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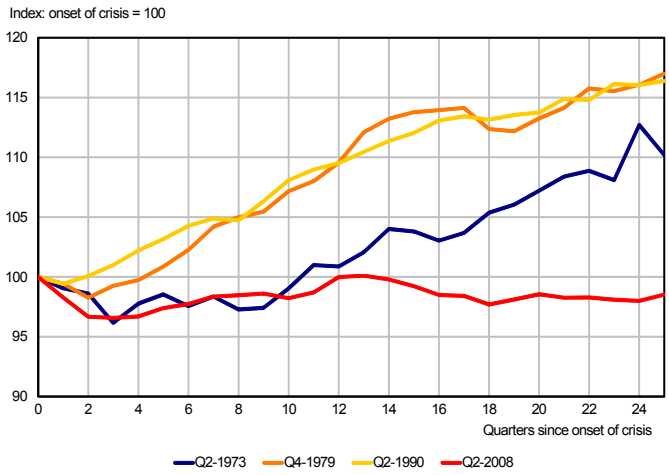
The United Kingdom's productivity puzzle

- British productivity[1] fell sharply during the 2008 crisis and has barely recovered since then. At the end of 2014, it was still two percentage points lower than in early 2008, and 15 points below the level it would have reached if it had followed its pre-crisis trend growth rate. The UK's persistently low productivity is noteworthy, both from a historical perspective and in comparison to the patterns seen in the other developed countries.
- The changing structure of the British economy, with the contraction of employment in the financial sector, one of the most productive ones, explains only a very small part of the productivity shock. Productivity weakened across all sectors of the economy. Similarly, labour hoarding and the increase in part-time and full-time employment do not provide an answer to the productivity puzzle.
- Productivity was negatively affected by the higher labour force participation rate of certain groups with lower-than-average productivity, and by the increased capacity of the labour market to absorb them. This concerns older workers in particular, as early retirement packages became less generous and the crisis eroded the value of their retirement savings. It also applies to foreign workers.
- Structural drivers of weaker long-term productivity included the lack of investment, impaired capital allocation and the slower pace of technological progress.
- The answer to the productivity puzzle is a decisive factor for the policy mix. The productivity growth rate is an important consideration for the Bank of England's forward guidance strategy and for setting fiscal policy.

Hourly productivity in the UK after the most recent recessions



Source: ONS, DG Trésor calculations.

(1) Unless otherwise specified, this discussion refers to hourly productivity in the economy as a whole.

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1. Cyclical labour adjustments offer only a partial explanation of why productivity remains lower than it was before 2008

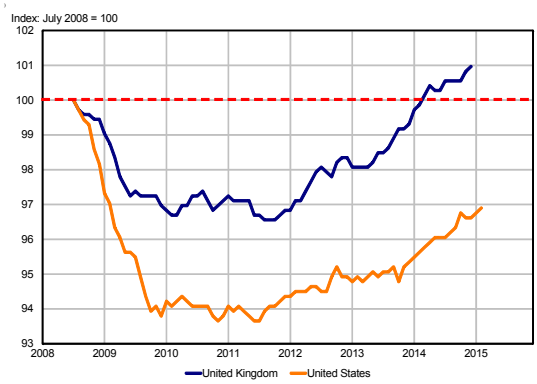
1.1 As the economy emerged from the crisis, employment rebounded more strongly than GDP...

In comparison to crises that hit the United Kingdom in the past, the 2008 crisis had a stronger and longer-lasting impact on growth. GDP fell by 6% between Q1-2008 and Q2-2009. The contraction in GDP stemmed from a sudden jump in the cost of borrowing and a sharp drop in export demand, especially from the United States and the euro-area countries, which are the UK's leading trading partners. The UK's sustained growth since early 2013 meant that its GDP overtook its pre-crisis peak in the third quarter of 2013 and now stands 3.7% higher than its pre-crisis level. But the recovery is still the slowest the country has experienced in more than a century. According to the calculations of the National Institute of Economic and Social Research, following recessions in 1920, 1930, 1973, 1979 and 1990, the economy took four years at most to return to pre-crisis levels.

