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Speech

Prospects for supply growth in Western Europe

Speech given by

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Introduction

Could I begin by thanking you for this kind invitation and by saying what a privilege it is to be here in Groningen to give this lecture. I would like to start with a reference to the golden years of the Dutch Republic, a period we look back on as the first example of economic dynamism, at least in Western Europe and which we know best of course from the wonderful pictures by artists such as Vermeer and de Hooch. Of course in Britain we also remember the greatest of your military heroes, Admiral de Ruyter!

Data produced and collated by Angus Maddison's colleagues at this University (Bolt and van Zanden, 2014) suggest that during the Golden Age living standards in Holland were more than twice those in England, but also that prosperity reached a peak in the Low Countries at this time. Measuring changes in living conditions over long periods is obviously very imprecise. But the data set suggests that the living standards of the early seventeenth century were not regained until the nineteenth century.

Some have suggested that this spectre of stagnation has returned to haunt not just the Netherlands but also other advanced economies.[1] Is that justified? I would like to use this speech to explore this, looking at the potential for productivity and output growth in Western Europe.

Europe, like other countries, was affected by the global financial crisis of 2007-09. But while economies often experience business cycles and, less often, crises, in the end economic growth is largely constrained by supply conditions. Demand growth adjusts to these, even if in particularly severe downturns this may take some time. So, in my talk today, I would like to look beyond the immediate cyclical issues facing the Western European economies, and think instead about the underlying potential for productivity and output growth. I will focus on France, Germany, the Netherlands, the United Kingdom and, for reference purposes, the United States but also draw on the experience of other advanced countries where helpful.

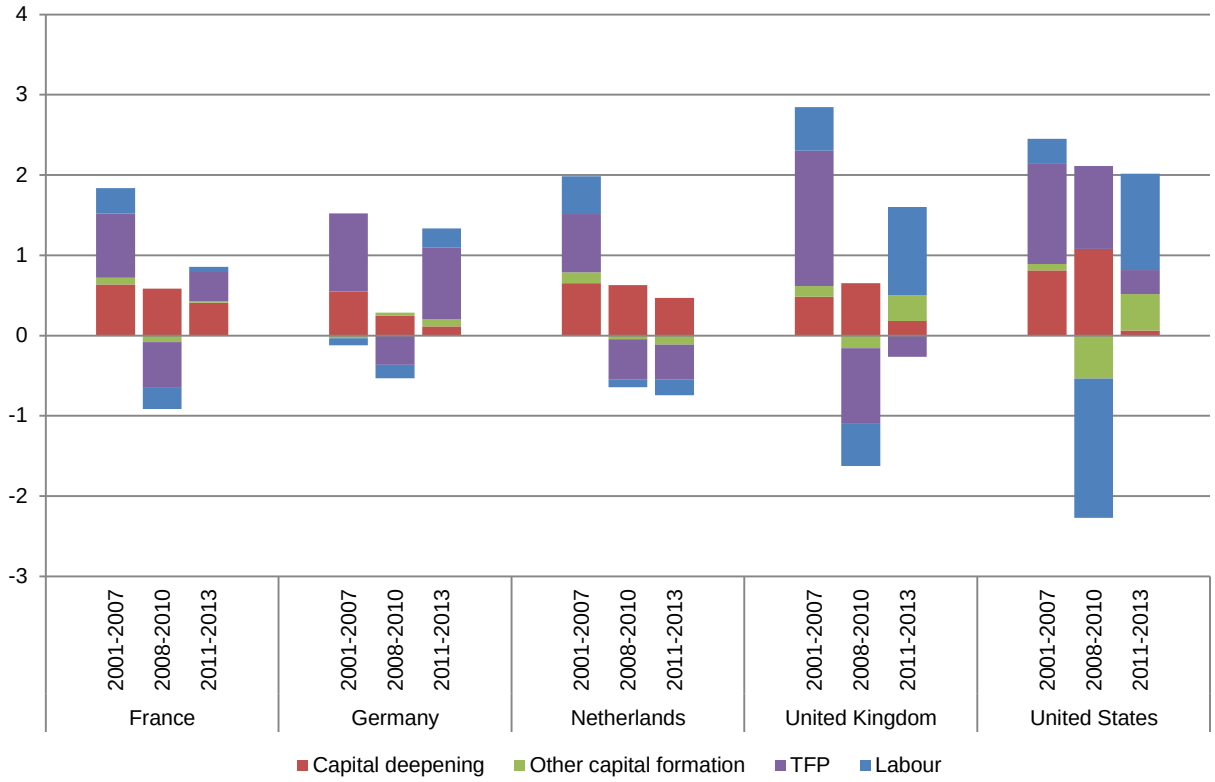
Viewed this way, the outlook for productivity growth therefore depends on its supply-side drivers, namely the contribution of capital, labour and a residual component called total factor productivity (TFP).[2] The three are inter-related, but it is useful to consider each separately, as I will do so below.

Figure 1 sets the scene for France, Germany, the Netherlands, the UK and the US. I have split the contribution of capital into two components. The first shows capital deepening, or the extent to which there was an increase in the amount of capital services used per hour worked. The second shows how the amount by which capital needed to grow in order to keep the total capital stock in line with a larger labour force. The prospects for growth in productivity are likely to depend on the outlook for both capital deepening and total factor productivity. I will discuss this in more detail in the next section; I will then consider developments in total factor productivity growth and its implications for labour productivity. Following this I will explore rates of return and the possible influence they may have on capital accumulation. This will provide a background from which to provide a view on the prospects for productivity growth. I will then comment briefly on the

[1] See, for example, Summers (2015).
[2] This framework for looking at potential supply is due to Solow (1957).

demographic headwinds affecting the advanced economies and the prospects for offsetting them, before coming to my conclusions as to the prospects for a return to the sort of growth pattern we saw before 2008.

Figure 1: GDP growth and its components



Sources: OECD and Bank calculations.

Technical Progress, Balanced Growth and Capital Deepening

Hicks (1932) suggested that one might think of technical progress as increasing the output of an economy without any increase in either capital or labour inputs. Harrod (1948) suggested an alternative approach in which technical progress has the effect of increasing the effective input of labour but leaves that of capital unchanged. His model set out algebraically was

$$Y = F(K, AL),$$

where Y is output, K is the capital stock, L is labour and A is a parameter representing the level of technology. In this case, even if the labour supply is constant, the capital stock, and thus capital services, will have to grow at the same rate as A on a balanced growth path.

One piece of evidence on the nature of technical progress can be provided by examining whether capital deepening, an increase in the amount of capital per worker or per hour worked, has actually taken place; that

would be expected if progress is labour-augmenting, as in the production function above, but not if it affects the productivity of capital and labour equally. The picture is, of course, not clear. Looking across the twenty countries for which the OECD provides data, the median rate of capital deepening was 2.8 per cent per annum, both for the period 1994-2000 and for the seven years just before the crisis, 2001-2007.[3] Median growth in labour productivity was 1.9 per cent in the first period and 1.4 per cent in the second period. Furthermore, in only one country in the second period, and two in the first, did capital deepening proceed less rapidly than the rate of growth in labour productivity. Generally then the input of capital services per hour worked grew more rapidly than did output per hour; obviously it is desirable to produce some explanation of this, but the assumption that technical progress is labour-augmenting is appreciably closer to the data than the alternative that innovation takes the form that Hicks suggested.

A particular form of "technical change" which is generally assumed to be labour-augmenting is an increase in the educational attainment of the workforce; i.e. it is assumed that one well-qualified worker is equivalent to more than one poorly-qualified worker, and that the ratio of their effective labour input is measured by the ratio of their wage rates. I will pay particular attention to this because it is easier to observe and measure than other forms of technical change.

