. Mismeasurement then is not the explanation.

A second possibility is that diminished competition and expensive rent capture have dissipated the potential gains. So we have islands of innovation and huge wealth, but a weak economy. Several researchers do argue on these lines. This may even be a partial explanation. But it would be astonishing if monopoly alone prevented innovative technologies from bringing productivity benefits to today's open economies.

A third possibility is that the new technologies are simply not what they are claimed to be, particularly compared with the wide range of transformative ones from the late 19th and early 20th centuries: clean water, electricity, the internal combustion engine, powered flight, petroleum and chemicals.

## Constant growth demands hugely increased resources

Effective number of researchers\* (1971=1)



Source: N Bloom, C Jones, J Van Reenen, M Webb (NBER, Sep 2017)

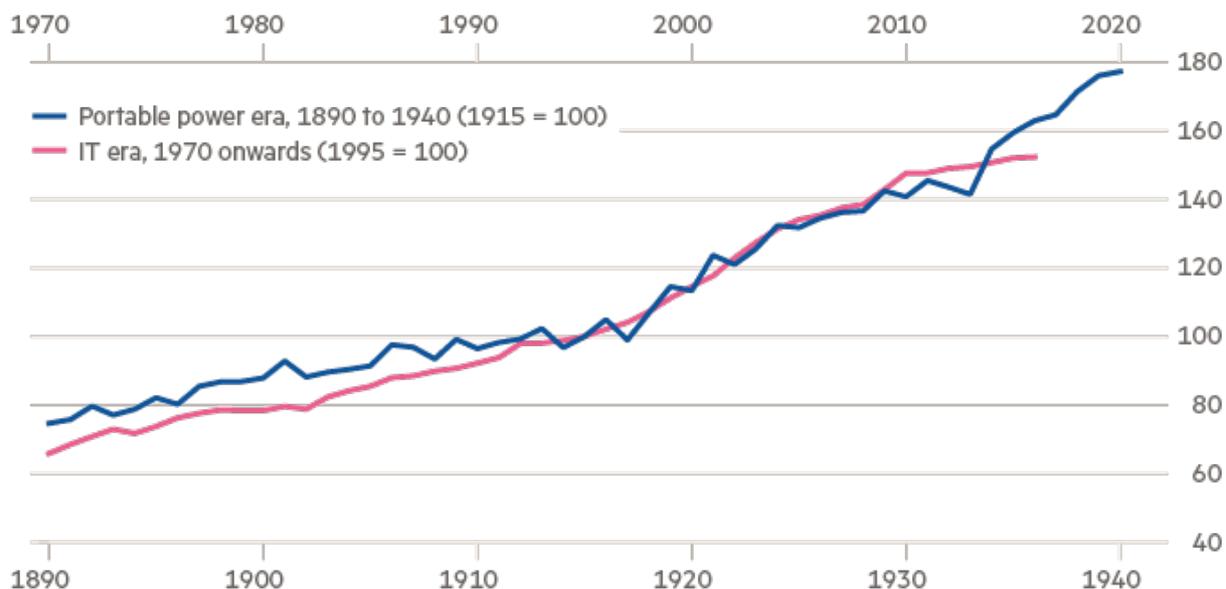
We take all those for granted, but they changed everything, as recent technologies may have not. Artificial intelligence may be a revolutionary general purpose technology but, a century ago, several technologies arrived at much the same time. A complementary view is that progress is harder now: it takes more researchers to advance technology than it used to do (though we can also employ more researchers today).

The final possibility — and the one that the paper by Mr Brynjolfsson and his co-authors unsurprisingly believes — is that this is the lull before a storm. It argues that the same productivity pause happened with electricity in the 1920s. It takes time for a new GPT to transform an economy.

Today, AI is in its earliest stages. Soon, they argue, it will change everything. This is consistent with the finding of Profs Crafts and Mills that past productivity performance is a poor forecaster of future performance.

## Impact of information technology parallels that of electricity

US labour productivity



Source: E Brynjolfsson, D Rock, C Syverson (NBER, Oct 2017)

When I look at the weighty presence in the modern economy of labour-intensive service sectors, such as health, education and care of children and the elderly, I conclude that the technological transformation will be slow. If I am wrong, it will be disruptive. At the moment, however, we have the worst of both worlds: significant disruption but near stagnation in average incomes.

What it will be in future — slow or disruptive — we do not yet know. But our societies are built on an implicit promise of growth. If the choice were between no progress and disruptive advance, we must hope for the latter — and do our best to manage the consequences.

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