Employment recovered more quickly than the economy and is still growing strongly. Total employment fell by 2% between Q1-2008 and Q2-2009. However, this trend quickly reversed and employment started growing again in the third quarter of 2009. Despite a further dip in 2011, 1,852,000 new jobs were created between the crisis trough in July 2009 and January 2015. The employment rate between November 2014 and January 2015 was higher than before the crisis, standing at 73.3% in January 2015, compared to 73.0% in January 2008. In contrast, the United States' employment rate posted a much larger fall over the same period, falling by 6.2% between July 2008 and December 2010, despite a more rapid recovery (see Charts 1).

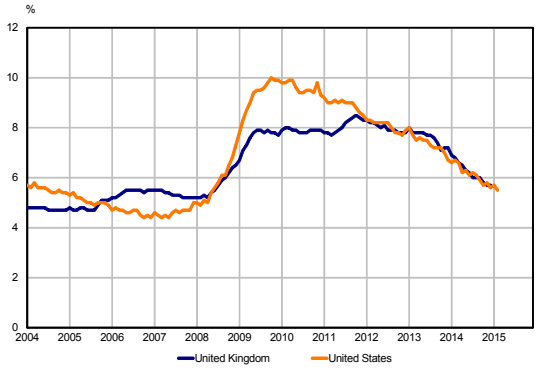
Charts 1: Comparison of British and American labour markets

Employment rates 16-64-year-olds in UK and USA



Sources: ONS and OECD. Last data points: December 2014 for UK and February 2015 for USA.

Unemployment rates in UK and USA

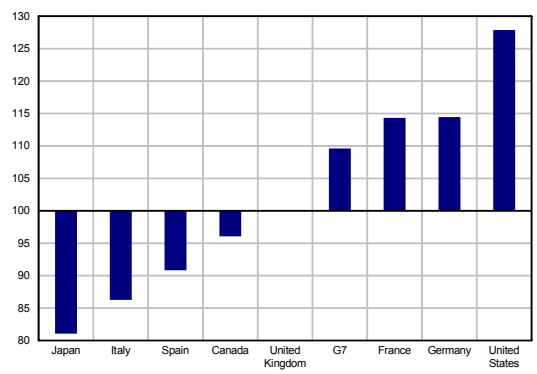


Sources: ONS and BLS. Last data points: January 2015 for UK and February 2015 for USA.

Consequently, the UK's productivity did not rebound during the recovery, in contrast to the other G7 countries. In the fourth quarter of 2014, the UK's productivity was still two percentage points below its peak in 2008, and 15 points below the level implied by its pre-crisis trend growth rate (see Charts 2). In the other G7 countries, economic growth recovered faster than employment, resulting in productivity increases. Productivity in euro area countries, especially France, and in Japan, returned to its pre-crisis levels in 2010. The UK's persistently weak productivity therefore stands out from other countries' experience (see Charts 2) and from the UK's own experience in the wake of previous recessions (see Chart in page 1).

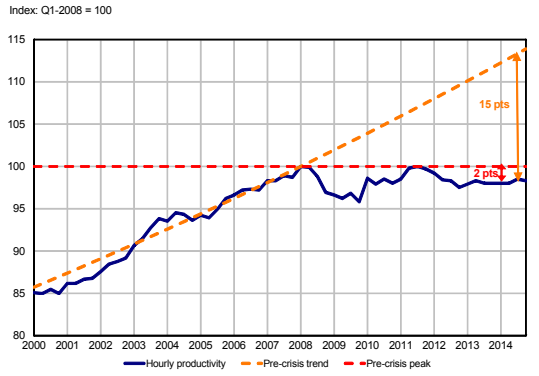
Charts 2: Hourly productivity of labour

Hourly productivity in 2013, UK = 100



Source: OECD, DG Trésor calculations.

Hourly productivity in UK



Source: ONS, DG Trésor calculations. Last data point: Q4 2014.

