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The UK Productivity and Jobs Puzzle: Does the Answer Lie in Labour Market Flexibility?

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Abstract

GDP per worker fell for the five years after 2008 which is unprecedented in post war UK history. In this paper we argue that "capital shallowing" (i.e. the fall in the capital-labour ratio) could be the main reason for this. This is likely to have occurred due to changes in factor prices: a large fall in real wages and increases in the cost of capital. In previous recessions real wages did not fall, but reforms to union strength and welfare have made wages more sensitive to negative demand shocks. This wage flexibility is desirable as it reduces the risks of long-term unemployment building up. After accounting for changes in capital TFP is more similar to earlier recessions and likely to be related to under-utilised resources and misallocation. The fall in labour productivity is therefore likely to reverse if demand improves – e.g. through stronger monetary or fiscal policy stimulus.

Acknowledgements

I.   INTRODUCTION

In the long-run productivity growth is the main determinant of material wellbeing. Contrary to popular belief there is a reasonably tight relationship between the growth of real hourly compensation and the growth of GDP per hour over the last 40 years (see Pessoa and Van Reenen, 2012). Figure 1 shows that the "decoupling" between average compensation and productivity has been exaggerated. [1] Given the importance of productivity, it is a serious concern that labour productivity has *fallen* since the onset of the Great Recession in 2008. GDP per worker was about 10% lower at the start of 2013 than it would have been had productivity continued to grow on a trend of 2% per annum (1971-2007 average) after 2008Q2 (see Figure 2).

There are many possible culprits behind the fall in labour productivity. One popular view is that of the "supply side pessimists" (King, 2013) who argue that the fall of productivity is permanent and structural, perhaps linked to the financial crisis or to some kind of mismeasurement of productivity in the decades leading up to the crisis. In this view the level of current output is close to potential output and attempts to stimulate the economy with monetary policy through quantitative easing (QE) will just stoke up inflation. Similarly, pessimists argue not only against relaxing the current fiscal consolidation programme (e.g. as suggested by Bagaria et al, 2012, through higher public investment), but even for a further tightening of fiscal austerity to avoid debt traps.

In this paper we emphasis one explanation that can potentially account for both the twin puzzles of low productivity and of surprisingly low unemployment given poor GDP growth. This explanation emphasises wage flexibility. Real wages are much more responsive to negative output shocks in the last few years than they have been in previous recessions (see Gregg et al, 2013). This is a secular change over time that is likely to be

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[1] The confusion arises because of a focus in the decoupling literature on the growth of median wages (deflated by the CPI) rather than average compensation (deflated by the GDP deflator). Standard theory points to a long-run relationship between productivity and average compensation with a common deflator in the absence a growth in the profit share of GDP. For example, median wages can diverge from average compensation due to a rise in wage inequality as has happened in the UK. See Pessoa and Van Reenen (2012) for more details.

due to weaker union power and welfare reforms that keep effective labour supply high even when demand is low (e.g. Blundell et al, 2004; Van Reenen, 2004). This flexibility meant that unlike earlier recessions, real wages fell significantly and employers faced lower labour costs than in earlier downturns. As real wages fall there is a fall in the capital-labour ratio ("capital shallowing") as people are substituted for structures and equipment. A second force that increased capital shallowing is the fact that this recession is a financial crisis that has increased the effective cost of capital, especially for small and medium sized enterprises (SMEs). Banks have been reluctant to lend as they repair their balance sheets. Because capital-labour ratios fell in response to changing factor prices, labour productivity has also fallen, but not necessarily Total Factor Productivity (TFP). Since it is TFP that determines long-run economic growth, our view is that this more important measure of productivity has been more resilient than usually imagined. Although there are many difficulties in accurately measuring the capital stock, our estimates suggest that most of the fall of labour productivity can be mainly accounted for by the fall in effective capital per worker (with some contribution from the fall in hour per worker). TFP trends over the recession look much more like those in the 1970s and 1980s and are not so surprising given the magnitude of the global shock.

Another way of seeing the point of this paper is that it is absurd to think that the correct counterfactual for the last five years is simply the extrapolation of the trend line in Figure 2. First, given that the output shock was huge, financially based and has been accompanied by multiple policy mistakes, a better counterfactual is to look at previous recessions. Second, when considering the collateral damage to the economy we should consider TFP which removes the impact of changes in other inputs such as capital and hours rather than GDP per worker. When these adjustments are done, the current recessions looks more like previous deep postwar recessions than an event that should cause a change in potential growth.

The structure of the paper is as follows. Section II describes the basic facts, Section III sketches our main theory, Section IV discusses other explanations of the productivity

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mystery, Section V offers some preliminary quantitative estimates and Section VI concludes.

