

THE ROLE OF THE STATE IN ECONOMIC GROWTH

PARIS

Globalization and the Rise of the Robots

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In a famous book, the two economists E. Brynjolfsson and A. McAfee of MIT describe how recent advances in artificial intelligence are changing our lives: driverless cars, drones for package delivery, computer programs to diagnose illnesses, intelligent pattern recognition software that replaces lawyers, 3D printing etc. The two economists call these developments the 'second machine age'.

In this column I want to discuss two hypotheses of how the second machine age may affect the world we live in.

Hypothesis 1: Robots will bring manufacturing back to the rich countries as machines are replacing workers and the cost of labour will not matter much.

Hypothesis 2: Intelligent machines will replace smart people rather than increase the demand for skills (capital bias rather than skill bias technical change) and as a result the relative price for skills (the skill premium) will decline.

The Revival of Manufacturing in Rich Economies

Let me start with hypothesis 1. Anecdotal evidence of reshoring (the relocation of activity back from the low-wage countries to the high-

wage countries) is mounting: Apple is shifting back some of the activity from Foxconn China to Silicon Valley in California; Airtex Design Group is shifting part of its textile production from China back to the US (see New York Times 2013). In a recent survey by the management consultancy PricewaterhouseCoopers among 384 firms in the Eurozone two-thirds said they had reshored some activities during the past 12 months and 50 per cent plan to do so in the next 12 months.

But can we see these developments in the data? In Figure 1 I look at the offshoring of production of rich economies to the low-wage countries (Asia, Eastern Europe, and Brazil and Mexico). The data were collected by Timmer (2012) from the World Input-Output Database. Offshoring is measured by the ratio of imported intermediates from low-wage countries to total intermediates used in the respective country. The data clearly show no sign of reshoring. The opposite is the case. In the Great Recession of 2008 we see a drop in offshoring activity in the US and Europe. But the activity quickly rebounded, increasing faster than before the crisis.

Figure 2, however, shows a shift in the pattern of offshoring of European firms away from Eastern Europe (including Russia and Ukraine) to Asia, in particular to China. Since 2005, Germany, France and Italy have made Asia an important destination for their offshoring activity.