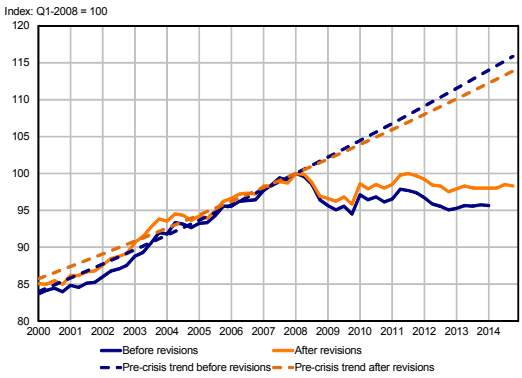
Box 1: **The revision of national accounts data does not explain the productivity puzzle**

On 30 September 2014, the United Kingdom revised its national accounts data to bring them into line with the **new European system of accounts** (ESA 2010). The new system entails a change in the base for the price index and the reclassification of R&D expenditure from intermediate consumption to investment. These methodological changes lead to an average upward revision of some GBP53 billion (4.3 percentage points) for each year from 1997 to 2013.

The revision changes the GDP profile, **showing a slightly shallower recession in 2008 and a stronger recovery since 2009**, due in part to much stronger investment growth. The fall of GDP from its peak in the first quarter of 2008 to the trough in the second quarter of 2009 has been revised from 7.2% under the previous system to 6.0%. The recovery is also stronger, with revised GDP growth of 1.6% in 2011 (versus 1.1%) and 0.7% in 2012 (versus 0.3%). The UK's GDP overtook its pre-crisis peak in 2013, instead of the second quarter of 2014 in the previous estimate. It now stands 3.7% higher than the pre-crisis peak, compared to 1.3% in France and 3.1% in Germany.

The revision of national accounts data results in a slight change in the scale of the productivity puzzle, but does little to explain it (see Chart 3). The upward revision of GDP growth, along with no change in the data on hours worked, automatically raises productivity. The UK's productivity still remains much lower than implied by the pre-crisis trend growth rate.

Chart 3: Hourly productivity and pre-crisis trend



Source: ONS. Last data points: before revisions: Q1-2014; after revisions: Q4-2014 .

1.2 …in contrast to the usual "productivity cycle"

The developed economies traditionnally experience a "productivity cycle" where productivity tends to weaken during downturns and rebounds during upturns. As demand weakens, employers prefer to cut overtime first and then reduce regular hours before laying off any of their employees. The cost of hiring and firing workers explains their preference. This means that employment falls less than output does, which automatically reduces the productivity per worker. The opposite pattern emerges as the economy starts to recover. Employers increase the working hours of existing employees before hiring new workers, which leads to a rebound in productivity.

2. At first glance, changes in the labour market do not explain the persistent weakening of productivity

2.1 The reallocation of labour to less productive sectors explains only a small share of the decline in apparent labour productivity

The reallocation of workers to less productive sectors explains only a tiny proportion of the dip in productivity. Productivity varies widely between the different sectors of the United Kingdom's economy. For example, productivity in the financial sector is four times higher than in the agricultural sector. This means that a reallocation of workers from high-productivity sectors to low-productivity sectors could explain the decline in aggregate productivity. However, breaking down per capita productivity into *(i)* a component measuring the impact of structural change in employment by sector and *(ii)* a component measuring like-for-like per capita productivity growth shows that structural change explains only 0.4 percentage point of the productivity decline during the crisis (see Table 1). This means that the 50,000 very high-productivity jobs lost in the City during the crisis had only a minor impact on aggregate productivity.

Table 1: per capita productivity by sector and sub-sector[a]

Average annual growth rate, %

	Like-for-like	Structural change	Total
2001-2007	2.4	−0.3	2.1
2008-2009	−2.2	−0.4	−2.6
2010-2013	0.5	0.0	0.4

a. This breakdown of productivity growth isolates the effects from structural changes in employment in order to assess how the reallocation of workers between sectors affects productivity. The "like-for-like" component is used to assess productivity gains stemming from changes within each sector. The "structural change" component assesses the impact of a change in the structure of employment by sector. A final component, not shown here, measures the combined effects of these two factors.

Source: ONS, DG Trésor calculations.