It should be noted that this approach to thinking about the nature of technical progress does not invalidate Solow's structure of growth accounting. If technical progress is labour-augmenting then the contribution of total factor productivity growth to labour productivity growth will be computed as the growth in technology, *A*, multiplied by the share of income accruing to labour. The remaining element of growth in labour productivity will correctly be attributed to growth in the capital stock, because this growth in the capital stock is necessary for output per unit of labour to grow at the rate *A*. Nevertheless, this growth in the capital stock is induced by the rise in effective labour input. Neglect of this would understate prospective growth in labour productivity.

A further change which may have led to an increase in the volume of capital services per unit of labour is a more subtle change in the technology in use. Technological change over the last thirty years or more has led to increased use of information and communication technology. The capital equipment associated with this technology, such as computers and computer equipment, depreciates rather more rapidly than did the capital equipment associated with earlier technologies; this in turn means that the contribution of gross capital services to output is increased.

Capital deepening might also be induced by a change in the return on capital. I will discuss this in more detail later, after assessing the prospects for labour-augmenting technical progress.[4]

[3] I make use of medians rather than means to reduce the impact of extreme values.
[4] Movements in real wages relative to productivity might also have an impact. I have not been able to explore this.

Labour-augmenting progress and the contribution of total factor productivity

In the long run, an economy's level of productivity is driven largely by technical change. Solow (1957) famously found that technical progress explained between 70 and 80% of US GDP growth in the first part of the twentieth century. And the size of the purple TFP bars in Figure 1 illustrates that it consistently plays a large role in explaining GDP growth, both over time and across countries. In this section I consider the path of TFP growth during the crisis, and possible explanations; and then I consider the scope for policy to intervene and improve TFP prospects in the long run.

The low rate of TFP growth after 2010 also explains the bulk of the productivity puzzle in the countries I consider: growth was lower in all five countries than it had been before the crisis. The decline in Germany was only small, while in the United States it was substantial and in the United Kingdom and the Netherlands, growth turned negative. Averaged across all the OECD countries for which data are available, TFP growth was 1.1 per cent from 1995 to 2007 but only 0.3 per cent from 2011 to 2013.[5]

Why, then, did TFP fall so much during the crisis? Several explanations have been suggested, and I find it useful to break them down into those we might think about as cyclical, and therefore short in duration; and more structural, with a longer-term effect.

In the early stages of the puzzle, labour hoarding and capital misallocation were suggested as culprits. But the first of these was at odds with the subsequent growth in employment, accompanying the recovery in output, while the second, it seemed to me, accounted for only a small part of the shortfall. Furthermore, its impact should have been expected to diminish over time, helped by the fact that returns in the capital scarce industries would be elevated. This would both increase the profits available for investment and provide an incentive for outside investors to direct investments to these industries. The mix of industries undoubtedly played a part, with some experiencing sharper falls in productivity than others. For example, in the capital-intensive oil industry in the UK – accounting for a significant proportion of total production – output fell sharply with little immediate effect on employment.

As the productivity puzzle has persisted, explanations emphasising structural factors have emerged. Amongst those relating to technical progress, the most enlightening suggestion I have found is that the crisis raised the barriers to the adoption of new technology by firms. It is quite intuitive that ideas, or the so-called stock of knowledge, can only improve productivity once firms have implemented them in practice, and this involves effort.[6] Three recent papers have presented mechanisms explaining why implementation might be costly.

Stokey (2015) presents a model in which technology, like physical capital, tends to depreciate over time. Skills are needed to *maintain* as well as exploit advanced technology. As a result, countries can only catch up to the level of productivity of the most advanced economies through a combination of implementing new

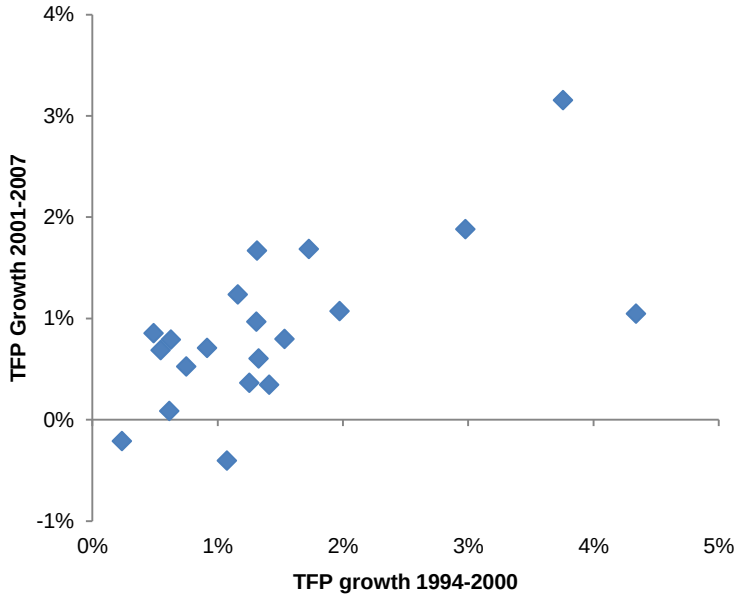
[5] Not weighted for the size of the different countries
[6] This idea is similar to the suggestion of Hayashi (1982) that there are costs to changing the physical capital stock.

technology and investing in human capital. If the barriers to implementation are large, then firms can try to offset this by investing more in skills, but this may take time.

In a similar vein, Bianchi and Kung (2014) and Anzoategui, Comin, Gertler and Martinez (2015) develop models in which it is costly to implement new technology; and this cost rises the more firms try to do it. As a result, cyclical peaks in output are associated with both high investment and high total factor productivity growth; conversely when investment is weak, it is likely that investment in knowledge will also be weak and total factor productivity growth will be poor.

The financial crisis triggered a rise in uncertainty and drop-off in business confidence, which affected all the countries I have considered here. So it seems plausible that it adversely affected firms' willingness to meet the costs of implementing new technology, with a knock-on effect on productivity.

Figure 2: TFP growth persistence



Sources: OECD and Bank calculations.

Looking at the scope for economies to regain the ground lost as a result of the crisis, it is perhaps natural to hope that pre-crisis rates of productivity growth will be resumed. In Figure 2 I compare the annual rate of total factor productivity growth in OECD countries between 1994 and 2000 with the growth rate over 2001 to 2007. I find a statistically significant coefficient of 0.6 linking total factor productivity growth in the second septennium with that in the first.[7] So if we were to take the view that the period since 2008 has been an aberration and nothing can be learned from it about the future prospects for productivity growth, one might forecast, over the seven year period starting in 2015 that countries whose growth in total factor productivity was above the median of 0.8 per cent per annum in 2001-2007 would remain a bit above the median, while those whose performance was below the median would be closer but still below the median. This points to annual growth rates in total factor productivity for the continental European countries of ½ to 1 per cent while for the United Kingdom and the United States the prospects seem slightly better at ¾ to 1¼ per cent. Dividing by the share of labour in total output, this suggests figures for growth in labour productivity of ¾ to 1¾ per cent for the continental countries and 1 to 2 per cent for the United Kingdom and the United States, with room for up to a ¼ point extra if capital deepening runs ahead of labour-augmenting progress as it did before the crisis. I wish I could

[7] Korea is an outlier and a least-squares analysis is likely to be distorted by this. Median regression provides an estimate of the relationship between total factor productivity growth in the two periods which is robust to the presence of outliers.

be more precise, but the calculations are inevitably so inexact that I cannot see much point in dissecting this with the sort of precision shown by Dr Tulp in Rembrandt's Anatomy Lesson.

