



Supply Stocktake (5/10)

Note title: **An update on the Productivity Puzzle**

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An update on the productivity puzzle

Main Message: The productivity puzzle is as large as it was in June last year. Data revisions and the additional outturns do not allow us to discount any of the original hypotheses, though persistent factors still explain more of the puzzle than cyclical factors.

1. This note updates analysis from the June 2014 *Quarterly Bulletin* article 'The UK Productivity Puzzle', which investigated the shortfall in UK productivity relative to its pre-crisis trend.¹ That article set out several potential explanations for the productivity puzzle, where possible quantifying the extent to which each explanation could account for a shortfall in productivity relative to its pre-crisis trend.

2. The article collected different explanations for the productivity puzzle into three broad groups. The first group of explanations all suggested that measurement issues will, in time, reduce the size of the puzzle. The second group of explanations suggested that productivity has been lower since the crisis due to cyclical factors that will prove temporary. The third group of explanations suggested the shortfall is due to more persistent factors. When the contributions from all of the different explanations were quantified, a significant proportion of the puzzle remained unexplained.

3. The first column in **Table 1** shows the estimated contributions from the various explanations presented in the original *Quarterly Bulletin* article. The second column shows the estimates updated for data revisions. The third column shows the estimates updated for the four quarters of data that have become available since the article's publication. The table shows that data revisions have reduced the size of the puzzle that existed in 2013 Q4, but the latest assessment is broadly unchanged since the original article. Persistent factors continue to explain more of the puzzle than cyclical factors, suggesting that productivity growth may remain weak.

Table 1: Factors contributing to the weakness in UK labour productivity (pp)

Factors contributing to the weakness in UK labour productivity			
	2013Q4 - Original	2013 Q4 - Latest	2014Q4
	Vintage	Vintage	
Shortfall relative to trend	16	13.5	15
Measurement issues	4	2.5	3
Measurement of output	2	0.5	1
o/w R&D capitalisation	1.5	0	0
Lower trend in some sectors	2	2	2
Actual shortfall to explain	12	11	12
Cyclical	0	0	0
Lower CAPU	0	0	0
Labour hoarding	uncertain	uncertain	uncertain
Persistent	6-9	7-9	7-9
Lower physical	2.5	2.5	2.5
Lower intangible	0.5-1.5	1.5	1.5
Impaired resource allocation & high firm survival rates	3-5	3-5	3-5
Total left Unexplained	3-6	2-4	3-5

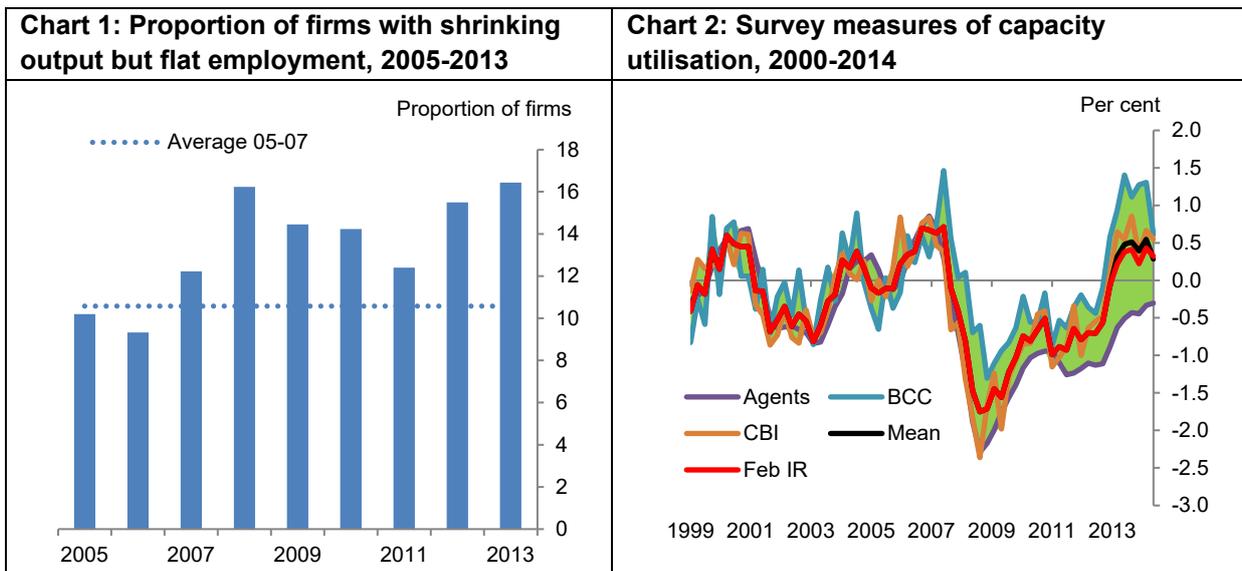
¹ <http://www.bankofengland.co.uk/publications/Documents/quarterlybulletin/2014/qb14q201.pdf>