The decline in per capita productivity is not limited to a few sectors; it affects most of them. In the period following the crisis, productivity declined or posted slower growth in all major sectors of the economy (see Table 2). The only sectors to post productivity gains were agriculture and construction, which account respectively for 1% and 7% of the UK's economy.

Table 2: Average productivity growth rates by sector and each sector's share of whole economy

		Total	Agriculture	Manufacturing	Construction	Private sector services	Public sector services
Average productivity growth rate	Pre-crisis*	1.56	−0.42	2.50	−1.40	2.41	0.45
	Post-crisis**	−0.44	0.07	−0.65	0.34	−0.22	−0.28
	Share of whole economy	100%	1%	10%	7%	56%	27%

* 2004-2008 average.
** 2009-2013 average.

Source: ONS, DG Trésor calculations.

2.2 Labour hoarding alone cannot explain the persistence and the scale of the decline in the UK's productivity

When output falls off, companies may try to retain certain employees, especially those with the most skills and experience, in order to avoid the cost of hiring new employees when the economy recovers. Prevailing uncertainty about how long the downturn will last means that labour hoarding undermines the productivity and financial performance of these companies. Some indicators reveal labour hoarding in the United Kingdom: the proportion of companies posting financial losses but no job losses doubled during the crisis, rising from 11% in 2005-2007 to 22% in 2011[1]. Furthermore, the average job tenure increased between 2004 and 2011: the percentage of employees with an average of at least five years tenure rose from 35% to 52%[2]. However, the strong take-off in job growth in 2012 does not seem to be consistent with labour hoarding, which should have enabled companies to boost output without hiring new employees.

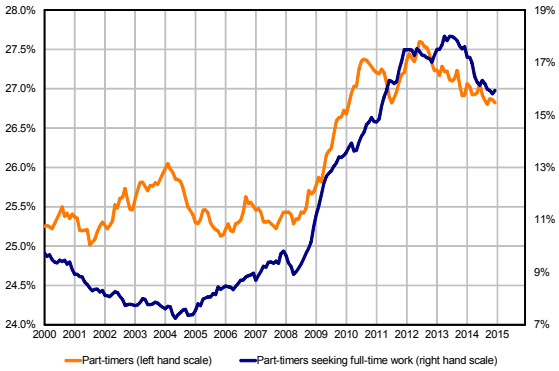
Job losses were also restricted by the minimum level of "overhead" labour that firms need to stay in business, but the impact on productivity was minor. Labour employed by firms can be divided into two types: "variable" labour that changes with the level of output, and "overhead" labour, which does not change with the level of output and is required unless the firm goes out of business. For example, a firm still needs security staff or accountants to prepare its financial statements and pay its taxes, even if its production declines. The development of the service sector in the UK economy, which accounted for 83% of employees in 2013, versus 74% in 1994, has accentuated this phenomenon: the overhead staffing level in the service sector is higher than in the manufacturing sector. However, the impact of the growing service sector on productivity has been limited, according to estimates by the Bank of England[3].

3. Other changes in the labour market may explain some of the decline in productivity

3.1 The compositional changes of the labour force may have reduced productivity by one percentage point

The increase in the proportion of part-time workers automatically reduces average productivity (see Chart 4). Since 2008, the proportion of British employees working part-time has increased from 25% to 27%. Before the crisis, the proportion of those working part-time because they could not find full-time employment stood at 10%. This rose to 18% in 2013. Yet, part-time workers are less productive than full-time workers. On average, they have less experience and lower educational attainment on average. In most cases, they work in sectors of the economy where productivity is weaker. On a like-for-like basis, part-time working may also reduce the average hourly productivity rate. It makes it more difficult to schedule working hours, especially for shift work, and leads to under-utilisation of equipment.

Chart 4: Proportion of part-time workers in the labour force



Source: ONS, DG Trésor calculations. Last data points: December 2014.