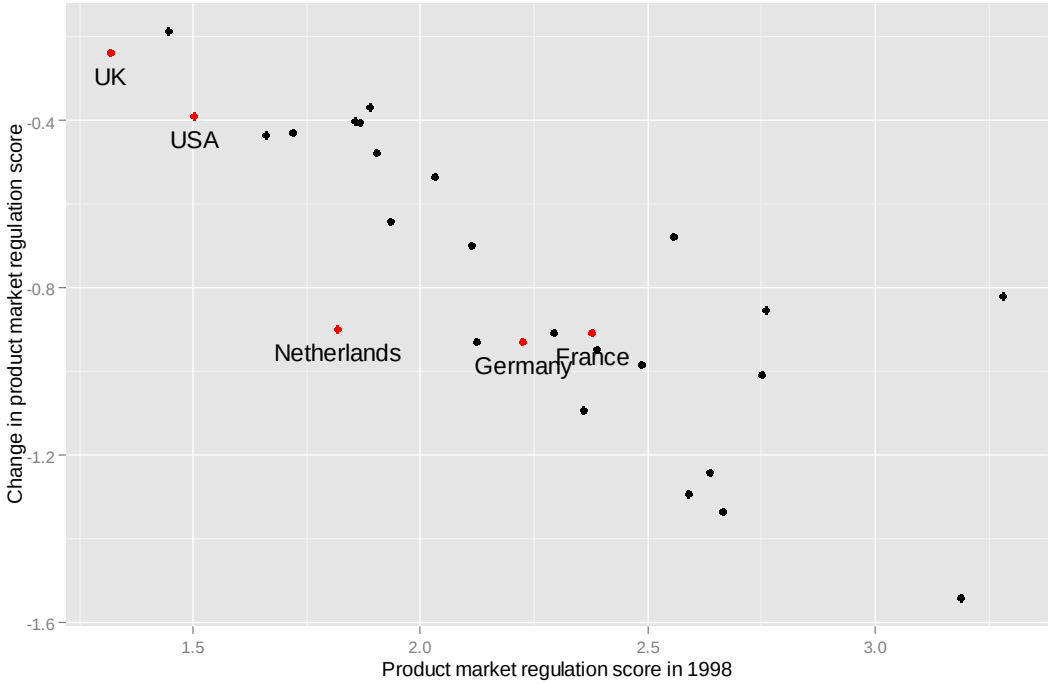
This simple calculation takes view that the obstacles to the adoption of new technology present over the last few years, have largely faded.[8] But it also assumes that nothing might be done to try to improve productivity performance, which invites the question of whether economic policy can help. Successive governments and international bodies have explored the potential for government intervention to improve outcomes, focussing mainly on a microeconomic level.[9] Of the possible areas for intervention, I will focus on the scope for government to improve competition, breaking this down into different components of overall regulation. The question of whether more competitive economies suffered smaller productivity puzzles following the crisis is interesting, but remains to be explored.[10] Instead, I will finish this section by considering how far pre-crisis reforms to the competitive environment in different countries have affected TFP growth rates after the crisis.

Measuring the extent and scope of regulation in different countries is challenging. An economy's regulatory regime is made up of many different parts, few of which have a quantitative measure: for example, how can we best compare the difficulty of starting a new business from one country to the next? Fortunately, the OECD has compiled a range of indicators of competition and regulation, published in its Product Market Regulation database (see OECD (2013a)). These cover areas such as the barriers to foreign direct investment, legal barriers to the entry of new firms, and the extent of government control over enterprises. For each indicator the OECD provides a judgement based score between 0 to 6 to indicate the degree of restrictiveness, where lower scores denote more competitive economies. Given the foregoing discussion of the drivers of innovation and TFP growth in the long run, we would expect more competitive economies to be more innovative, and enjoy greater gains from TFP.

Figure 3 provides an impression of the spread of different countries' product market regulation scores in 1998, when they were first collected, and the subsequent change through to 2013. As one might expect, given the desire of governments over the past for less regulation, the USA and UK have lower scores than those of continental European economies. But those with the highest scores in 1998 have also seen greater improvement in the fifteen years that followed. As OECD (2010, 2015b) notes, the movements in these scores have been driven by governments' attempts to improve the overall climate for innovation, by reducing barriers in the market, and negative externalities arising from government interference.

[8] In the United Kingdom, after several years of near stagnation, labour productivity has grown by 1.5 per cent over the year to 2015 Q2.
[9] In the UK, HM Treasury (2000) and HM Treasury (2015) illustrate the desire of different governments to improve productivity through a mix of supple-side policies. On a European level, the 2000 Lisbon Agenda stressed the importance of establishing a climate for investment and promoting innovation. Broader still, the OECD has published a series of reports on long-run growth policy under the programme *Going for Growth* – see OECD (2015b) amongst others.
[10] There is some evidence that competition and productivity have an 'inverted U' relationship; some degree of monopoly protection is needed to reward innovators for their research and development activity. But too much protection yields breeds a lack of competitiveness and lazy innovators, which stifles innovation. Fawcett and Cameron (2005) provide a review of the literature.

Figure 3: OECD Product Market Regulation scores, 1998 to 2013



Sources: OECD and Bank calculations.

The indicators that comprise the overall Product Market Regulation score fall under three different headings: the degree of state control in the economy; barriers to entrepreneurship; and barriers to trade and investment. I am also interested in the specific role that each of these has to play in influencing TFP growth.

So the question to ask is therefore *how far* have these policy changes improved TFP growth? In answering it, I should point out two considerations. First, it may well be that countries with stronger TFP growth are better-placed to enact reforms to regulation and competition – or equivalently, the direction of causation does not only flow from greater competition to productivity. The empirical work I will present attempts to take account of this. Secondly, the financial crisis inevitably muddies the waters when evaluating the impact of reform, as it represented a joint demand and supply-side hit to most of the economies I consider. So whilst I have tried to take account of this in my study, it is inevitably inexact.

Table 1: Impact of reform on TFP growth

	Dependent variable is the change in average TFP growth between the periods 2001-07 and 2011-13				
	(1)	(2)	(3)	(4)	(5)
Reduction in overall product market regulation score, 1998-2008	1.47** (0.61)		1.16* (0.64)	1.08	
Reduction in barriers to trade and investment, 1998-2008		1.75* (1.00)	1.32* (0.70)		1.11
Reduction in barriers to entrepreneurship, 1998-2008		0.36 (0.67)			
Reduction in state control, 1998-2008		0.40 (0.31)			
Average TFP growth during 2007-09	0.39*** (0.14)	0.32* (0.18)	0.32** (0.15)	0.65	0.59
Estimation method	IV	IV	IV	IVQ	IVQ
Number of countries	18	18	18	19	19
Countries omitted	Korea	Korea	Korea		

Sources: OECD and Bank calculations. In order to account for reverse causation – namely that countries with stronger productivity growth were in a better position to enact reforms to product markets – the estimation method is by instrumental variables, where the instruments in each regression are the levels of the various OECD scores in 1998.

The first column of Table 1 suggests that reforms to regulation have had a positive effect. After controlling for the shock to TFP brought on by the global financial crisis, a reduction in the overall level of product market regulation in the decade before the crisis is associated with higher average TFP growth.[11] Translating the results into more familiar terms, they suggest that reforms between 1998 and 2008 boosted post-crisis TFP growth by around 0.8pp a year on average. This seems like quite a high estimate, but it is nonetheless informative as a first exploration of the impact of reform on productivity following the financial crisis.[12]

The second and third columns in Table 1 show how different components of the overall regulation score affect TFP growth. Of the three more detailed indicators, the only statistically significant one is the Barriers

[11] The dependent variable in the regression is the difference between TFP growth before the financial crisis – 2001-07 – and after the financial crisis – 2011-13.