II.   SOME BASIC FACTS

In an accounting sense the productivity puzzle is easily explained. GDP is still about 3% below the level it stood at the start of the crisis in 2008 whereas employment levels have largely recovered. Consequently, as a matter of arithmetic, GDP per worker fell. Figure 3 shows the cumulative change of GDP since the start of the downturn (black line) compared to its evolution in all other major recessions in the last century. The current recovery is worse than all of them as by this point of the business cycle; GDP had made a stronger recovery in the Inter-War years.

Figure 4 produces the analogous figure for labour productivity for post-war recessions. It is clear that productivity stalls or drops in all recessions. The fall was likely to be larger in this recession because the magnitude of the 2008/09 shock was larger. Indeed, two years after the start of the current recession, labour productivity was at a similar level to the mid 1970s recession. What is more surprising is that over four years later productivity had still not recovered and appears worse than all other postwar downturns.

The fall of GDP per hour looks worse than the fall of total GDP because the labour market has recovered more quickly than the output market. The fall in GDP per worker is worse than the fall in GDP per hour as there has been a move to more part-time work, self-employment and zero hours contracts which has caused hours per worker to fall. This is explored more deeply by Blundell et al (2013) and Wadsworth (2013) and we will examine the quantitative importance of hours in Section V. The key fact though is that labour productivity has fallen on both a per worker and a per hour basis.

There are two pieces of evidence that suggest that the fall in productivity may be temporary rather than permanent. Firstly, the UK is not unique in having a "productivity puzzle" as other European countries also experienced a fall in labour productivity (see

Figure 5). US productivity did do much better than in Europe, but again this is the flipside of what happened in the jobs market. Although the magnitude of the initial GDP shock was similar in the US and the European countries, American unemployment rose much more severely (from 4.4% in late 2006 to 10% in late 2009) compared to the UK and Germany. Part of the reason for the faster rise in US unemployment in than in the UK may be because of lower US firing costs, the extensions of unemployment benefit and deeper problems in the housing market.

A second cause for possible optimism is that the fall in UK productivity is surprising in the light of recent economic history. As shown in Aghion et al (2013), the UK reversed a century of economic decline in the three decades after the end of the 1970s. Figure 6 shows that the advantage in per capita GDP enjoyed by the UK in 1870 over our American and European counterparts had evaporated by 1979 with the US, France and Germany all ahead of the UK. In the next three decades however, something changed. On the eve of the crisis, the UK had again overtaken France and Germany and made inroads into the lead of the US.

Some of this was due to improvements in the labour market with employment rates rising. But a good part was due to an improvement in productivity growth. Figure 7 shows that UK productivity growth outstripped the other countries after 1979 under both Conservative and Labour governments. With the exception of the US this is true even taking the Great Recession into account. Nor was this strong productivity growth simply due to unsustainable booms in finance, oil, property or the government sector. Corry et al (2012) show that value added per hour growth in the market sector (dropping the public and property sectors) was about 2.7% per annum 1979-2007 and only around a tenth of this productivity growth was accounted for by the financial services sector.[2]

Aghion et al (2013) argue that these productivity improvements can be linked to policy reforms such as enhanced product market competition (e.g. privatisation and tougher

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[2] Oulton (2013) shows that given the way GDP is measured in the UK finance cannot have caused a large bias in the measurement of GDP growth in the pre-crisis period. This is essentially because finance is an intermediate input so is no counted in GDP which is value-added.

anti-trust policies), labour market flexibility (e.g. weakening union power) and the growth of independent institutions such as utility regulators, the Monetary Policy Committee and the National Institute for Health and Care Excellence (NICE). If these improvements to UK economic capacity were real, it seems unlikely that they would quickly disappear.

Having said this, it is of course possible that a large part of the productivity loss is permanent and/or that the UK is on a much lower trend growth path for the foreseeable future even though this would be a break with historical experience. To explore this we turn to a simple model and empirical evidence in the next two sections

III. THEORY

Flexibility of the labour market

Consider a representative firm facing competitive market conditions with a constant returns production function of the form:

$$Q = AL^{\alpha} K^{1-\alpha} \tag{PF}$$

where Q is output, L is labour, K is capital and A is TFP. From the first order conditions, labour productivity is related to the real product wage, i.e. nominal wages (W) deflated by the output price deflator (P)

$$\frac{Q}{L} = \frac{1}{\alpha} \frac{W}{P} \tag{MRPL}$$

This gives us a conventional downward sloping labour demand curve as illustrated in Figure 8. For simplicity we consider an inelastic supply curve which generates an equilibrium wage with full employment $L = L^*$ where L^* is the labour force.

Now consider a recession which is a negative output shock (Q to Q') shifting the labour demand curve to the left. In a "normal" recession real wages are downwardly rigid, hence employment will fall and unemployment will emerge ($L^*- L'$). Notice that equation (MRPL) still holds as even though output and employment are lower their ratio remains

the same (Q'/L'). Because real wages are unchanged labour productivity is also unchanged.

