

Comment **UK productivity: a puzzle but not a surprise**

- *Labour productivity in the UK has been weak since the 2008 crisis*
- *The reasons for this are almost certainly various and many*
- *But labour productivity is always pro-cyclical, and recent behaviour is not out of line*
- *Hence the productivity slowdown may be a puzzle; but it is not a surprise*

Three questions

It has become conventional wisdom that the growth of labour productivity in the UK has been unusually weak since the 2008 financial and economic crisis.¹ But has it? There are three issues here: Has productivity indeed been weak? If so, why? And has its performance been unusual?

Post-crisis productivity has been weak

Productivity has indeed been weak

Certainly, the post-crisis performance of labour productivity has been weak. Whole-economy output per hour as measured² is currently around 15% below the level that would have been implied by the continuation of its pre-crisis trend;³ and, in contrast to the level of output, which has surpassed its pre-crisis level, productivity is still, depending on the specific measure, around or even below its previous peak.

Labour productivity has thus grown slowly since the crisis. Between 1960 and 2007, labour productivity, measured as real GDP per employee (not adjusted for hours worked), grew by a little more than 2% per year on average. By contrast, over the past seven years taken as a whole productivity did not grow at all. Moreover, this performance has been weaker than over any seven-year period since at least 1960.

Determinants of productivity

The determinants are many and various

Productivity is a complex phenomenon, especially at the level of an economy as a whole. Of its many determinants, some are long term, others shorter term. Some are powerful, some less so. Some wax, while others wane. In the 1960s and 1970s a veritable research industry arose to seek to quantify the contribution of a whole range of factors to the growth of output.⁴ Perhaps the results were not always wholly convincing, but a number of key contributors can be identified.

Investment. Of the longer-term influences, the most fundamental are investment and technology. But quantifying their contribution is not straightforward. Were labour and capital to combine under constant returns to scale, every 3 to 4 percent of GDP that is invested would add around 1 percentage point to the capital stock;⁵ and potentially around 1/3 of a percentage point to output and thereby labour productivity.⁶

Typically, in the aftermath of a financial crisis, investment falls sharply,⁷ thereby contributing importantly to the fall in aggregate demand and to the level of capital per head, future output, and thereby future labour productivity. Over the decade before the crisis, UK investment was growing at around 3% per year. Had it continued to grow similarly, capital per worker would now be around 30% higher than it currently is. The constant returns to scale calculation would imply that potential output, and thereby labour productivity, would thus be around 9% higher.

Economies of scale. In the real world, however, economies of scale effects are ubiquitous, and considerably augment the labour-productivity effects of investment. Volumetric shapes – pipes, tanks, trucks ships, oil refineries, and the like – typically require only a 6% or 7% increase in the quantity, and hence cost, of materials used for each 10% increase in volume.⁸ These and other dynamic effects, such as ‘learning by doing’, can be realised through access to large, growing markets.

Technology. Investment also contributes importantly to bringing new technologies into the economic system. Together, therefore, the joint effects of economies of scale and embodied technical progress can be powerful.

Compositional effects. Even were labour productivity in every sector to be unchanging, productivity in the economy as a whole would increase whenever labour moved from low- to high-productivity activities, for example from agriculture to manufacturing as part of economic development. And the reverse can happen when, as in the UK after the 2008 financial crash,

employment redeploys from high-productivity financial services to lower-productivity self employment.

Shorter-term, cyclical, influences. In addition to its trend, long-term behaviour, labour productivity historically has been strongly pro-cyclical,⁹ for a variety of reasons. Much of total employment, whether in a factory or an office, is ‘overhead’ – cleaners, accountants, managers, and the like – so that an increase in output, up to the capacity of the enterprise, requires an increase only in process staff. Moreover, firms may choose to hoard labour during a recession, especially if they expect it to be brief, rather than face the costs of re-hiring and re-training new employees.

Causality

An additional level of complexity/complication in analysing productivity growth is that causality between output growth and productivity runs in both directions: faster growth of productivity enables more to be produced from available resources, while faster growth of output both leads to existing resources being used more efficiently and encourages new investment – which in turn adds both to demand and to supply – the ultimate dynamic phenomenon.

Our judgement is that, while productivity in the UK doubtless tends to increase slowly over time, largely as a result of the accretion of knowledge, fast productivity growth requires brisk investment growth. And in general that is much more likely to be realised when output and expected output are rising fast than when growth and expectations of growth are in the doldrums.