[12] An additional concern relates to the role of outliers in the set of countries I have studied. In particular, Korea enjoyed particularly strong TFP growth before the crisis, and in the simple regression framework presented in column (1), it has been omitted, to avoid it distorting the results. To check whether this is valid, I have also reported robust regression results from a quantile estimator, which is less affected by large outlying observations, in column (4). The fact that the estimated impact of reform in columns (1) and (4) are similar, suggests that the estimate is quite robust.

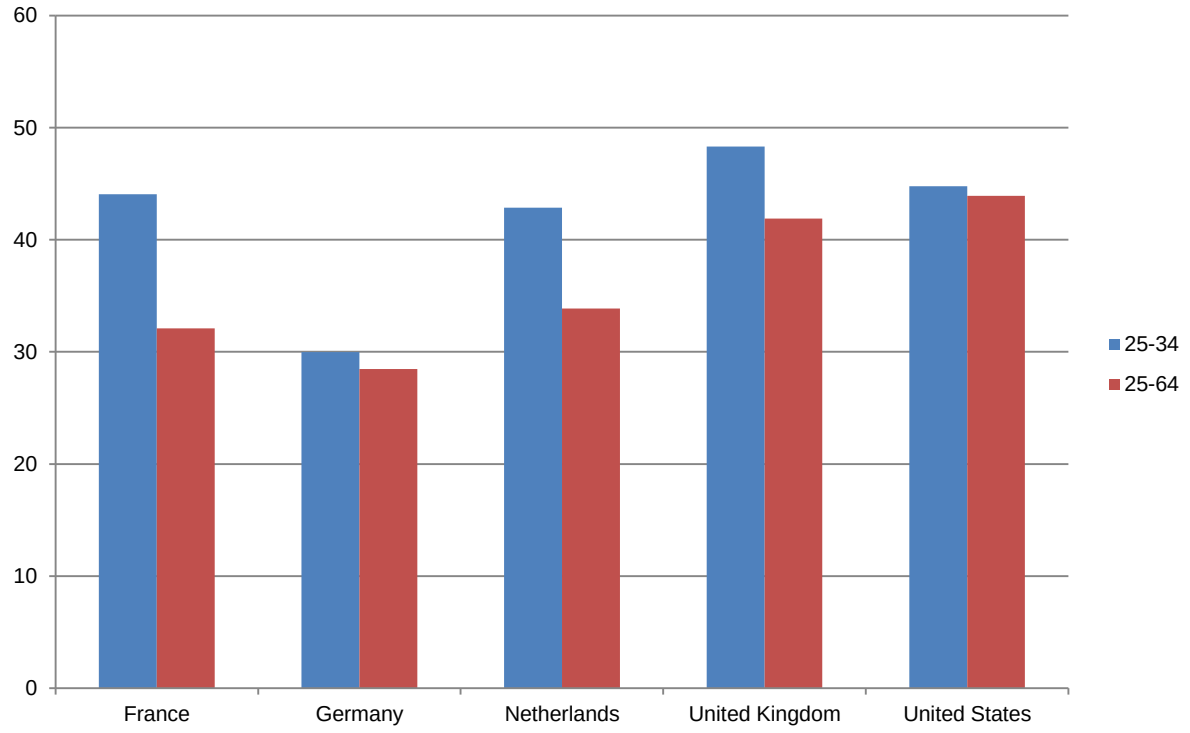
to trade and foreign direct investment. This chimes with the literature I discussed earlier, which placed great emphasis on trade as a means of facilitating innovation.[13]

Summarising these results, I find that there is tentative evidence that reforms to regulation have had a beneficial effect on productivity performance: in the absence of reform, the fall in average TFP growth between the pre- and post-crisis periods would have been deeper. But the crisis had a large influence too: the more an economy's TFP growth fell during the crisis, the weaker it was in the years that followed.

Labour-augmenting Progress and the Quality of Labour

The discussion above was based on the premise that productivity increased as a result of the adoption of new technologies. Rising educational standards are, however, often also regarded as a source of increased productivity. It is generally found that well-qualified people are paid more than poorly-qualified people, and it is a reasonable assumption that this difference reflects a difference in effective "labour power" per hour worked. So how much growth might be expected to come from rising educational standards over the next few years? I would like to focus on one element of this – the proportion of the work-force that has a university education.

Figure 4: Education gaps in 2013: proportion with tertiary education



Sources: OECD and Bank calculations.

[13] As in the previous footnote, I have also reported robust regression results in column (5) which suggest that the exclusion of Korea from the regressions in columns (2) and (3) is not material.

In Figure 4 I plot the proportion of two age groups that have some tertiary education, most commonly a Bachelor's degree, for the same selection of Western European countries as above and the US. The first age group, 25 to 34 year olds, represents the most recent cohort that may have completed tertiary education. The second group, 25 to 64 year olds, represents a common definition of the post-education working-age population. The reason for comparing these two groups is to see how much scope there appears to be for the average educational attainment of the labour force to improve if recent levels of tertiary education persist.

In Gordon's (2014) recent work on labour productivity growth prospects for the United States, he identified the plateau in educational attainment as one of the major headwinds that he expects to subtract from growth in that economy. An element of the feature that Gordon identified is obvious from the chart: the proportion of young Americans achieving a tertiary education has been similar for many years. This means that the proportion of workers in the United States with some tertiary education should not be expected to increase very much if recent trends in University attendance persist.

Most of the other countries that I highlight in Figure 4 display some scope for further improvement in the educational attainment of the average worker. The picture is particularly promising for France and the Netherlands, whose recent University graduation rates been comparable to those in the United States, when for previous generations they were much lower. The notable exception to this story is Germany where, as in the United States, the most recent cohort has achieved similar levels of tertiary education as earlier cohorts. The difference to the United States is, though, that the university graduation rate is much lower in Germany, although it should be noted that is Germany renowned for having some of the best vocational training available to those who do not attend university.

Table 2: Earnings premium of tertiary over upper secondary education

	2000	2002	2004	2006	2008	2010	2012
France	-	150	147	149	147	154	-
Germany	145	146	155	168	168	172	174
Netherlands	-	148	-	154	161	156	-
United Kingdom	160	157	157	160	154	165	156
United States	176	186	184	186	177	177	174

Sources: OECD and Bank calculations.

I would now like to move away from recent history to consider what we can learn about the prospects for investment in education in the future. One of way of looking at this is to consider the incentives to attain a university education. There are of course many benefits that arise from education, but the easiest to measure is the increase in pay that accrues to workers, which is commonly referred to by economists as the return to education.

In Table 2 I display the average gross earnings of workers who have attained a tertiary education relative to that of those with an upper secondary education in the same selection of countries. It is no surprise that more-educated workers receive higher pay – in all countries achieving a university education entails several years of foregone earnings, in addition to the substantial tuition fees in some countries, and so if this differential did not exist it is unlikely that the non-economic benefits alone would be enough to compensate.

I should note here that the earnings premiums in Table 2 are significantly larger than those that are commonly reported by economic studies. That is because these studies attempt to estimate the difference in pay that an individual would receive with and without a university degree, whereas the premiums in Table 2 are partly due to the fact that individuals with a degree are likely to have different types of jobs to those with an upper secondary education.

The most interesting feature of the data displayed in Table 2, at least to me, is the variation, or lack of variation, over time. If we are wondering whether the incentives to invest in education are as strong for those currently making this decision as it was for previous cohorts, then the fact that the returns to having some tertiary education have either increased or remained fairly constant in the countries under consideration, points to this being the case.