The polar opposite case of a classical labour market where real wages are completely flexible in Figure 9. In this case real wages fall to ensure full employment, but now labour productivity has fallen $\dfrac{Q'}{L} = \dfrac{1}{\alpha}\dfrac{W'}{P} < \dfrac{Q}{L}$. The greater flexibility of real wages has protected jobs, but measured productivity is lower.

One way the adjustment takes place is through changes in the capital-labour ratio. Combining the first order conditions for labour and capital we obtain $\dfrac{K}{L} = \dfrac{1-\alpha}{\alpha}\dfrac{W}{R}$ where R is the cost of capital. Assuming that the cost of capital is unchanged, the fall in W means an offsetting fall in K. This fall in the capital-labour ratio will depress labour productivity, the output to labour ratio.

Another way to see this is to re-write the production function in logarithmic changes and solve for TFP growth:

$$\Delta \ln A = \Delta \ln(Q/L) - (1-\alpha)\Delta \ln(K/L) \tag{TFP}$$

TFP growth is the difference between labour productivity growth and the change in the (weighted) capital-labour ratio. A pure demand shock causes a fall in $\Delta \ln(Q/L)$ and $\Delta \ln(K/L)$ but leaves TFP unchanged.

This is obviously an extreme model as real wages are not really fully flexible and will not fall by as much as suggested in Figure 9. Nevertheless, if the current recession is closer to Figure 9 and previous recessions were closer to Figure 8, then this may explain why employment has fallen by less in this recession than in previous recessions and labour productivity has fallen by more.

The qualitative evidence gives considerable support for this simple model. We focus on the four full years after 2008Q2 as the Lehman's collapse was in 2008Q3 and there are

likely to be much more severe data revisions in the most recent quarters. In the four years after 2008Q2 real product wages fell by 4% (and CPI deflated wages by 8%). This is unprecedented for a post-war recession and is likely linked to policy reforms that have weakened unions, lowered the replacement rate and kept up work search pressure on benefit claimants (those claiming Job Seekers Allowance, but also Incapacity and Lone Parent Benefits). The sensitivity of wages to negative shocks has increased over time: Gregg et al (2013) show that the "wage curve" (Blanchflower and Oswald, 1994) has become more elastic, i.e. an increase in unemployment has a more depressing effect on real wages today than in the 1980s or 1990s.

Other causes of a fall in the effective capital to labour ratio

In addition to falls in real wages, other factors may have depressed the capital-labour ratio. According to Bank of England (2012) the cost of capital for large firms has risen by about a quarter from 8% in the pre-crisis period to 10% in 2012 (see Figure 10). The increase in the cost of capital for SMEs is likely to be far higher. Despite a fall in the Bank of England's base rate banks have been re-building their balance sheets and are so very reluctant to lend. Various government credit easing schemes such as Project Merlin, the National Loan Guarantee Scheme and Funding for Lending do not seem to have made a significant impact (e.g. Armstrong, 2013).

Investment has been held back by low demand expectations and a higher cost of capital. But a third factor is that uncertainty has also risen. This always tends to increase in recessions (see Bloom et al, 2013) but the increase in uncertainty in this recession may have been particularly severe due to the size of the demand shock. Although fiscal policy was aggressive in the first year of the recession, in subsequent years policy-makers have struggled to find a consistent way to tackle the problem of low growth and spiraling deficits. In 2010 the new UK coalition government accelerated an already tough austerity programme inherited from the previous Labour administration, and has had to constantly revise its estimates of growth downwards and budget deficits upwards. The crisis in the Eurozone has a strong affect on the UK as almost half of all exports go there. The chaos over the fiscal cliff, debt ceiling and sequester in the US has also added to policy

uncertainty. Since uncertainty can be an important barrier to investment (Bloom, Bond and Van Reenen, 2007; Bloom, 2009), this policy risk may further reduce investment.[3]

Together these factors may explain the collapse of investment in the UK as shown in Figure 11. The UK has had a problem of low investment for many decades (Aghion et al, 2013) and this has taken a severe turn for the worse since 2008. In Section V we show how this helps resolve much of the productivity puzzle as it leads to a fall in capital intensity and therefore output.