The estimated productivity gap between full-time and part-time workers, however, shows that this phenomenon could explain only 0.5 percentage point of the decline in productivity. The productivity of part-time workers cannot be measured separately from that of full-time workers. But the differences observed in their hourly wages, with part-timers' hourly

(1) Barnett A., Chiu A., Franklin J. and Sebastia-Barriel M. (2014), "The productivity puzzle: a firm-level investigation into employment behaviour and resource allocation over the crisis," *Working paper* No. 495, April.
(2) Bryson A. and Forth J. (2014), "The UK's Productivity Puzzle," NIESR.
(3) Barnett A., Batten S., Chiu A., Franklin J. and Sebastia-Barriel M. (2014), "The UK productivity Puzzle," Bank of England, *Quarterly Bulletin* Q2.

wages 1.5 times less than full-timers' wages, could be a sign of differences in productivity. Starting with this hypothesis, as the IFS[4] does, and assuming that part-timers' productivity is 70% of that of full-timers, the observed shift of 2% of workers from full-time to part-time employment has an impact of only 0.6 percentage point on total productivity.

The increase in the proportion of self-employed workers also contributes to a decline in average productivity, but its impact seems to be relatively weak. The proportion of self-employed workers rose by 2 percentage points, from 13% to 15% since 2008 (see Chart 5). In the same way part-timers are less productive than full-timers, self-employed workers, particularly self-employed workers in unincorporated businesses, are less productive than employees. Based on the assumption that self-employed workers' productivity is 80% of that of employees, the larger proportion of self-employed would only reduce total productivity by 0.4 percentage point. Even making the extreme hypothesis that new self-employed workers' productivity is nil would explain only two percentage points of the observed decline in productivity.

Chart 5: Proportion of self-employed workers in the labour force

Source: ONS, DG Trésor calculations. Last data point: December 2014.

3.2 The decline in real wages has been mentioned as an explanation for the UK's weak productivity

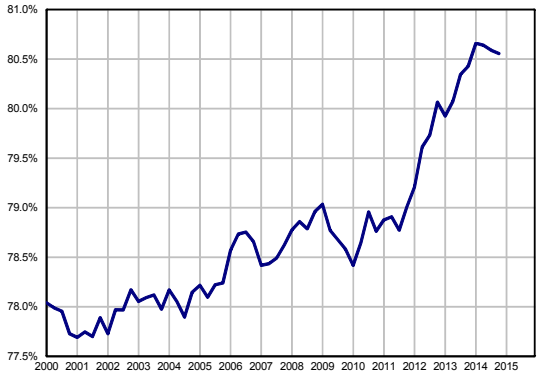
The scale of the decline in real wages in the UK since the beginning of the crisis is particularly stark: relatively stable nominal wages and high inflation from 2008 to 2012 meant that real wages shrank by an average of 1.4% each year after 2008, and by more than 7% since the onset of the crisis (see Chart 6). The larger proportion of part-time workers, who earn a lower hourly wage than full-timers, and whose earnings average one-third those of full-timers, also explains the decline. Since 2008, the real median wage has fallen by approximately 10%. Businesses benefited from this cheap labour when the economy recovered, which explains the strong employment numbers, at the price of a large drop in productivity[5].

Chart 6: Real average hourly earnings per capita in constant 2005 GBP

Source: ONS. Last data point: December 2014.

Some of the decrease in wages is explained by the increase in labour supply. Several factors may have led to the decline in real wages. First of all, some employees had to accept much lower wages or pay freezes to find or keep a job during the crisis, as shown by a Centre for Business Research study[6]. Lower wages may also stem from taking a lower skilled job than the one previously held. Several reforms implemented since 2010 have also increased the labour supply: tighter eligibility requirements for certain benefits (for single parents and the disabled), elimination of the requirement that employers automatically retire employees aged 65 or more, and less attractive early retirement packages. At the same time, the crisis eroded the value of retirement savings schemes and may have caused some employees to postpone their retirement. The supply of labour was also increased by higher immigration to the UK, particularly when the UK labour market was opened up to workers from Eastern Europe in 2004, which may have held down the average wages of unskilled workers. In contrast to the experience of most developed countries, the participation rate has increased by nearly two percentage points in the UK since the crisis, rising from 78.8% in January 2008 to 80.6% in January 2015 (see Chart 7). This is particularly true for older workers, with the participation rate for 55-64-year-olds rising from 67.6% in January 2008 to 71.5% in November 2014, and the rate for the over-65s rising from 7.3% to 10.4%.