Table 3: The contribution of educational upgrade

	Proportion of 25-64 population with tertiary education in 2012	**Predicted proportion of 25-64 population with tertiary education in 2022**	**Earnings premium**	**Proportion of LF aged 25-64**	**Contribution of educational upgrade to annual GDP growth to 2022**
	(a)	(b)	(c)	(d)	(b-a)*c*d
France*	0.31	0.36	0.54	0.90	0.27
Germany	0.28	0.29	0.74	0.89	0.04
Netherlands	0.34	0.38	0.56	0.84	0.17
United Kingdom	0.41	0.44	0.56	0.85	0.16
United States	0.43	0.44	0.74	0.86	0.03

* Earnings premium is from 2010. **Sources:** OECD and Bank calculations.

Table 3 details the contribution that we might expect the increasing attainment of tertiary education to make to GDP growth over the medium-term. We see that, if current graduation rates persist, it is expected to contribute about a quarter percentage point per annum to growth in France and slightly less in the Netherlands and the UK. However, as discussed above, the contribution of the improvement of worker quality along this dimension is expected to make only a minor contribution to growth in Germany and the US.

Obviously the possession of a university education is not the only measure of the general skill level of workers. Recent OECD work has looked at returns to more basic skills, and found large heterogeneity across

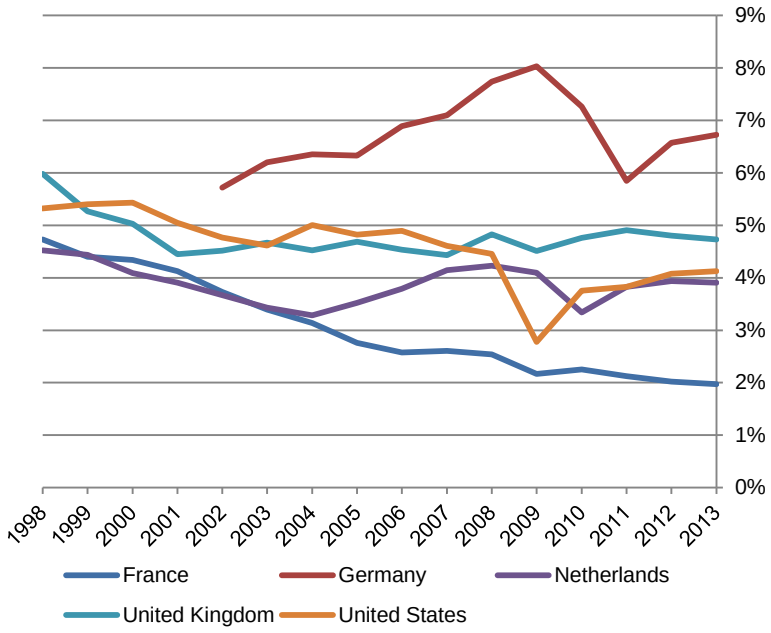
countries.[14] Particularly striking is the returns to higher skills that are present in the United States and the United Kingdom, countries in which skills are particularly unequally distributed across workers. This suggests that there is considerable scope for an improvement in the average skill level of workers in these countries to feed into higher economic growth rates, if the demand for these skills is met.

The return on capital and its contribution to economic growth

The framework set out above assumed that the capital stock would grow in line with effective labour input per hour worked. I pointed out that in fact capital deepening had run ahead of what might be expected if technical progress was labour-augmenting.

One reason why that might have happened of course is that the required return on the capital stock had declined. That seems a particularly pertinent explanation given the way in which real rates of interest have declined over the last twenty years or so (Broadbent, 2014). A low return on capital would require a higher share of net investment in income to finance a balanced growth path. If returns were abnormally low, as they are on financial assets at the moment, it would also raise the prospect these low returns would act as a deterrent to investment, so that the capital deepening of the last pre-crisis period would be replaced by a period of capital-shallowing. While growth accounting (Oulton and Srinivasan, 2003) focuses on gross returns, the incentive to invest is a consequence of net returns on capital, and I examine these for France, Germany, the Netherlands, the United Kingdom and the United States.

Figure 5: The net rate of return on national capital



Sources: National statistical sources and Bank calculations.

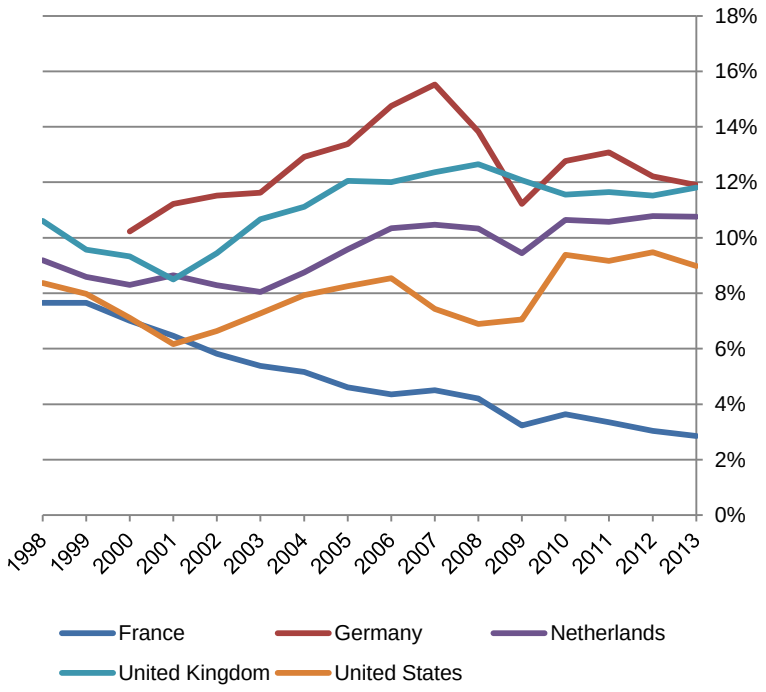
Figure 5 shows the overall net returns on capital in each of these countries.[15] The analysis presented here shows the return computed as net operating surplus plus a component of mixed income as a proportion of capital stock measured at replacement cost except that land is valued at market prices. An analysis in terms of replacement cost is more appropriate when exploring growth potential. The figures for all except the Netherlands draw on official figures produced by statistical offices, as do those for the Netherlands since

[14] OECD (2015a).
[15] These figures differ from those presented by Piketty and Zucman (2014); they are returns with capital valued at replacement cost, while Piketty and Zucman looked at the return to household sector wealth.

2010. The earlier for the Netherlands data draw on preliminary balance sheet data produced by van den Bergen, de Boo, Taminiau-van Veen and Veldhuizen (2011).

In the last few years returns in the Netherlands, the United Kingdom and the United States have been reasonably close together while those in Germany are high and those in France low.[16] The high return in Germany stands at odds with its status as the world's largest capital exporter. Moreover, rates of return after the financial crisis are not very different from those before the crisis. The declining rate of interest has not been associated with a decline in the return on productive capital in five of the six countries while in France the return has drifted down steadily. Insofar as the effects of the crisis are visible, it shows as dips in the return in 2009 which are pronounced in Germany and the United States, but extremely modest in the United Kingdom and France. Overall, with the possible exception of France, this picture suggests that it is unlikely that economic growth since the crisis has been limited by a poor return on capital or that it is held back by a lack of investment opportunities.

Figure 6: The return on corporate capital



Sources: National statistical sources and Bank calculations.

These overall estimates of the rate of return are, however, strongly influenced by the importance of housing, both the stock of houses and the land on which they stand. Arguably a better picture of prospects is found by looking at returns in the corporate sector shown in Figure 6. This, at close to or above ten per cent, is high in Germany, the Netherlands and the United Kingdom. It takes intermediate values in the United States, and has declined to low levels in France, particularly since the financial crisis. Such a disparity, particularly among the European countries which have created a single market, is something of a surprise; the gap between Germany and France is sufficiently large to make it unlikely that it is simply a reflection of data problems and measurement errors.