IV. OTHER EXPLANATIONS OF THE PRODUCTIVITY SLOWDOWN

Mismeasurement

One mundane explanation for the puzzle is simply mismeasurement. The denominator of labour productivity is simply employment or hours and measurement error is not likely to be a major concern here (although there could be some contribution coming from the increasing number of self-employed and those on zero-hours contracts). A more serious concern is that GDP may be understated. The GDP number is subject to very large revisions, but Grice (2012) shows that the magnitude of these revisions is not usually large enough to explain away the puzzle and future revisions may *lower* the GDP number rather than raise them.[4]

Under-utilisation of resources

As Wadsworth (2013) points out, the UK population has risen by about a million since 2008, so the absolute number of jobs is a poor measure of labour market tightness. As expected - there has been a significant rise in unemployment and fall in the employment rate (employees as a proportion of working age population) during the recession. So there is clear under-utilisation of human resources. Labour productivity measures account for this, however, as only employed or hours are in the denominator. It may well be,

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[3] Of course, uncertainty will also reduce hiring, but since labour has lower adjustment costs than capital the impact is likely to be less severe.

[4] Still the disruption of the ONS move to Newport and severe nature of the recession leaves room for concern. For example, if service exports were severely understated this would help resolve both the puzzle of both why productivity and exports are so surprisingly low despite a large sterling depreciation.

however, that people are not being used to their full potential when in work. This is usually described as "labour hoarding" whereby firms will not reduce employment by as much as expected as they hope that demand will pick up later and do not want to pay the cost of re-hiring the laid off workers (e.g. if they have firm-specific human capital). This is the usual explanation of why productivity is pro-cyclical.

The labour hoarding story has become less plausible as time goes by. This is because employment rates have been rising for the last two years and it is hard to square this with labour hoarding. There is some evidence that the increase in employment has been in some low productivity sectors, however, so the hoarding may still be happening in some firms and sectors where demand remains depressed but employers are reluctant to shed as many workers even though output has fallen (e.g. Martin and Rowthorn, 2012).

Zombies: Misallocation of capital
Representative firm models are a poor reflection of economic reality as firms differ considerably in their productivity, efficiency and management quality (Appendix Figure 1 shows the extreme heterogeneity of management quality across firms in all countries). Modern theories of heterogeneous firms emphasis that much of aggregate productivity growth is caused by the reallocation of capital from less productive to more productive firms. A given aggregate quantity of capital may be allocated in different ways across firms of heterogeneous efficiency. Allocating too much capital to inefficient firms for example will diminish aggregate productivity. This has been shown to be of first order importance when considering aggregate productivity differences across countries (e.g. Bartelsman, Haltiwanger and Scarpetta, 2013; Hsieh and Klenow, 2009; Bloom, Sadun and Van Reenen, 2013). Some have argued that this could account for the fall in UK productivity (Bank of England, 2012). Another way of saying this is that the *effective* amount of aggregate capital has fallen due to increased misallocation.

There is some suggestive evidence of these capital misallocation forces having got worse in the recession. First, the rate of bankruptcies and liquidations appears to be particularly low given the macro-economic climate (See Figure 12). Second, the cross sectional

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variance of employment, output and prices has increased across sectors (see Figure 13). Finally, Field and Franklin (2013) point to the increased variance of productivity across establishments even within sectors.

Why should misallocation have become worse? First, Bloom et al (2013) argue that increased uncertainty is pervasive in all recessions and that this is responsible for a substantial fraction of aggregate productivity falls. As noted above, uncertainty may be particularly severe in the current recession.

A second set of reasons focuses more directly on the dysfunctionality of the financial system − after all, a massive banking crisis was the catalyst for the 2008/9 Great Recession. The major issue here is of bank "forbearance", i.e. that banks are reluctant to call in underperforming loans to firms and projects that can no longer make their interest payments. Hence low productivity projects and firms that in "normal times" should have exited the economy do not, and their persistence pulls down aggregate productivity. Why should banks behave in such a manner? It may be rational to allow debt restructuring/forgiveness if lenders believe that projects are ultimately viable and demand will recover (analogous to labour hoarding). However, lenders may be sure that a project will not be viable and still not call in their loans if they are reluctant to admit the true state of the under-performing loans on their balance sheet as this may force them into bankruptcy or regulatory intervention. This seems to have been a pervasive feature of Japan following the bust of the asset bubble in the 1980s (e.g. Caballero et al, 2008). A second reason for forbearance may be political pressure, especially when many banks are fully or partially owned by the public sector (e.g. RBS) as politicians are reluctant to push SMEs into bankruptcy and be seen to be making workers redundant.

These under-performing companies are often pejoratively called "zombies". If output could be swiftly reallocated from low productivity zombies to other projects this would tend to raise productivity. However, if some of the value of the assets were lost this is a cost to be born in mind. For example, there may be firm-specific capital that is lost or workers may spend considerable time in non-employment before they are reallocated to

more productive firms. Since these problems may be particularly severe in deep recessions, it is not obvious that faster closing down of the zombies is welfare enhancing. Although it is often assumed in Austrian economics that recessions are the best time for cleansing the economy of low productivity firms, the evidence on this is unclear. For example, in a financially driven recession many productive firms may also be closed down during a sharp downturn if they are credit constrained (e.g. smaller actual and potential innovators as in Garicano and Steinwender, 2013).