On that argument it seems more reasonable to presume that a major part of the weak performance of productivity following 2008 was due to a fall in aggregate demand reducing GDP, rather than to a sudden exogenous fall-off in productivity causing the fall in GDP.

Disentangling, and accounting for, the behaviour of productivity in the economy as a whole thus remains as challenging as it always has been.¹⁰ However there is one thing that can be said.

The procyclicality of productivity

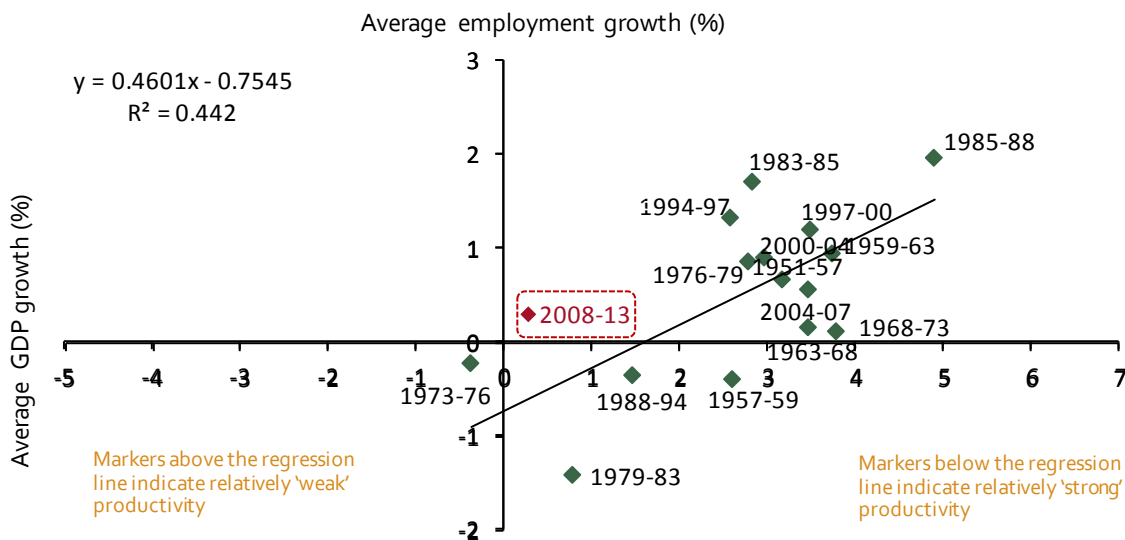
Notwithstanding all the conceptual, measurement, and data issues, productivity growth displays one interesting and potentially instructive feature: a systematic tendency to be brisk when output is growing fast, and to be slow when output is weak. Importantly, this relationship – often known as Verdoorn’s law – is not only a short-term, cyclical relationship: it has been found to hold as between one business cycle and the next, as well as across sectors and economies.¹¹

The UK has experienced 15 growth cycles over the period 1950 to 2008.¹² Average labour productivity growth has ranged from -0.1% over the 1973 to 1976 cycle to 3.7% over the 1963 to

Causality almost certainly runs two ways

Cyclically adjusted, productivity has not been that unusual

Figure 1: UK GDP growth and employment growth



Source: ONS, Bank of England, ECRI, and Llewellyn Consulting

Notes: Periods are based on ECRI estimated UK GDP growth cycles. Averages are compound annual growth rates.

1968 cycle. Although the relationship is by no means perfect, statistically speaking,¹³ typically each 1 percentage point faster (slower) average GDP growth over the cycles was associated with a 0.5% faster (slower) growth in employment¹⁴ – and thereby a similar increase in labour productivity.¹⁵

Judged on this basis, while the UK's productivity performance over the past few years has been weak, it has not been unusually so for a period when GDP has been so weak – see Figure 1.¹⁶ Moreover, GDP has likely not reached its cyclical peak yet, so it is quite possible that the average for this latest cycle will ultimately prove to be even nearer to the regression line than the 2008-13 average currently puts it.

Conclusion

Weak productivity may be a puzzle, but it is not a surprise

UK labour productivity growth has been weak since the 2008 financial and economic crisis. It is highly unlikely that there has been just one single cause: the reasons are almost certainly numerous and complex, particularly at the whole-economy level.