Figure 1: Offshoring to Low-Wage Countries

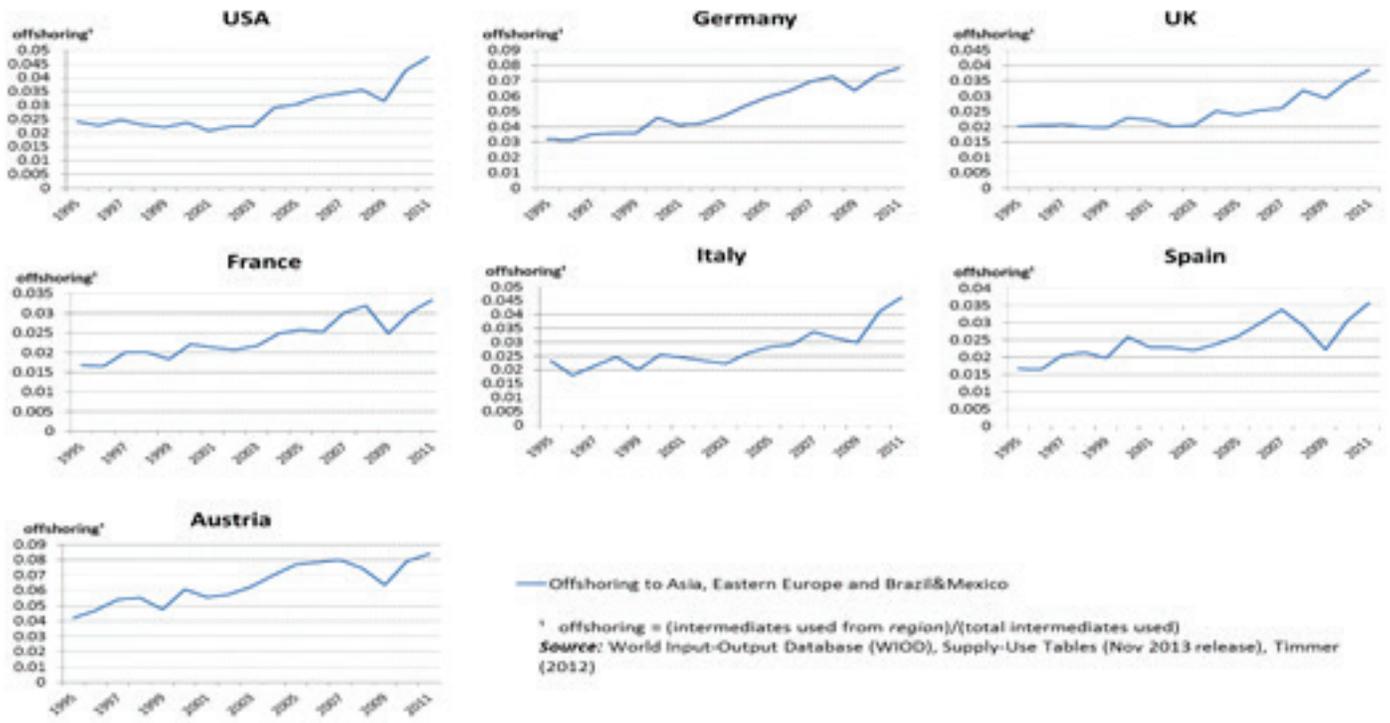
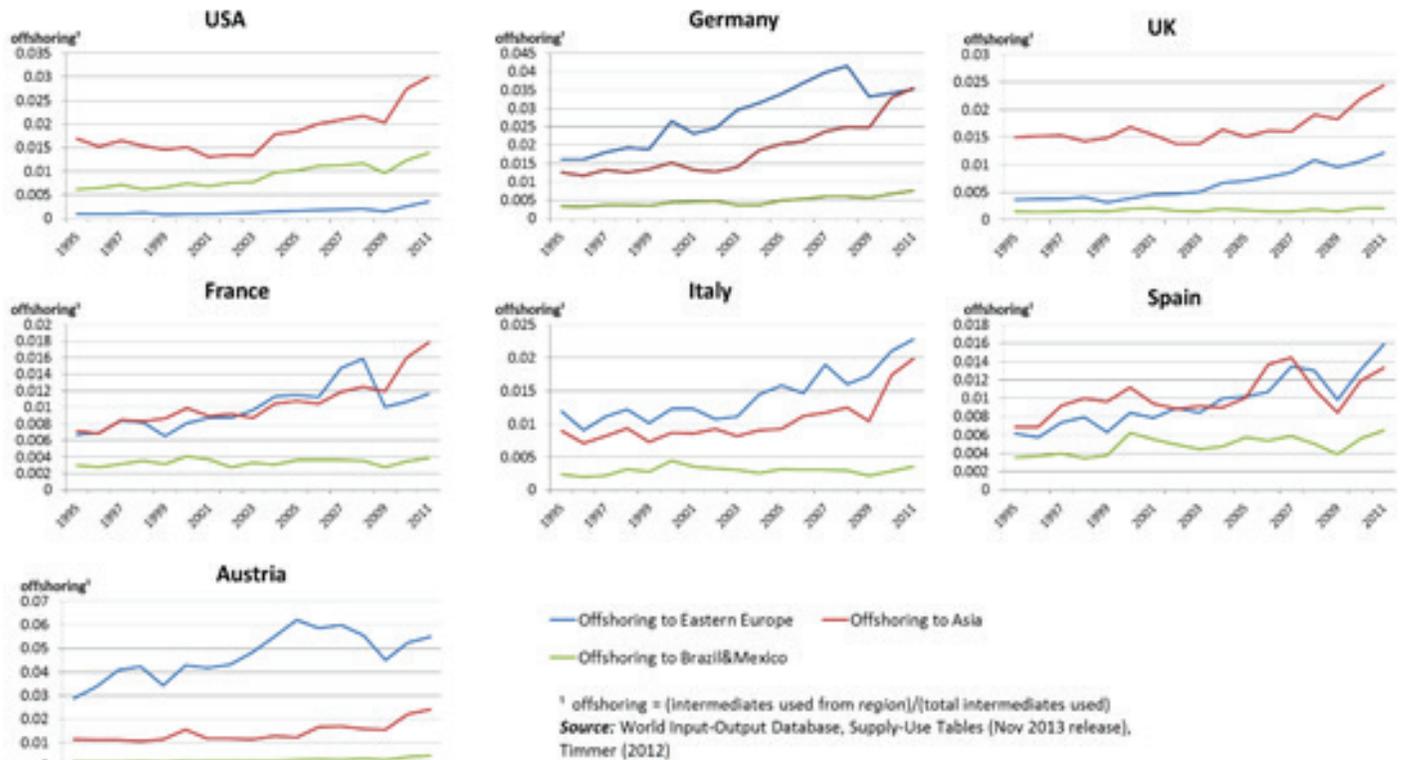