The direct micro-evidence on zombies is rather mixed. In the early part of the recession in 2008-2009 it seemed as if most of the fall in productivity was confined to small firms who may be most susceptible to forbearance. However, after 2009 it appears that productivity also fell in larger firms. Furthermore, decompositions of the aggregate fall in labour productivity suggest it is a within establishment rather than a between establishment phenomenon (Bank of England, 2013). However, the fall in labour productivity in these surviving firms is all accounted for by falls in real wages and investment (Crawford et al, 2013)

Since the forbearance story is mainly on the exit/entry dimension, this suggests that the problem is with ongoing plants rather than zombies. Consequently, the role of zombies seems less important than changes in factor prices.

Intangible capital

Our focus so far has been on tangible capital, but an influential line of research suggests that intangible capital such as scientific know-how, business practices, advertising, etc. may be as important as more conventional equipment and structures. Goodridge, Haskel and Wallis (2013) allow for intangible capital in analysing UK productivity growth through 2010 and argue that about a third of the productivity slowdown could be due to mismeasurement of intangible capital. The essential problem is that output growth is mismeasured when intangible capital is ignored. Intangible investment should be part of GDP but is instead treated only as an intermediate input and therefore not included in GDP (which is a value added based measure net of intermediate inputs). During times

when intangible investment is growing fast (as in the late 1990s and early 2000s) GDP growth and therefore productivity is over-estimated. During periods when intangible investment is growing more slowly (as today) GDP and productivity growth is under-estimated.

Labour quality

Another explanation of the fall in labour productivity is that the quality of the workforce could have deteriorated: for example, older workers may be delaying retirement because of the fall in house prices. In fact, labour quality tends to rise during recessions as unskilled and less experienced workers are more likely to be unemployed. The current recession is similar in this regard. But the relevant counterfactual is what happened in previous recessions. It does not appear that there is much of a difference in the increase in labour quality in this recession compared to previous recessions, however (Blundell et al, 2013). This may seem surprising given the more flexible labour market, but it appears that the main reason for the fall in aggregate real wages is that incumbent workers are accepting more nominal wage freezes which are eroding aggregate real wages.

V.   PUTTING IT ALL TOGETHER

Table 1 gives some examples of some growth accounting estimates over recent years where we are just using equation (TFP) to decompose the growth of whole economy GDP per worker: $\Delta \ln(Q/L) = \Delta \ln A + (1-\alpha)\Delta \ln(K/L)$. These are very crude, "back of the envelope" estimates in order to examine whether the labour market flexibility story might matter quantitatively. We focus on the four years of 2008Q2 to 2012Q2 from the start of the recession to where data is less likely to be subject to large revisions. Over this period whole economy real GDP fell by 3.6% (column (1)), employment by 1.1% and GDP per worker by 2.5% (column (2)). Estimating the change in the capital stock is non-trivial as the ONS have not produced a measure of the UK capital stock since 2009. A series for the volume of real investment is produced, however, so we update the net capital stock in 2008 with this quarterly investment series using the perpetual inventory

method.[5] We estimate that capital per worker has declined by 5% using this method (column (4)). Assuming that GDP is split two-thirds to labour costs and one third to capital costs implies that "capital shallowing" has made a contribution of -1.8 percentage points to declining labour productivity (column (4)). Hence, changes in capital can account for about 68% of the labour productivity decline. This is obviously a much smaller proportion of the gap between current labour productivity and what it might have been "but for" the recession (recall Figure 2), but we have argued that this is an unrealistic counterfactual. A more plausible counterfactual would be the productivity experience of previous severe recessions, which we examine below.

Our estimates of the fall in the aggregate capital stock are larger than others have used on shorter runs of data (e.g. ONS, 2013; Goodridge et al, 2013) so we performed some checks on the plausibility of the estimates. The model presented earlier implies that the evolution of relative factor uses could be described as $\Delta\ln(K/L) = \Delta\ln(W/R)$. The real product wage fell by 4.1% in the four years after 2008Q2 and the Bank of England (2012) suggests an increase in the cost of capital of 2%. This implies a fall in the capital-labour ratio of 6.1% and therefore an even bigger contribution of capital to the fall in labour productivity - it now accounts for 83% of the fall in row 2 of Table 1. Our data runs through the end of 2012 so we examined re-estimating the model adding the final quarters of the year (i.e. the period from 2008Q2 to 2012Q4). As labour productivity improved a bit in the last two quarters we more than account for the entire fall of labour productivity. In the final row we use a lower depreciation rate of capital and find similar results to the baseline of row 1.

Taking Table 1 as a whole capital shallowing caused by changes in factor prices seems to account for at least two-thirds of the fall in labour productivity in the period since the start of the Great Recession.