Chart 7: Labour force participation rate, total population



Source: ONS, DG Trésor calculations. Last data point: Q4-2014.

(4) Martin B., Rowthorn R. (2012), "Is the British economy supply constrained? A renewed critique of productivity pessimism," *Centre for Business Research*, May. The same argument is made by Blundell R., Crawford C. and Jin W. (2013), "What can wages and employment tell us about the UK's productivity puzzle?" *Institute for Fiscal Studies*, June.

(5) Calvo G., Coricelli F. and Ottonello P. (2012), "The labor market consequences of financial crises with or without inflation: jobless and wageless recoveries," *NBER Working Paper*, October.

(6) See note 4.

However, the direction of causality between productivity and wages is not clear. Classical theory holds that productivity is an exogenous variable driving wage-setting, with wages seen as the remuneration of the marginal productivity of labour. This view has been challenged by the efficiency wage theory, which states that an employer may obtain more effort and more productivity from workers by paying them more. This makes productivity an endogenous variable, since it is determined by wages, rather than the other way round. Under this hypothesis, the decline in real wages is also a cause of the lower productivity, which obscures the direction of the causal link between productivity and wages. A study by two researchers from Cambridge University[7] goes even further, identifying three ways lower real wages have impaired productivity: (1) lower wages have cushioned the decline in corporate profits, keeping some struggling firms afloat, (2) lower wages are an incentive to hoard labour and, (3) cheaper labour has been substituted for capital. Under this approach, technological innovation determines potential productivity, and thus workers' wages in the long run. On the other hand, the relative prices of capital and labour determine short-term factor combination choices, thereby determining labour productivity.

4. More structural factors may explain the fall in productivity

4.1 Productivity may have been impaired by a lack of investment and a malfunctioning financial system

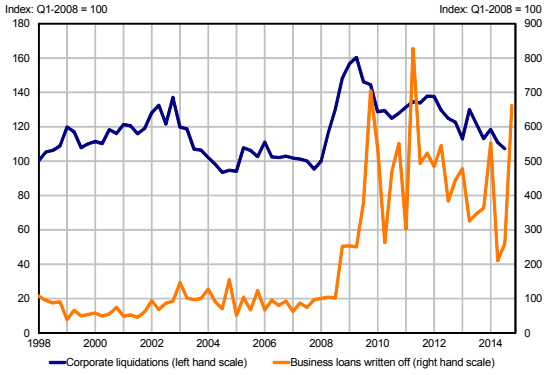
Lower real wages, combined with credit constraints, may have spurred firms to hire more workers rather than invest to meet demand. Business investment returned to its pre-crisis level in 2013, but it still falls far short of its trend growth rate (see Chart 8). Investment may have been hampered by banks' reluctance to lend to firms, despite the government programmes implemented to support lending to the private sector. The Funding for Lending Scheme[8] provided direct support for lending to the private sector. It boosted lending to households, particularly housing loans, but its results were mixed for corporate lending. Business lending was down by 0.9% over the year to November 2014, according to the Bank of England.

Chart 8: UK business investment

Sources: ONS. Last data points: Q4 -2014.

A weak banking system may also have hampered the growth of high-productivity businesses. Some businesses with low-productivity managed to survive thanks to banks' forbearance during the crisis: rather than book losses, financial institutions preferred to renegotiate the loans, instead of demanding full repayment after a breach of the loan covenant (see Chart 9). The Bank of England notes that the number of corporate liquidations has remained relatively low since the crisis, despite an increase in the volume of business loans in default. This may have impaired the mobility of capital for new projects. According to the Bank of England's estimates[9], the slowdown in the creative destruction process, at the expense of the most productive firms, can explain one percentage point of the decline in productivity.

Chart 9: Loan losses and corporate liquidations in England and Wales



Sources: BIS and Bank of England. Last data point: Q4-2014.