Figure 2: Offshoring Regions



Physical Capital rather than Human Capital

Let me turn now to hypothesis 2. Acemoglu and Autor (2011) argue that the second machine age represents a skill-biased technology. Technology and skills are complements and thus technology requires ever more skills. As the demand for skills rises, the wage gap between skilled and unskilled workers (the college premium) will rise as well. The rise in the skill premium will be even steeper if a country does not expand the supply of skills fast enough. In their book *The Race between Education and Technology*, Goldin and Katz (2009) argue that since 1980, education in the US has stopped advancing fast enough to meet the pace of technological change, and this led to a steep rise in inequality between skilled and unskilled workers in the 1980s and 1990s in the US.

How has the skill premium evolved in Europe? Figures 3 and 4 report the evidence. The data were collected by Timmer (2012) from the World Input-Output Database. Except for the US and more recently for Germany (since 2001), the skill premium between tertiary education and secondary education on the one hand, and between tertiary education and primary education on the other, is declining in all Western countries (Figure 4).

Why is this happening? There are two possible explanations for the decline in the skill premium in Europe. First,

a reverse Goldin and Katz effect may be at work in Europe. Advances in education may have been faster than the pace of technical change. Indeed, Figure 5 shows that education has advanced fast in most of Europe since the turn of the century, while it has advanced slowly in the US and Germany. In Austria, the share of people with an academic degree increased 2.5 fold between 1996 and 2012, in the UK and Italy it almost doubled, in Spain it increased by 70 per cent, and in France by 60 per cent. The US and Germany have seen a modest increase in the share of the population with a tertiary education of about 25 per cent in the last 17 years. The data suggest that education policy in Europe was far too aggressive given the demand for skills.

Second, the second machine age represents a capital-bias technology that requires ever less human capital as physical capital replaces human capital. Technology and skills are substitutes and thus intelligent machines are replacing educated people such as lawyers, doctors, professors and journalists. As the demand for skills declines, the wage gap between skilled and unskilled workers will decline as well. Do we have evidence that the technology is indeed of a capital bias nature? Three pieces of evidence are available: the decline in the skill premium in Europe, the global decline of the labour share in GDP since 1980, and the rise in skill unemployment, in particular among the young.