Measurement

4. The *Quarterly Bulletin* article argued that the comparison between measured labour productivity growth and its pre-crisis average was likely to be overstating the true size of the productivity puzzle.
5. The size of the shortfall is sensitive to measurement issues and data revisions affecting employment, output or their pre-crisis trends. In 2014 the ONS decided to capitalise R&D expenditure in the National Accounts. Intangible investment has been less weak than tangible investment since 2008, so this change reduced the puzzle by around 1.5pp. The Bank's backcast now embodies an expected revision to the level of GDP of about 1pp, more than the 0.5pp expected in 2013 Q4.
6. Changes in trend for certain sectors also make it unlikely that aggregate productivity will return to its pre-crisis trend. For example, North Sea oil and gas output has been falling since 2003, and future productivity growth is likely to remain lower than before the crisis. The financial sector is another sector that is likely to exhibit lower productivity growth in the future. Potential trend changes reduce the productivity puzzle by an estimated 2pp.
7. Subtracting the estimated impact of measurement issues leaves the 'actual' shortfall in 2015 Q1 broadly similar in size to the actual shortfall in 2013 Q4, as productivity growth has remained weak in subsequent outturns.

Cyclical factors

8. The *Quarterly Bulletin* article played down the significance of cyclical factors in explaining the weakness of productivity, given the length of time that had passed since the initial downturn. Possible explanations for the weakness in productivity growth related to cyclical factors include firms hoarding labour and lower capacity utilisation.
9. The proportion of firms experiencing shrinking output but flat employment rose in 2012 and 2013 (**Chart 1**). This might reflect the slowdown in 2012 causing businesses to 'hoard' or hold on to labour. This is more likely to be the case if the reduction in firms' output was too small to trigger any adjustment to the labour force. Slack in the labour market may also have discouraged employees from leaving low productivity firms by making them less confident of finding another job or an increase in wages in another firm.



10. However, survey measures of capacity utilisation do not indicate that labour hoarding is widespread. The swathe of capacity utilisation survey measures in **Chart 2** shows that companies are reporting that they are operating slightly above their usual levels of capacity. Taking the evidence together, the role of cyclical factors in the ongoing weakness in productivity remains uncertain. Indicators of spare capacity suggest there is limited scope for any cyclical rebound in productivity.

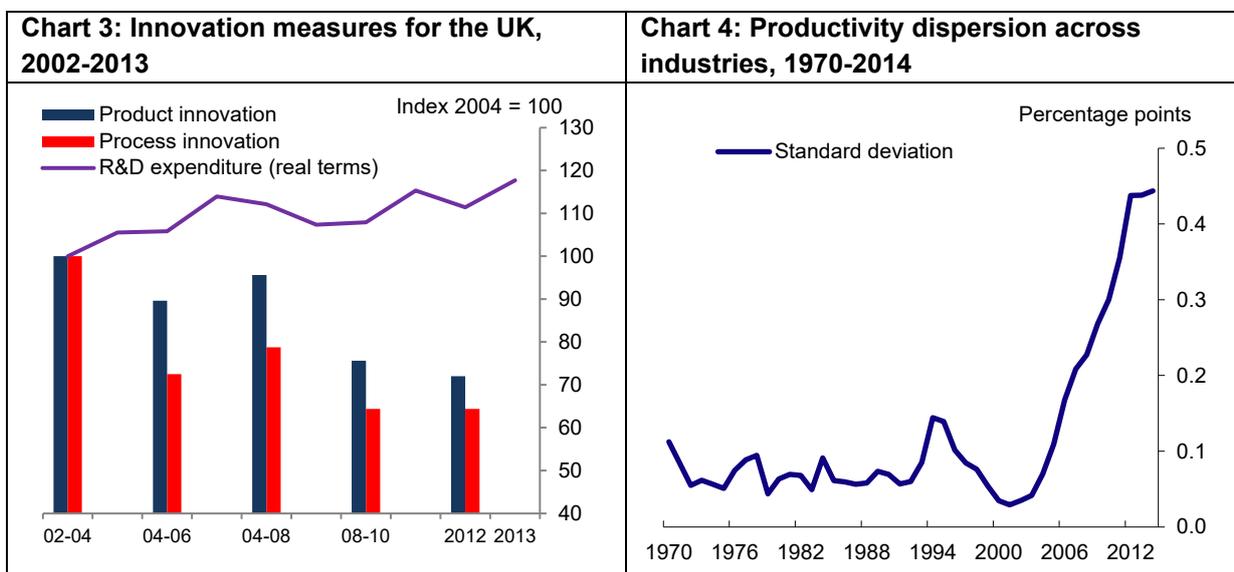
Persistent factors

11. The *Quarterly Bulletin* article showed that persistent factors explained more of the puzzle than cyclical factors in 2013 Q4. These factors included weak business investment and an impaired financial system, with the former lowering labour productivity by reducing capital per worker and the latter reducing how efficiently firms can use capital.

12. Growth of business investment since 2008 has averaged 0.5 per cent per quarter, compared to a pre-crisis average of 0.75 per cent. This has significant implications for the level of capital per worker. We expect this to account for around 2.5pp of the shortfall in productivity.