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[5] We use a quarterly depreciation rate of 2.2%, slightly higher than normal to reflect capital scrapping in the baseline results, but check the sensitivity of this assumption to alternative depreciation rates.

Figure 14 illustrates another way of pulling the information together. It again decomposes the fall in GDP per worker into a contribution from capital and TFP, but now also includes an estimate of the role of declining hours per worker.[6] In other words we look at including a correction for the change in average hours worked ($\Delta \ln(H/L)$) in our labour productivity decomposition:

$$\Delta \ln(Q/L) = \Delta \ln A + (1-\alpha)\Delta \ln(K/L) + \alpha \Delta \ln(H/L)$$

As in row 1 of Table 1 capital shallowing contributed 1.7 percentage points or 68% of the fall in GDP per worker. The fall in average hours per worker contributed another 0.57 percentage points (23%). Residual TFP fell by 0.20 percentage points so accounted for under a tenth of the total fall. Hence, the fall in labour productivity is mainly coming from the fall in capital intensity (due to shifts in factor prices) and to a fall in average hours worked.

We use this method to produce a crude TFP index for the current recession and compare this to the 1970s and 1980s recessions in Figure 15.[7] This is a much more plausible counterfactual than the "continues on trend" assumption in Figure 2. Figure 15 shows that in TFP terms the current recession is not so unusual compared to other severe post-war recessions. In 2010 the TFP performance was actually better than the previous recessions, but it then stalled so by the end of 2012 it was worse than the 1980s recession (but still better than the 1970s). Given that the global shock following the Lehman's collapse was worse than both of these recessions, there is much less of a mystery to be explained in TFP terms. The fall of measured TFP in recessions is likely to be a more standard combination of labour hoarding and misallocation – there is no compelling evidence of a permanent structural change in underlying potential output growth according to these estimates.

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[6] In principle it is always best to adjust for hours, but since hours are measured with more error than employment, Table 1 focused on the simpler measure.

[7] It is crude because *inter alia* we are not making adjustments for heterogeneous types of capital or labour services in the current recession. For a much more sophisticated analysis which takes this into account see Goodridge et al (2013).

VI.   CONCLUSIONS

We have argued that the twin puzzles of the fall in labour productivity (GDP per worker) and the good performance of the labour market both have their source in the greater flexibility of the UK labour market compared to earlier recessions (probably because of labour market policy reforms over the last 30 years). The big difference of this recession is (i) its severity and (ii) that real wages have fallen dramatically. The fall in the price of labour coupled with the rise in the cost of capital has meant a fall in the capital to labour ratio which means that labour productivity falls substantially even though TFP has barely fallen at all. The fall in TFP is similar to other (less severe) post-war recessions from which the economy eventually recovered. The fall in measured TFP in recessions is likely to be due to factors such as under-utilisation of factors and uncertainty-driven misallocation. These are real costs but rather are more a feature of a typical cyclical downturn rather than permanent, structural changes.

What this means is that the UK economy is not fundamentally the victim of a large supply side shock, but rather a very severe demand side shock. We should not be complacent – the longer the recession goes on, the greater risks of structural damage through hysteresis effects (e.g. DeLong and Summers, 2012). However, these demand problems are amenable to conventional solutions of fiscal and monetary stimulus as they imply a substantial output gap. In other words, the argument of supply side pessimists that such stimulus programmes will simply lead to higher inflation do not, in our view, appear to be strongly supported by the data.

There is a further consideration. Say there is substantial uncertainty about whether there has been a severe permanent TFP shock. If there was a fiscal expansion with little output gap this would be met with increases in inflation. The monetary authorities would be able to deal with this through raising interest rates, hopefully preventing a rise in inflationary expectations (unlike earlier recessions when interest rates were still under political control). On the other hand, if the argument of this paper is correct such a fiscal expansion would lead to higher output and more modest effects on inflation. In the

absence of such a fiscal experiment we will be condemned to slow growth for many years and potential hysteresis effects with severe effects on potential output.

The message of this paper is *not* that structural policies are unnecessary. For example, strategies to improve the functioning of credit markets are vital. Long-run policies to improve investment in human capital, infrastructure and innovation are also very important as argued by Aghion et al (2013). But the upshot of our analysis is that there is room for a fiscal expansion, ideally through greater public investment in infrastructure, housing and schools.

REFERENCES

Aghion, Philippe Tim Besley, John Browne, Francesco Caselli, Richard Lambert, Rachel Lomax, Nick Stern and John Van Reenen (2013) *Investing for Prosperity: Report of the LSE Growth Commission* London: LSE
 http://www2.lse.ac.uk/researchAndExpertise/units/growthCommission/documents/pdf/LSEGC-Report.pdf

Armstrong, Angus, Phillip Davis, Iana Liadze and Cinzia Rienzo (2013) "Evaluating changes in bank lending to SMEs over 2001-2012" National Institute for Economic Social Research Discussion Paper 408.