Figure 3: Hourly Wages by Skill Level

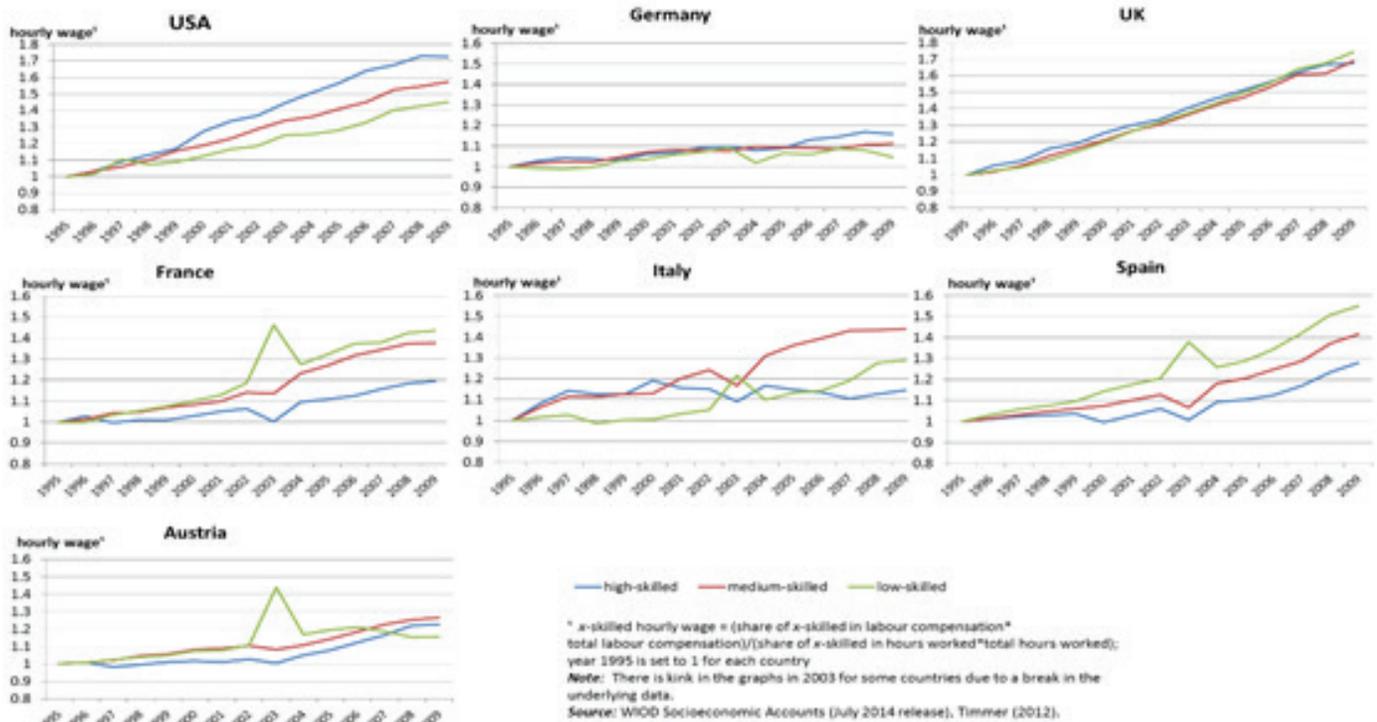


Figure 4: The Skill Premium of Tertiary Education

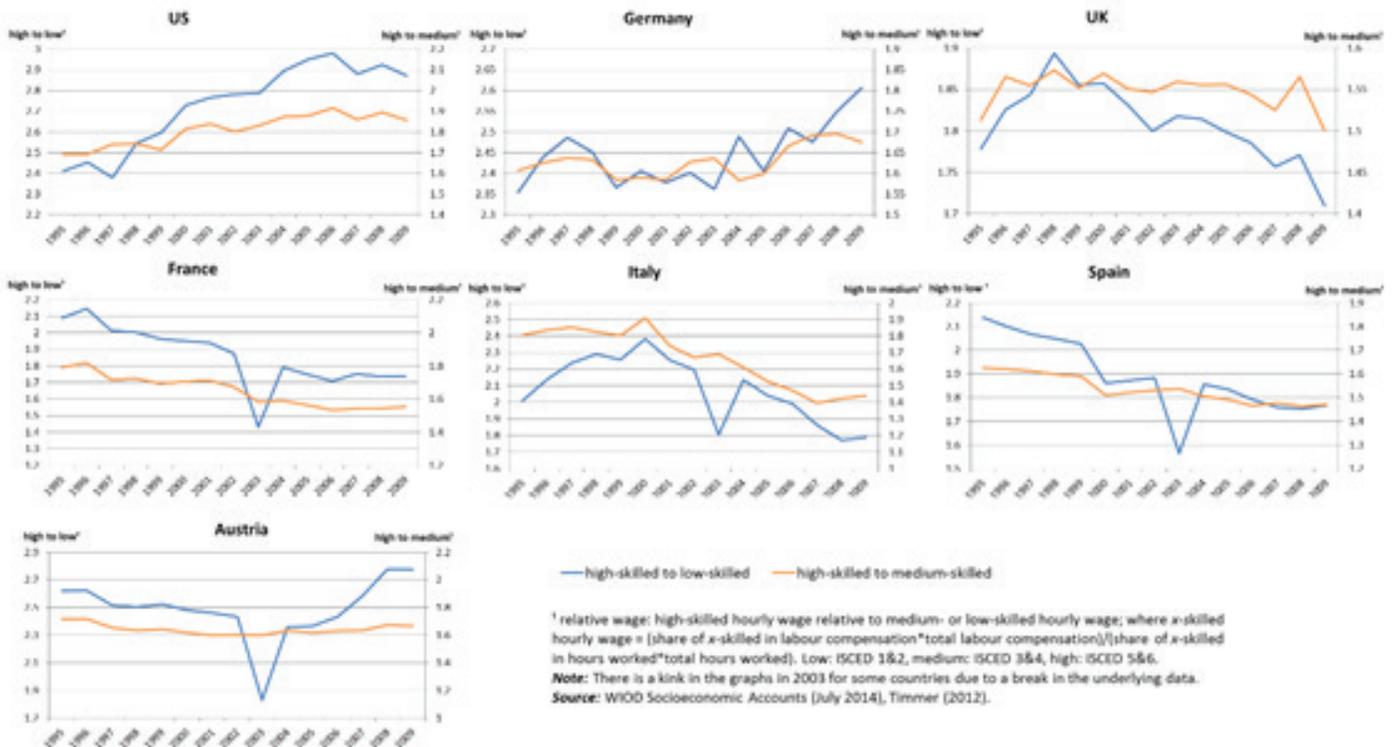
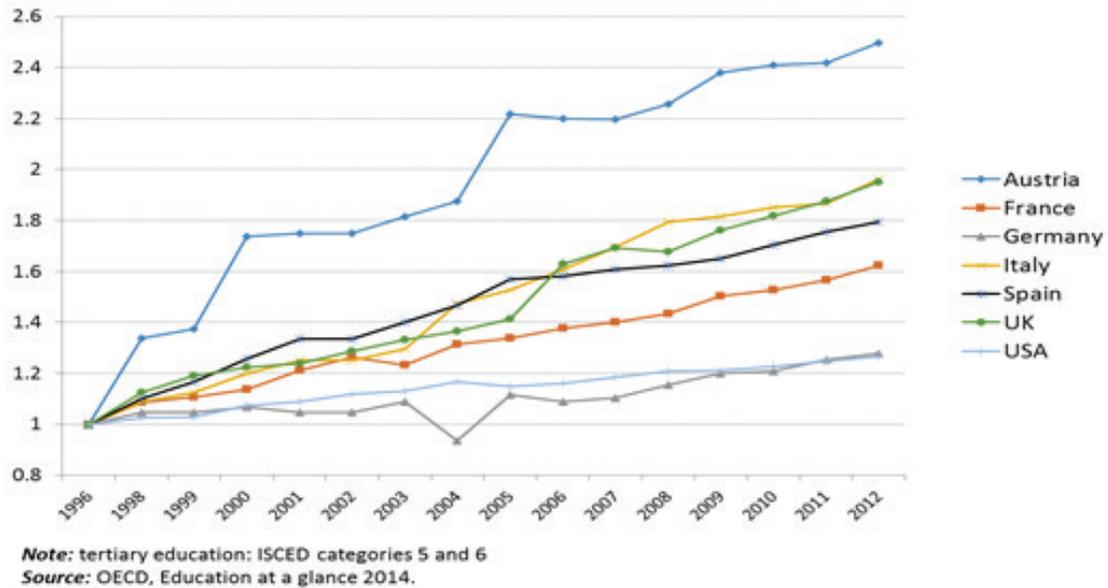