13. In contrast to tangible investment, investment in intangible capital has been relatively robust since 2008 (**Chart 3**). Spending on R&D continued to increase in the period after the crisis, and was 6% higher in real terms in 2013 compared with 2012. However, measures of innovation output have fallen since the crisis. The UK Innovation Survey showed that the proportion of companies introducing new goods or services ('product innovators') between 2010 and 2012 was 5% lower than in 2008-2010. The proportion of product innovators declined from 24% to 18% between 2008 and 2013. Product innovators are estimated to be around 20% more productive than other firms, so this decline implies a 1.5pp difference in productivity between 2008 and 2013.

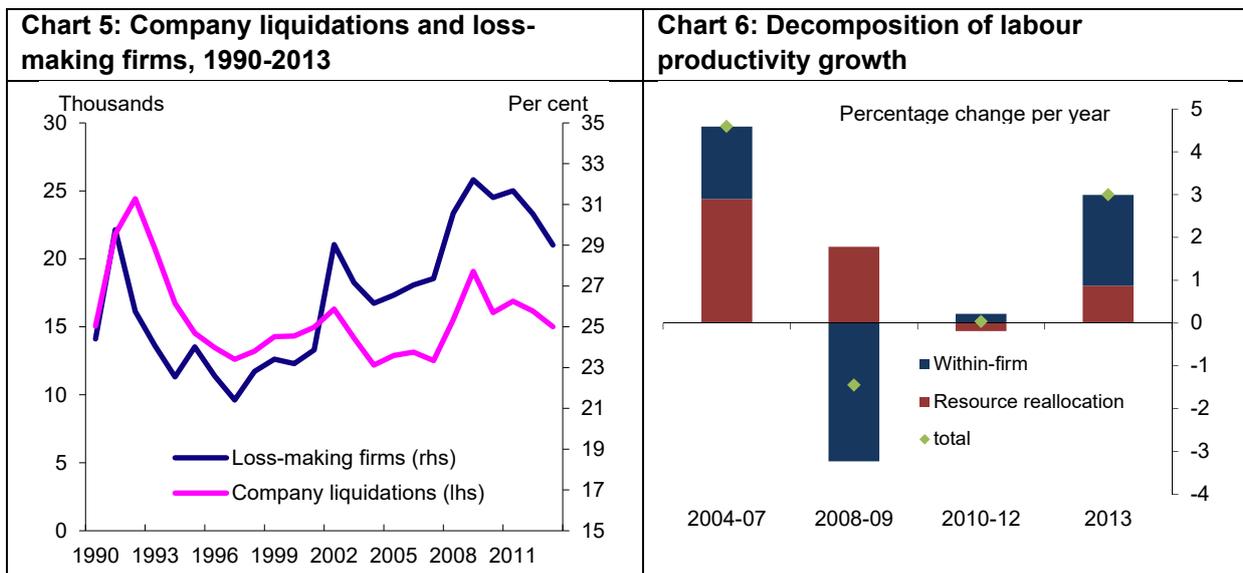
14. Aside from the amount of capital per worker, the efficient use of capital and resources more generally may have been held back by financial conditions in the aftermath of the crisis. The dispersion of differences in productivity relative to pre-crisis for different sectors remained high in 2013, indicating a lack of resource reallocation from low to higher productivity sectors (**Chart 4**).



15. The *Quarterly Bulletin* article made reference to an estimate for the impact of inefficient capital allocation on productivity of 3-4pp as well as considering the impact of impaired resource reallocation due to higher firm survival. The level of firm liquidations remained low during the crisis while the number of loss-making firms increased significantly and has remained elevated into 2013 (**Chart 5**).

16. Evidence from firm-level data suggests that higher firm survival may have contributed to lower productivity growth than might otherwise have been the case. **Chart 6** is a decomposition of changes in private sector productivity growth into contributions from ‘resource reallocation’ (changes in market share, and firm entry and exit), and within-firm effects. Before the crisis, changes in market share and firm exits tended to push up on productivity as resources were reallocated from low to high productivity firms. These effects have been weaker since the crisis. In 2013 the contribution from resource reallocation to productivity growth remained weaker than in 2004-07.

17. To find the impact of higher firm survival on productivity, the *Quarterly Bulletin* article reported the results of an exercise which compared productivity with the higher rate of firm survival seen after the crisis with a counterfactual scenario of a higher firm death rate, in line with the 1990s. The impact of higher firm survival was estimated to have lowered productivity by around 5pp by 2011. Using the past average contribution of firm deaths to productivity growth as a counterfactual for 2012-13, the impact of higher firm survival is still around 5pp.



18. This note has presented updated analysis from the June 2014 *Quarterly Bulletin* article ‘*The UK Productivity Puzzle*’, incorporating the subsequent data revisions and releases. That article set out several potential explanations for the productivity puzzle, where possible quantifying the extent to which each explanation could account for a shortfall in productivity relative to its pre-crisis trend. The additional data outturns do not allow us to discount any of the original hypotheses. Persistent factors continue to explain more of the puzzle than cyclical factors, suggesting that productivity growth could remain weak.