However, judged in the light of its typical procyclical behaviour, recent performance does not seem to have been particularly seriously out of line with historical experience.

In that sense, the UK's weak productivity growth since 2008 may be a puzzle, but it is hardly a surprise.

Watch for

- Productivity continuing to pick up, providing that economic growth continues at or around current rates
- Investment picking up with output growth, albeit, thereby contributing to faster productivity growth. ■

Endnotes

- ¹ See for example the useful summary by Giles, (2014). *Productivity will make or break the next government*. Financial Times, 17 December 2014. Similarly, Barnett, A., et al., (2014) observed that “Since the outset of the 2007-08 financial crisis, labour productivity in the United Kingdom has been exceptionally weak ... This shortfall is sometimes referred to as the ‘UK productivity puzzle’ ...” – see p. 115.
- ² It may be that measurement issues – concerning both output and labour input – are a problem here, although on balance it seems unlikely that they could be anything like big enough to account for the bulk of the observed productivity slowdown – see Barnett, A., et al., (2014), p. 118.
- ³ See Barnett, A., et al., (2014), pp. 115-116.
- ⁴ The intellectual point of departure was the classic article by Solow (1957), which found that only around one-eighth of the growth of output in the United States could be explained by capital combining with labour under conditions of constant returns to scale. The classic quantitative study was Denison (1967), which sought to decompose the Solow “residual”, for the United States and for each of eight European countries, 1950 into over twenty different sources of growth.
- ⁵ The capital/output ratio in a wide range of countries is generally estimated as lying within the range 3 – 4.
- ⁶ In a constant returns to scale Cobb-Douglas economy the elasticity of output with respect to the capital stock, as well as the analogous capital share of national income, is generally reckoned to be of the order of 0.3.
- ⁷ See Abiad et al. (2009). *Whats the Damage? Medium-term Output Dynamics After Banking Crises*. IMF Working Paper.
- ⁸ For a sphere, for example, the relationship between its surface area (A) and its volume (V) is: $A = f(V^{2/3})$. Cost being approximately proportional to the area of material used, it follows that cost too varies as volume to the 2/3 power, so that a 10% increase in capacity requires only around a 6 or 7% increase in expenditure. This general phenomenon, sometimes known as the ‘power rule’, applies to vessels of many different shapes, albeit with somewhat different coefficients. Moreover, the phenomenon extends beyond industry and volumetric shapes. In agriculture, for example, the fact that a doubling of fence length quadruples the area enclosed is an important scale effect.
- ⁹ See Barnett, A., et al., (2014), chart 4, p. 117.
- ¹⁰ Barnett, A., et al., (2014) concludes similarly: “Labour productivity growth in the United Kingdom has been particularly weak since the start of the crisis... [but] there remains considerable uncertainty around any interpretation of the puzzle.”
- ¹¹ Nicholas Kaldor, who did much to make Verdoorn’s Law known in the English-speaking world, placed particular emphasis on dynamic economies of scale in manufacturing. Writing in 1966 he observed a strong tendency across countries for productivity growth to correlate with output growth in manufacturing – see Kaldor (1955). Believing that manufacturing productivity growth drove productivity growth in much of the rest of the economy, and that UK manufacturing growth was constrained by a lack of available labour, led Kaldor to propose the Selective Employment Tax.
- ¹² Estimated based on data from the Economic Cycle Research Institute (ECRI).
- ¹³ In a next round of research we intend to investigate the possible influence of other factors, including importantly investment.
- ¹⁴ It might seem simpler to examine the relationship between output growth and productivity growth, rather than that between employment growth and output growth. But productivity growth is the difference between output growth and employment growth. Hence to that extent that the variability of employment growth is less than that of output growth, regressing output growth on productivity growth would be to regress output growth in large part on itself. Hence the equation that was estimated was $e = a + b*q$, where e is employment growth, and q is output growth. The test that productivity is procyclical is thereby that $0 < b < 1$. It is to be expected that the coefficient ‘a’ will have a negative sign, and be of the order of a percentage point or so.
- ¹⁵ Interestingly, the shorter-term relationship estimated using annual data, and thereby capturing short-run, cyclical, effects, yields a similar result.
- ¹⁶ We also estimated the relationship on the basis of total hours worked, in place of employment, subject to data availability. The results were not materially different. Using an alternative interpretation of ECRI growth cycle years also did not fundamentally alter the conclusions.

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