With returns in the company sector appreciably higher than those in the economy as a whole, it follows, as a matter of arithmetic that those in the rest of the economy must be lower than in economy as a whole. The national accounts are constructed on the assumption that the public sector does not earn any return on the

[16] These data are somewhat at odds with Caselli and Feyrer's (2007) observation that the marginal product of capital is not very different in different countries.

capital that it owns, but this explains only a part of imbalance. The return on household sector capital and in particular on housing is much lower than that found in the corporate sector.

Tax issues are probably one factor behind this. Corporate income is typically taxed more heavily than income accruing directly to households (Jorgenson et al, 1987) although the tax rates quoted by Eurostat (2014) suggest that this is not the only influence. People may also own houses in the expectation of sharp capital gains, although that has not been recent experience everywhere. They may also regard investment in housing as safe while investment in companies is risky. Risks of disaster have been used to explain the different between stock market returns and returns on "safe" assets (Barro, 2009). But it is hard to see investment in property as being safe; an explanation that works for government securities does not so plausibly work for housing.

Overall, though, these data do not suggest that opportunities for profitable investment have faded away, and indeed in Germany, the Netherlands and the United Kingdom pre-tax returns are higher than in the United States. But it is possible to imagine that in France the low returns on capital may prove an obstacle to capital-deepening that I have assumed runs in step with labour-augmenting technical progress.

The contribution of labour inputs to economic growth

My focus so far has been on an assessment of the prospects for labour productivity, but it would be a pity not to comment at all on the overall potential for economic growth, taking account of the scope for increased labour input.

The rate of growth of output is the sum of the growth in this and the growth in labour productivity. Projections of labour input growth are perhaps even more uncertain than usual and I will simply discuss some possible influences. The natural starting point is with projections of the growth rates of the working age population, defined as those aged 15-64.

The first three columns of Table 4 display past and future working-age population growth rates as forecast by the UN's Population Division in 2015 in the same selection of Western European countries and the United States. It is striking how much variation there is in the experiences of the different countries displayed, both over the last 15 years and in what is expected over the coming 10 years. Taking the two extremes, by 2024 the working age population of the United States is expected to be 15 per cent larger than it was in 2000, whilst that of Germany is expected to be just over 10 per cent smaller. If labour input were to grow in line with population of working age, this could be expected to give an overall growth figure about 0.2 per cent per annum higher than the rate of labour productivity growth in the United Kingdom and United States, while having little impact in France. It would deduct about 0.2 per cent per annum in the Netherlands and 0.6 per cent per annum in Germany. Of course these projections are affected by a number of other issues, such as changes in migration patterns, amongst others, so forecasts are inevitably speculative.

Table 4: Total hours worked, population growth and population projections

Growth in:	Working age population (15-64)			Total hours worked	
	2000-2007	2008-2014	2015-2024	2000-2007	2008-2014
France	4.0%	-0.3%	0.2%	3.0%	-1.8%
Germany	-4.2%	-0.3%	-5.9%	-0.9%	0.7%
Netherlands	2.9%	-0.7%	-1.9%	4.5%	-2.7%
United Kingdom	5.5%	2.1%	2.4%	5.0%	5.5%
United States	8.0%	3.7%	1.7%	2.7%	0.8%

Sources: UN (2015), OECD and Bank calculations

But an economy's demographic distribution is not the only thing that determines how effectively it can supply labour. Labour market participation – which is defined as the share of the overall working-age population that forms an active part of the labour force – determines the size of the pool of workers who are either in jobs, or not (whether voluntarily or involuntarily).

Figure 7 illustrates how far countries have been able to include different groups of workers into the labour market. It shows participation rates for four groups: all men aged between 15-64; all women in the same age range; all aged 15-24; and all aged 55-64. The yellow diamonds show the rates in 1998, and the blue show 2014.

Speaking, as I am, in Groningen, I wanted to flag the success of the Netherlands on these measures. It stands out as having encouraged high labour market participation across a broad range of groups. Female participation was already above-average in 1998, but then grew more than nearly all other OECD countries up to 2014. Similarly, participation of workers aged 55-64 grew by more than any other country in the sample.

Taking a step back and looking across all the countries in the sample, I want to contrast the outcomes for two different groups. On one hand, there was a marked increase in the participation of old workers in nearly all countries. But at the same time, in most countries the participation of young workers has fallen.

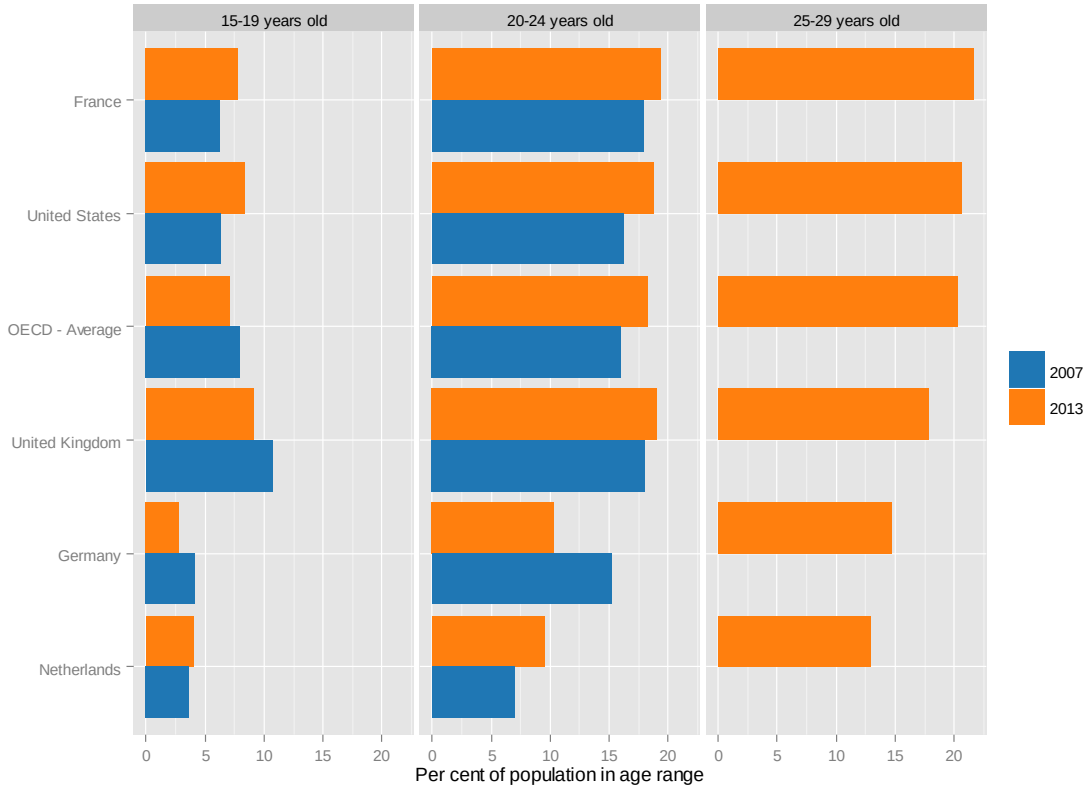
Figure 7: Labour participation in different parts of the labour force

Sources: OECD and Bank calculations.

Rising life expectancy might explain the rising participation of old workers, as people delay their retirement. Bloom, Canning and Moore (2014) show that retirement decisions are likely to be determined by the balance between rising real wages, which lead to earlier retirement, and rising life expectancy, which leads to later retirement. And as the evidence of rising life expectancy has become clear over the last two decades, participation of old people in the labour force has increased sharply.