Bagaria, Nitika, Dawn Holland and John Van Reenen (2012) "Fiscal Consolidation during A Depression" *National Institute Economic Review* 221 (July) 38-50.

Bank of England (2012) "Productivity and the Allocation of Resources", Speech by Ben Broadbent, http://www.bankofengland.co.uk/publications/Pages/news/2012/082.aspx

Bank of England (2013) "Productivity Puzzles", unpublished mimeo.

Bartelsman, Erik, John Haltiwanger and Stefano Scarpetta (2013) "Cross Country Differences in Productivity: The Role of Allocation and Selection", *American Economic Review* 103(1) 305-334.

Blanchflower, David and Andrew Oswald (1994) *The Wage Curve*, Cambridge MIT Press.

Bloom, Nick, Steve Bond and John Van Reenen (2007) "Uncertainty and Company Investment Dynamics: Empirical Evidence for UK firms" *Review of Economic Studies* (2007) 74, 391-415.

Bloom, Nicholas (2009) "The Impact of Uncertainty Shocks", *Econometrica*, 77, 623-685.

Bloom, Nicholas, Max Floetotto, Nir Jaimovich, Itay Saporta-Eksten and Stephen Terry (2013) "Really Uncertain Business Cycles" CEP Discussion Paper 1195.

Bloom, Nick, Raffaella Sadun and John Van Reenen (2013) "Management as a Technology" LSE mimeo
http://cep.lse.ac.uk/textonly/_new/staff/vanreenen/pdf/mat_2012fmar16_ucb.pdf

Blundell, Richard, Monica Costa Dias, Costas Meghir and John Van Reenen (2004) "Evaluating the Employment Impact of a Mandatory Job Search Assistance Programme" *Journal of the European Economics Association* (2004) 2(4) 569-606.

Blundell, Richard, Claire Crawford and Wenchao Jin (2013) "Employment Composition, Hourly Wages and the Productivity Puzzle" IFS mimeo.

Caballero, Ricardo, Takeo Hoshi and Anil Kashyap (2008) "Zombie Lending and Depressed Restructuring in Japan" *American Economic Review*, 98(5), 1943-1977.

Corry, Dan, Anna Valero and John Van Reenen (2012) "UK Economic Performance under Labour" *Renewal* (2012), 20(1) 56-69.

Crafts, N. (2012), "British Relative Economic Decline Revisited: the Role of Competition", *Explorations in Economic History*, 49, 17-29.

Crawford, Claire, Wenchao Jin and Helen Simpson (2013) "Firms' Productivity, Investment and Training: What Happened During the Recession and How Was It Affected by the National Minimum Wage?" IFS Report to the Low Pay Commission.

Delong, Brad and Larry Summers (2012) "Fiscal Policy in a Depressed Economy" *Brookings Papers on Economic Activity*, Spring, 233-274.

Field, Simon and Mark Franklin (2013) "Micro-data perspectives on the UK Productivity Conundrum" ONS http://www.ons.gov.uk/ons/dcp171766_295470.pdf

Garicano, Luis and Claudia Steinwender (2013) "Survive another Day: Does Uncertain Financing Affect the Composition of Investment? CEP Discussion Paper No 1188.

Goodridge, Peter, Jonathan Haskel and Gavin Wallis (2013) "Can Intangible Investment explain the productivity puzzle?" *National Institute Economic Review,* 224, May, R48-R58.

Gregg, Paul, Stephen Machin and Maina Salgade (2013) "Real Wages and Unemployment in the Big Squeeze", CEP mimeo.

Grice, Joe (2012) "The Productivity Conundrum, Interpreting the Recent Behaviour of the Economy" London: ONS.

Hsieh, Chiang-Tai and Pete Klenow (2009) "Misallocation and Manufacturing TFP in China and India", *Quarterly Journal of Economics,* 124(4) 1403-1448.

King, Stephen (2013) "Putting lower unemployment ahead of higher productivity risks long-term economic damage" *The Times*, March 19th 2013.

Martin, Bill and Bob Rowthorn (2012) "Is the UK economy supply constrained II" Centre for Business Research, University of Cambridge http://www.cbr.cam.ac.uk/pdf/BM_Report3.pdf

Oulton, Nicholas (2013) "Has the Growth of Real GDP in the UK been overstated because of Mis-Measurement of Banking Output?" *National Institute Economic Review,* 224, May, R59-R65.

Patterson, Peter (2012) "The Productivity Conundrum, Explanations and Preliminary Analysis" London: ONS.

