

# The next productivity revolution: the 'industrial internet'



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Today's technological innovation is regarded by many as all about social media and entertainment, with no impact on economic growth. This column argues that such scepticism is premature. A closer look at selected industries suggests that the 'industrial internet' - a network that binds together intelligent machines, software analytics and people - through accelerated adoption of sensors and software analytics, will have a powerful impact on productivity and growth.

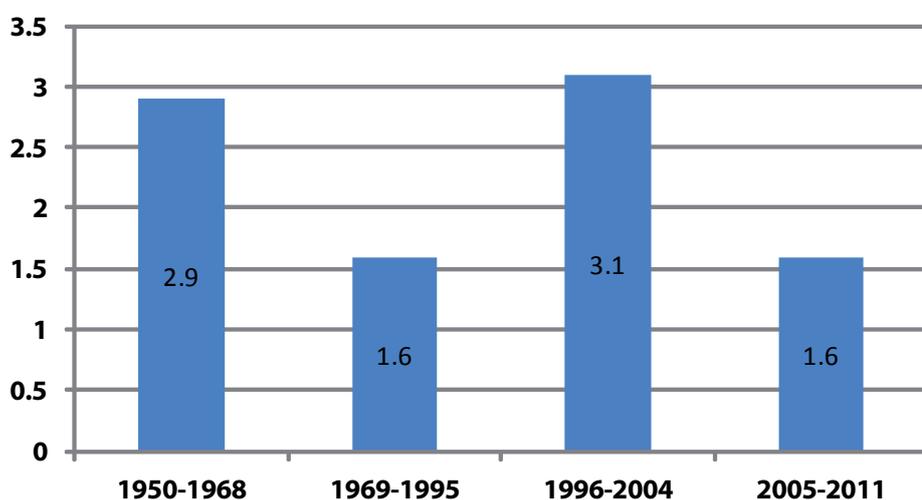
**T**he largest advanced economies are struggling with weak growth prospects and daunting fiscal challenges. Looking at the macroeconomic equation, there is no easy way out. Looking at the microeconomic level, however, suggests that it is innovation that might come to the rescue.

## Game over for productivity growth?

US labour productivity surged to an annual average of 3.1% between 1996 and 2004, nearly double the rate of the previous quarter-century; empirical evidence suggests that the Information and Communication Technology (ICT) revolution was an important driver of this productivity boost, which benefited both manufacturing and services<sup>123</sup>. Then it fizzled out. The deep 2008-09 recession and

subsequent weak recovery, as well as the dramatic reduction in employment levels, make it hard to draw any meaningful conclusions from the swings in productivity growth rates of the last few years (labour productivity growth accelerated sharply in 2009-10 and then collapsed in 2011) - but overall, labour productivity has averaged a meagre 1.6% since 2005. The sceptics argue that technology has exhausted its growth-enhancing potential, that innovation is now mostly about social media, entertainment and silly games, with no ability to boost living standards. In a recent provocative piece<sup>4</sup>, Robert Gordon has argued that the recent waves of technological innovations are simply not as transformative as those of the industrial revolution, and Martin Wolf<sup>5</sup> of the *Financial Times* commented: "Today's information age is full of sound and fury signifying little."

**Figure 1. The US productivity decline and rebound**



## The next wave of innovation

This scepticism might be premature. In a recent report<sup>6</sup>, my co-author Peter Evans and I have looked at the productivity-enhancing potential of the 'industrial internet', a network that binds together intelligent machines, software analytics and people. The declining cost of instrumentation is beginning to enable a much wider use of sensors in machines ranging from jet engines to power generation turbines to medical devices. Software analytics can then leverage the enormous amount of data generated in order to optimise the performance of individual machines, fleets and networks.

This means, for example, having a better insight in the performance of a jet engine and being able to anticipate mechanical failures so that maintenance can be performed in a pre-emptive way, minimising the delays that occur when the problem emerges shortly before take-off. It means being able to track the exact location of medical devices in a hospital and whether they are in use or idle, so that patient admissions and medical procedures can be scheduled more efficiently, yielding better health outcomes to more patients at lower cost.

The potential benefits are sizeable. Just a 1% gain in fuel efficiency over fifteen years would yield \$30 billion in savings in aviation and \$66 billion in the power generation industry, while a 1% efficiency gain would yield \$63 billion in the healthcare industry and \$27 billion in the rail industry. Our study focuses on the sectors where General Electric has a strong presence, because those are the sectors we know best and where we are seeing these gains materialise. But the industrial internet has the potential to impact a much wider range of industries, as well as services.

### The industrial internet's impact on economic growth

As the industrial internet spreads, it could have a major impact on economic growth. Forecasting productivity is an extremely difficult exercise. But looking at the potential efficiency gains in individual industries, we feel it is not unreasonable to posit that the impact of the industrial internet might be comparable to the first wave of the internet revolution.

In the US, if the industrial internet could accelerate annual labour productivity growth by 1-1.5 percentage points, bringing it back to its previous peaks, it could give a crucial boost to US economic growth. And the benefits would not be limited to the US. In fact emerging markets, where investment is likely to increase at a fast pace in the coming years, have the opportunity to become early adopters of the new technologies. Given EM's greater share in the world economy, this would quickly amplify the impact on the global economy.

### Turning point

The technologies underlying the industrial internet have been in the making for some time. Why get excited about it now? The cost of instrumentation is declining, making a wider use of sensors economically viable, and is matched by the impact of cloud computing, which allows us to gather and analyse much larger amounts of data at lower cost. This creates a cost-deflation trend comparable to that which

## "... the impact of the industrial internet might be comparable to the first wave of the internet revolution"

spurred rapid adoption of ICT equipment in the second half of the 1990s.

The mobile revolution will compound this effect, making information sharing and decentralised optimisation easier and more affordable. Industrial internet technologies is set to accelerate.

### Enabling conditions

Reaping the full benefits of the industrial internet will require a set of key enablers and catalysts:

- Investment to rapidly incorporate the new technologies into the capital stock.
- Strengthening cyber security to manage the new vulnerabilities of a more internet-heavy industrial system.
- Development of a strong talent pool, which will include new professional roles combining mechanical, industrial and software engineering expertise.

### More jobs?

The last point is especially important. Every wave of innovation raises a concern that higher productivity will simply mean fewer jobs. In today's context of high unemployment, this concern is especially acute. As in the past, technological innovation will make some jobs redundant. But it will create new ones and, if the impact on global growth is as strong as we believe, it will certainly create more jobs overall. But the education system will need to ensure that the supply of skills matches the evolving demand.

### Conclusion

The industrial revolution unfolded in waves over a very long period of time. The internet revolution is following a similar pattern, and we think the next, most powerful and disruptive wave is arriving now. The efficiency gains that are coming within reach in individual industrial sectors suggest that the potential impact of the industrial internet on productivity and GDP growth is substantial. In 1987, Robert Solow famously quipped: "you can see the computer age everywhere but in the productivity statistics". Ten years later, productivity growth surged. Today's widespread scepticism might prove similarly premature. ■

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