Although youth participation was particularly badly hit during the financial crisis in some countries, it had in fact been steadily declining beforehand. Falling labour market participation for this age group could, of course, reflect rising uptake of full-time education, so Figure 8 reports the population shares of those neither in education, employment or training – so-called NEETs – for a range of countries both before and after the crisis. NEET rates are typically low for those aged 15-19, as a result of compulsory education policies that affect many in that group. But more worrying are the high rates of NEETs aged 20-24 and especially 25-29. Whilst the outcomes for Germany, France, the Netherlands and the UK are better in comparison to the Euro area periphery countries, it is clear that some problems remain.

Figure 8: Shares of population neither in training, employment or education (NEETs)



Sources: OECD and Bank calculations. Data for 25-29 year olds are not available for 2007.

What is the scope of labour market reform to improve these outcomes, especially for younger workers? OECD (2004) points out that there is a complex relationship between the degree of employment protection in an economy, and labour market outcomes. Whilst some employment protection can be beneficial, the OECD also observes that *highly restrictive* employment protection legislation could hinder employment of young workers, whilst boosting the outcomes of those already in work;[17] I can explore the extent to which relaxing this protection could improve outcomes, using estimates of the degree of employment protection legislation in different economies published by the OECD (OECD 2013b) alongside indicators of product market regulation.

The results reported in Table 5 suggest that a reduction in employment protection legislation could boost participation of younger workers. To put the estimates in context, if a country such as France, with a comparatively high degree of employee protection, were to reduce the level to that of the Netherlands, then youth participation might rise by just short of 20 percentage points, to a level comparable with the USA (though still below that of the Netherlands). Of course, these estimates are only indicative, and as I noted above, more detailed empirical work has suggested that *some* degree of protection is beneficial (OECD,

[17] This 'insider-outsider' effect, in which those in employment exploit their bargaining power to secure their positions, at the expense of those out of work, has been discussed extensively in the literature (e.g. see Layard, Nickell and Jackman (2005)).

2004). And other labour market policies also have an influence on outcomes. But it does suggest that for some countries, at least, there may be scope to increase participation among young workers.

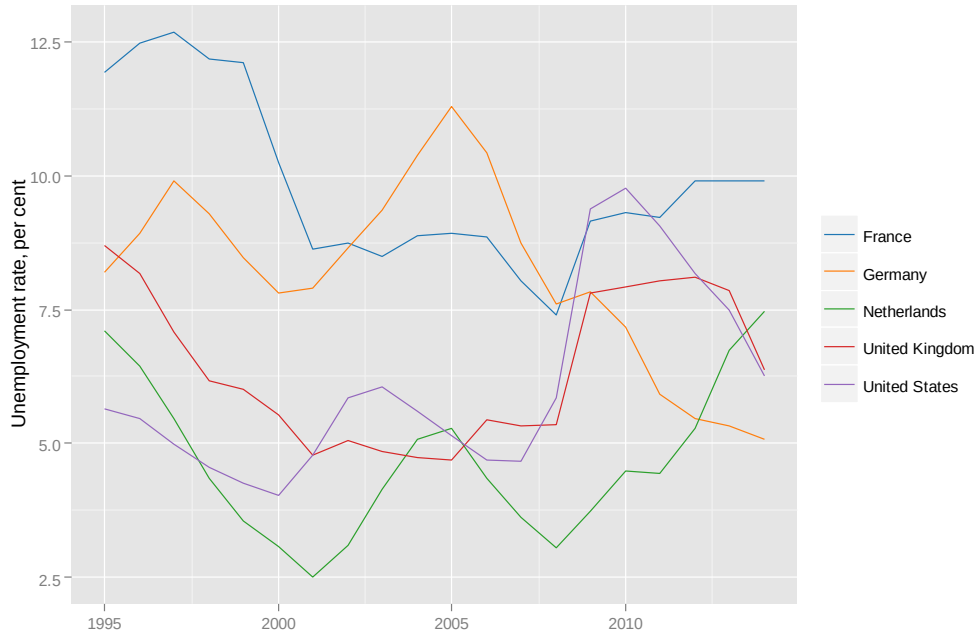
Table 5: Impact of reform on labour market outcomes

	Dependent variable is the participation rate of all workers aged 15-24
Impact of Employment Protection Legislation level in 2008	-14.40*** (4.37)
Impact of GDP growth between 2007-09	0.50 (0.93)
Number of countries	32
Estimation method	IV
Instruments used	OECD Product Market Regulation score in 2008 (instrumented variable is the level of Employment Protection in 2008)

Sources: OECD and Bank calculations

Alongside trends in the participation rate, I also want to highlight two other determinants of labour input: one – unemployment – affected by fluctuations in the business cycle, and the other – average working hours – affected by longer-term trends. Both have a bearing on the outlook for labour supply over the next few years.

Figure 9: Unemployment rates in a selection of countries



Sources: OECD and Bank calculations.

Figure 9 shows that the financial crisis had a very different effect on unemployment from one country to another. In Germany, the United Kingdom and the United States it seems hard to believe that there is room for a substantial further reduction in unemployment rates, while in the Netherlands, there should at least in principle be room for a fall and the same must be true of France. At the same time, it is not clear how far, or how fast, unemployment will fall as these economies pick up speed.

On the question of hours worked, Gordon (2004) points to a long-term trend towards shorter working weeks in general, and in particular a change in the working hours of the USA compared to Western Europe. According to him, in 1960, Western Europeans worked around 2% more hours per week than workers in the USA, on average; but by 2004, this had reversed, to working 15% fewer hours. Part of this trend may be explained by the structure of the workforce. A country with a high proportion of women working may well find that, because women disproportionately work part time – as is the case in the United Kingdom – its average number of hours worked is lower than in countries with lower female participation. But in any case, in the long run I might expect rising living standards to continue to push down on average hours worked per worker.

A comparison of the first three columns of Table 4 with the last two shows how important these other factors can be. The last two columns display the growth in labour inputs, total hours worked, since 2000. You can see that for many countries there is a significant difference between the growth rates of the working-age population and the total hours worked. In particular, in the period before the Great Recession, the Netherlands saw hours grow much more than the working-age population, Germany managed to almost maintain a constant number of hours worked in the face of a declining working-age population, and the United States saw total hours worked grow by much less than the size of the population.

So while we can infer that Germany in particular, but also the Netherlands faces a demographic head-wind, that does not necessarily translate into a decline in labour input over the next few years.

Conclusions

Growth rates have been low in advanced economies recently, partly because growth rates of productivity have been weak. The evidence suggests that, except perhaps in France where returns on capital have been falling for some time, rates of return in the corporate sector have held up. This suggests, in contrast to what might be inferred from returns on financial assets, that plenty of opportunity for profitable investment remains. Nevertheless, the evidence suggests that much capital investment is induced by labour-augmenting technical progress and the key to growth in labour productivity is therefore the extent to which this, measured by the rate of total factor productivity growth divided by the share of labour in total income, recovers.

A body of work suggests that technical progress can be handicapped by barriers to the implementation of new technology, and a loss of business confidence is likely to constitute one such barrier. Britain's most recent experience suggests tentatively that reviving business confidence can see an improvement in productivity growth and an analysis of the persistence of rates of technical progress suggests the five

countries I have considered might all hope for underlying productivity growth in the rate of 1-2 per cent. If, as before the crisis, actual capital deepening runs ahead of labour productivity growth then the rate of labour productivity growth might be higher than this, while if, as in France, low returns deter investment, it may be lower. The evidence also suggests that countries with substantial scope for reducing regulation of product markets could see a further productivity dividend. France, the Netherlands and the United Kingdom are also likely to benefit from increasing educational attainment.