Figure 5: Tertiary Education of 25-64-year-olds (in per cent of population)



The decline in the skill premium: In addition to the fast expansion of the supply in education in Europe, the demand for skills may have slowed because physical capital is replacing educated workers. It is difficult to separate the supply side from the demand side effect on the skill premium. But the US is a case in point here. Education has been advancing only modestly in the US since the turn of the century which should have put upward pressure on the skill premium. Nonetheless, the trend in the skill premium since 1999 has been almost flat (see Figure 4) suggesting that capital-bias technology has been driving this trend in the US. In the 1980s and 1990s the slow expansion of education in the US led to a steep rise in the wage gap between skilled and unskilled workers.

A more nuanced version of skill-biased technical change is the polarization hypothesis according to which computers will increase the demand for both the highest-skilled jobs (professional and managerial) and the lowest-skilled jobs (personal services) with a decline in jobs in the middle (routine office jobs). Middle-skilled jobs are driven out by computers replacing routine labor, while computers fail in the more complex jobs at the top and the bottom of the skill distribution. The decline in the wage gap between high-skilled and medium-skilled workers in all western countries except the US and Germany does not give strong support for this hypothesis, however.

The decline of the labour share in GDP: It used to be the case that about 70 per cent of income went

to labour income and 30 per cent to capital income. Since the 1980s the share of income going to labour has declined in all rich countries. It is now at about 58 per cent of GDP. In a recent paper, Karabarbounis and Neiman (2014) show that 50 per cent of this decline is due to lower costs of information technology allowing firms to replace workers with the cheaper physical capital.

The rise in skill unemployment: Skill unemployment is on the rise in the US and the UK, where it doubled between 2000 and 2012, and in Spain and Italy, where it tripled in the same period. In Germany and France we do not see a rise in skill unemployment. The doubling of academic unemployment between 2000 and 2012 and the modest increase in the skill premium in the US, in spite of the slow expansion of education, suggest that capital bias technology is driving this outcome. In Germany, skill unemployment is low and did not increase between 2000 and 2012 precisely because education was advancing slowly in Germany.

Are we fighting the wrong battle? Is the rapid expansion of education as an answer to the challenges of globalization the wrong way to go? Will we see an excess supply of human capital in the next decade that earns penny wages? It may well be that the 'war for talent' and the scarcity of human capital is an issue of the past.

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