The decline in government investment since 2010 could also impair productivity. Fiscal consolidation in the UK brought about a sharp reduction in general government investment (see Chart 10). Budget data show that net investment (GFCF minus fixed capital consumption), was halved, falling from GBP52 billion in 2009 to GBP25 billion in 2013.

National accounts show a slightly smaller, but still substantial reduction of about one-third, from 3.3% of GDP to 2.1%. However, the impact of this lower public investment on the UK's productivity must be interpreted with care for two reasons. First, the negative impact is expected to be felt in the medium term. The savings measures implemented since 2010, following strong government investment growth in 2008 and 2009, cannot explain weak productivity during the recovery phase. Furthermore, government investment was already low in the UK before the crisis, standing at an average of

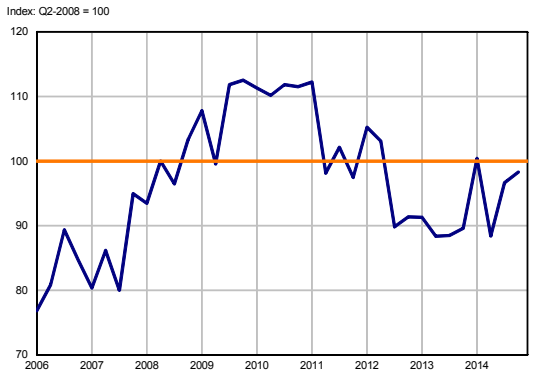
(7) Martin B. and Rowthorn R. (2012), "Is the British economy supply constrained? A renewed critique of productivity pessimism," *Centre for Business Research*, May.

(8) The Funding for Lending Scheme arranges a collateral swap with the Bank of England for commercial banks and building societies. Participants can borrow UK Treasury bills from the Bank of England at a lower cost in exchange for risky assets, which are primarily loans to households and businesses, if they maintain or increase their lending.

(9) According to a study published in the December 2013 Bank of England Quarterly Bulletin (Arrowsmith et al., "SME forbearance and its implications for monetary and financial stability") the banks' forbearance with regard to borrowers in default has an impact of around 1 percentage point on the level of productivity.

2.0% of GDP from 1998 to 2007. Therefore, the decline seen since 2010 can hardly explain a dip in the trend growth rate of productivity.

Chart 10: Government investment



Source: ONS. Last data point: Q4-2014.

4.2 The recent decline in productivity could also hide more structural economic changes

Productivity growth could be persistently weaker in the future. The "Great Stagnation" thesis set out by the American economist Tyler Cowen[10] in 2011 covers two factors leading to a structural slowdown in productivity growth. On the one hand, the gains from university education for the masses and for women cannot be reproduced on the same scale in the future, which means that the growth in the overall level of education will be lower. On the other hand, recent technological innovations, especially those related to the Internet, do not contribute as much to GDP as the industrial innovations of the past. A crowd-sourced online encyclopaedia, for example, has a huge impact on the well-being of its users, but only a minor impact on the output recorded in the national accounts.

A structural slowdown in productivity growth may also already be taking place in some sectors, especially energy and finance. The productivity of gas and oil extraction in the North Sea has been declining since 2008 because the oil fields are growing older and extraction is becoming more difficult[11]. The same pattern can be seen in the financial sector: before the crisis, annual total factor productivity (TFP) growth in the UK's financial sector was 1.5 percentage point greater than TFP growth for the economy as a whole. It now seems that part of this growth was based on the growth of certain very lucrative activities, such as selling credit default swaps, which generate high added value. The strong contraction of these market segments led to lower productivity in the sector, but it is likely to have a beneficial effect on financial stability [12].