These prospects are offset by demographic headwinds in the Netherlands and particularly in Germany. While demographic prospects must eventually curtail overall economic growth, even with respectable productivity performance, over periods of several years it is perfectly possible for actual labour input to move very differently from the number of people of working age. Thus the outcome for overall growth is likely to depend both on the way in which people respond to changing economic circumstances and the institutional framework in which employment takes place.

To return, however, to my starting point, Bolt and van Zanden (2014) indicate that, during the run-up to the Golden Age from 1550-1600, GDP *per capita* in the Netherlands grew by 0.8 per cent per annum. That is at the bottom of what I think is the likely range for labour productivity over the next ten years and appreciably below what I think of as the most likely outcome.

Hartlijk Dank!

References

Anzoategui, D., D. Comin, M. Gertler and J. Martinez (2015), 'Endogenous Technology Adoption and R&D as Sources of Business Cycle Persistence', mimeo

Barro, R (2009). 'Rare Disasters, Asset Prices, and Welfare Costs'. *American Economic Review,* 99(1), pp 243-64.

van den Bergen, D., A. J. de Boo, P. Taminiau-van Veen and E. Veldhuizen (2011), 'Non-Financial Balance Sheets for the Netherlands: Use, Compilation and Extensions', paper presented to joint IMF-OECD conference on sectoral position and flow data in the macroeconomic accounts

Bianchi, F. and H. Kung (2014). 'Growth, Slowdowns, and Recoveries'. *NBER Working Paper* 20725

Bloom, D.E., D. Canning and M. Moore (2014). 'Optimal Retirement with Increasing Longevity'. *Scandinavian Journal of Economics,* 116. pp 838-858.

Bolt, J. and J. L. van Zanden (2014). 'The Maddison Project: collaborative research on historical national accounts'. *Economic History Review,* 67(3), pp. 627–651.

Broadbent, B. (2014) 'Monetary policy, asset prices and distribution', speech delivered to the Society of Business Economists Annual Conference

Caselli, F. and J. Feyrer (2007). 'The Marginal Product of Capital'. *Quarterly Journal of Economics,* 122, pp. 535.568.

Eurostat (2014). 'Taxation Trends in the European Union'.

Fawcett, N. and G. Cameron (2005) 'The Five Drivers of Productivity', *Oxford University Economics Discussion Paper* 252

Gordon, R. J. (2004) 'Why was Europe Left at the Station when America's Productivity Locomotive Departed?', *NBER Working Papers*, 10661.

Gordon, R. J. (2014). 'The Demise of U.S. Economic Growth: Restatement, Rebuttal, and Reflections'. *NBER Working Papers* 19895

Harrod, R. (1948). *Towards a Dynamic Economics*. London Macmillan.

Hayashi, F. (1982). 'Tobin's Marginal q and Average q: A Neoclassical Interpretation'. *Econometrica,* 50(1), pp. 213-24.

Hicks, J. (1932). *The Theory of Wages.* London: Macmillan

HM Treasury (2000) *Productivity in the UK*, London

HM Treasury (2015) *Fixing the foundations: creating a more prosperous nation*, London

Izyumov, A. and J. Vahaly (2015) 'Income share revisited'. *Review of Income and Wealth*, 61 (1).

Jorgenson, D., F. Gollop and B. Fraumeni (1987) *Productivity and U.S. economic growth*, Cambridge, Harvard University Press.

Layard, R., S. Nickell and R. Jackman (2005) 'Unemployment: Macroeconomic Performance and the Labour Market'. *OUP Catalogue, Oxford University Press.*

Marris, R. (1964) *The Economic Theory of "Managerial" Capitalism*, New York: Free Press of Glencoe
OECD (2004) 'Employment Protection Regulation and Labour Market Performance', *Employment Outlook*, 1, 61–125.

OECD (2010) *Economic Policy Reforms: Going for Growth 2010*, OECD: Paris

OECD (2013a) *Product Market Regulation Database*, http://www.oecd.org/economy/pmr

OECD (2013b) 'Protecting jobs, enhancing flexibility: A new look at employment protection legislation', Chapter 2 of the *OECD Employment Outlook 2013*, OECD: Paris

OECD (2015a) 'Chapter 2: Skills and Wage Inequality'. *OECD Employment Outlook 2015*, OECD: Paris

OECD (2015b) *Economic Policy Reforms: Going for Growth 2015*, OECD: Paris

Oulton, N. and S. Srinivasan (2003) 'Capital stocks, capital services, and depreciation: an integrated framework'. *Bank of England Working Paper No. 192.*

Piketty, T. and G. Zucman (2014) 'Capital is Back: Wealth-Income Ratios in Rich Countries 1700-2010'. *Quarterly Journal of Economics,* 129(3), pp. 1255-1310.

Solow, R. (1957) 'Technical Change and the Aggregate Production Function'. *The Review of Economics and Statistics, MIT Press, Vol. 39, No. 3, pp. 312-320, August.*

Stokey, N. (2015) 'Catching up and falling behind'. *Journal of Economic Growth,* 20 (1), pp. 1-36.

Summers, L. (2015) 'Demand Side Secular Stagnation'. *American Economic Review*, 105(5), pp. 60-65.
UN (2015) *World Population Prospects 2015*, UN: New York

Appendix I: Calculation of Rates of Return

The return to capital can be calculated in a number of different ways. The measure we focus on in the first instance is computed as the value of operating surplus net of depreciation divided by the capital stock. There are, broadly speaking, four different types of capital. First there is capital equipment, buildings, machinery and transport equipment. Secondly there is intangible capital. This has been measured only relatively recently; it represents items such as the stock of knowledge resulting from research and development activity. Even though it is harder than conventional capital equipment, the role that it plays in the production process is straightforward enough to understand. Thirdly, while stocks do not play a role in the process of physical production, businesses know that in order to produce efficiently, they have to keep adequate stock levels. "Just in time" stock management has the advantage that it keeps stocks to a minimum. But it does leave production vulnerable to supply disruption. An efficiently run business will strike a balance between the risks of disruption and the costs of holding and managing large levels of stocks. Finally, land is a non-produced capital good whose importance to the economy cannot be denied. After all, people need somewhere to live and industrial enterprises need premises.

The first three of these can be measured either at the cost of production or in terms of the value put on them by financial markets18 . The fourth, land, has in broad terms, no cost of production and can be measured only at market value. Marris (1964) coined the term "valuation ratio" to represent the ratio of the financial market value of a firm to the replacement cost of its capital.

The calculation is complicated by the fact that the incomes of self-employed people, so-called mixed incomes, include both an element of wage income, for the effort that the self-employed person puts into the business, and a return on the capital employed. It is not possible to distinguish the two, perhaps even for the proprietors of such businesses. There is no completely satisfactory way of splitting mixed income between employment income and operating surplus (Izyumov and Vahaly, 2015). The approach most frequently adopted is to assume that the split is the same as that observed between employment income and surplus gross of depreciation in the non-financial corporate sector. This makes it possible to derive an estimate of the surplus straightforwardly.

A further complication is that, while business profits are typically collected from surveys and tax data, one important component of operating surplus, the return on owner-occupied housing, is imputed. Estimates of overall returns will depend on how accurate, or inaccurate this imputation is.

Finally, an important component of the capital stock, that owned by the government is often provided to users without direct charge. It is not possible to say how far the fact that businesses have access to roads without paying directly for their use increases the profits of the business sector, or perhaps the employment income of the people who work in it. This means, first of all, that the overall return on capital is probably

[18] In financial markets we can observe the value put on businesses but not the individual components of capital which make up their balance sheet.

understated and secondly, that the return on capital in the business sector is probably overstated. There is, however, no reason to think that the distortion is on such a scale so as to render the calculation meaningless.