Box 2: Estimated impact of factors driving down productivity

	Bank of England estimates	Insee estimates (not summable)
Deviation from long-term trend	**16 pts**	
Productivity cycle	Uncertain	3 pts
Lower trend growth in the finance sector and extractive industries	2 pts	4 pts
Lower real wages per capita growth	/	Less than 7 pts
Of which investment deficit	3 to 4 pts	3 pts
Of which increase in part-time working	/	Less than 1 pt
Of which increase in participation rate	/	Less than 1 pt
Increase in self-employed workers	/	Less than 1 pt
Impaired capital allocation and under financing	3 to 5 pts	/
Measurement errors	2 pts	Marginal except for financial services

Source: Barnett A., Batten S., Chiu A., Franklin J. et Sebastia Barriel M. (2014), "The UK productivity puzzle", Bank of England, Quarterly Bulletin, Q2 and Jess N., Pramil J. and Roucher D. (2013), " In search of lost British productivity , INSEE, note de conjoncture, December.

5. The outlook for the UK's economy depends in part on the answer to the productivity puzzle

The UK's economy has expanded rapidly since the start of 2013. Its growth hit 2.8% in 2014, which was its best performance since 2007, and the European Commission predicts that the UK's GDP will rise by 2.6% in 2015. Yet, the recovery has not brought a rebound in hourly productivity, which rose by only 0.8% from Q4-2012 to Q4-2014. The average growth per quarter stood at 0.1%, way below the average growth of 0.5% from Q1-2000 to Q1-2008. Future productivity growth is the main determining factor for the growth potential of the British economy. It is therefore crucial for the conduct of the UK's monetary and fiscal policy.

(10) Cowen T. (2011), "The Great Stagnation: How America Ate All the Low-Hanging Fruit of Modern History, Got Sick, and Will (Eventually) Feel Better," June.

(11) According to calculations by the *Financial Times* based on ONS figures (before the revisions for ESA 2010), three sectors (finance and insurance, extractive industries, utilities) account for three quarters of the decline in productivity from 2008 to 2013 - Giles C. (2014), "Oilmen, bankers, and utilities blamed for fall in UK productivity," *Financial Times*, April.

(12) Haldane A. and Madouros V. (2011), "What is the contribution of the financial sector?" VoxEU.org, 22 November.

5.1 Regarding monetary policy, the productivity trend is a determining factor for the forward guidance strategy that the Bank of England has implemented since August 2013

In August 2013, the Bank of England announced that it would not raise its Bank Rate as long as unemployment remained above 7%[13]. This strong form of forward guidance was aimed at convincing economic agents that the highly accommodative stance of monetary policy was going to last for a long time. At the time, the Bank thought that the unemployment threshold would not be reached until 2016. This scenario assumed that productivity growth would rebound, since firms were supposed to increase the working hours of their existing employees before hiring new ones.

This strategy soon became pointless because of a rapid drop in unemployment and stagnant productivity. Therefore, the original forward guidance was replaced by a less precise guidance in February 2014. The new guidance states that the Bank Rate, standing at 0.5% since March 2009, will not be increased until spare capacity has been reduced. The Bank of England's working hypothesis, which it deems to be conservative, is that productivity will return to its pre-crisis trend growth rate, without making up for the ground lost during the crisis. This would lead to a relatively gradual reduction of spare capacity and curb inflationary pressures. If productivity were to increase less rapidly, leading to a sudden reduction in spare capacity, the Bank could be forced to tighten its monetary policy sooner than expected.

5.2 Regarding fiscal policy, productivity growth is a determining factor for estimating the structural government balance, which depends on the output gap in the UK's economy

The UK government's target is to balance the cyclically-adjusted current budget three-years ahead[14]. In its March 2015 Economic and fiscal outlook, the Office for Budget Responsibility (OBR) estimated the output gap at 0.8% for fiscal year 2014-15, with the Maastricht structural deficit estimated at 4.4% and the headline deficit at 5.2%. A stronger rebound of productivity could cause the OBR to revise its potential output growth estimate upward. This would automatically increase the output gap and reduce the structural deficit, thereby reducing the need for spending cuts or tax increases to meet the target of a balanced cyclically-adjusted budget. On the other hand, persistent impairment of productivity growth would increase the efforts required to meet the government's fiscal targets.

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(13) Provided this does not entail material risks to either price stability or to financial stability.

(14) The target of a balanced cyclically-adjusted current budget five years ahead was set in the June 2010 Budget. The time frame was cut to three years in January 2015.

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