Pessoa Joao and John Van Reenen (2012) "Decoupling of wage growth and productivity growth: myth and reality", LSE mimeo
 http://www.resolutionfoundation.org/us/downloads/decoupling-wage-growth-and-productivity-growth/Decoupling_of_wages_and_productivity.pdf

Van Reenen, John (2004) "Active Labour Market Policies and the British New Deal for Youth in Context" in Richard Blundell, David Card and Richard Freeman *Seeking a Premier Economy*, Chicago: Chicago University Press.

Wadsworth, Jonathan (2013) "What's up Now? The Behaviour of UK Employment over Recent Recessions" CEP mimeo.

FIGURE 1: GROWTH IN GDP PER HOUR GROWTH VS. COMPENSATION IN UK 1972-2010 (1972=1)
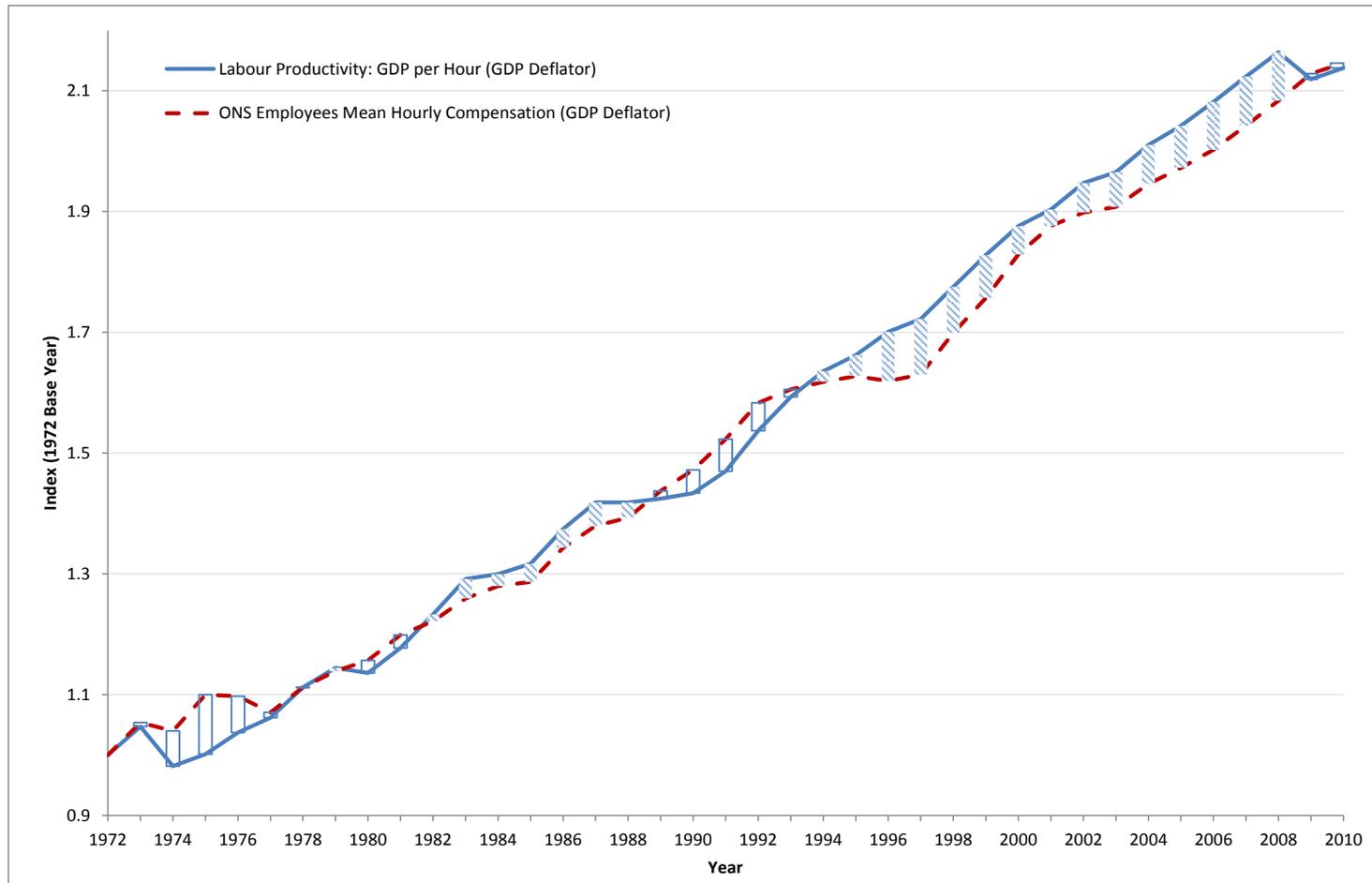
Source: Pessoa and Van Reenen (2012)
Note: Both GDP and hourly wages deflated by GDP deflator.
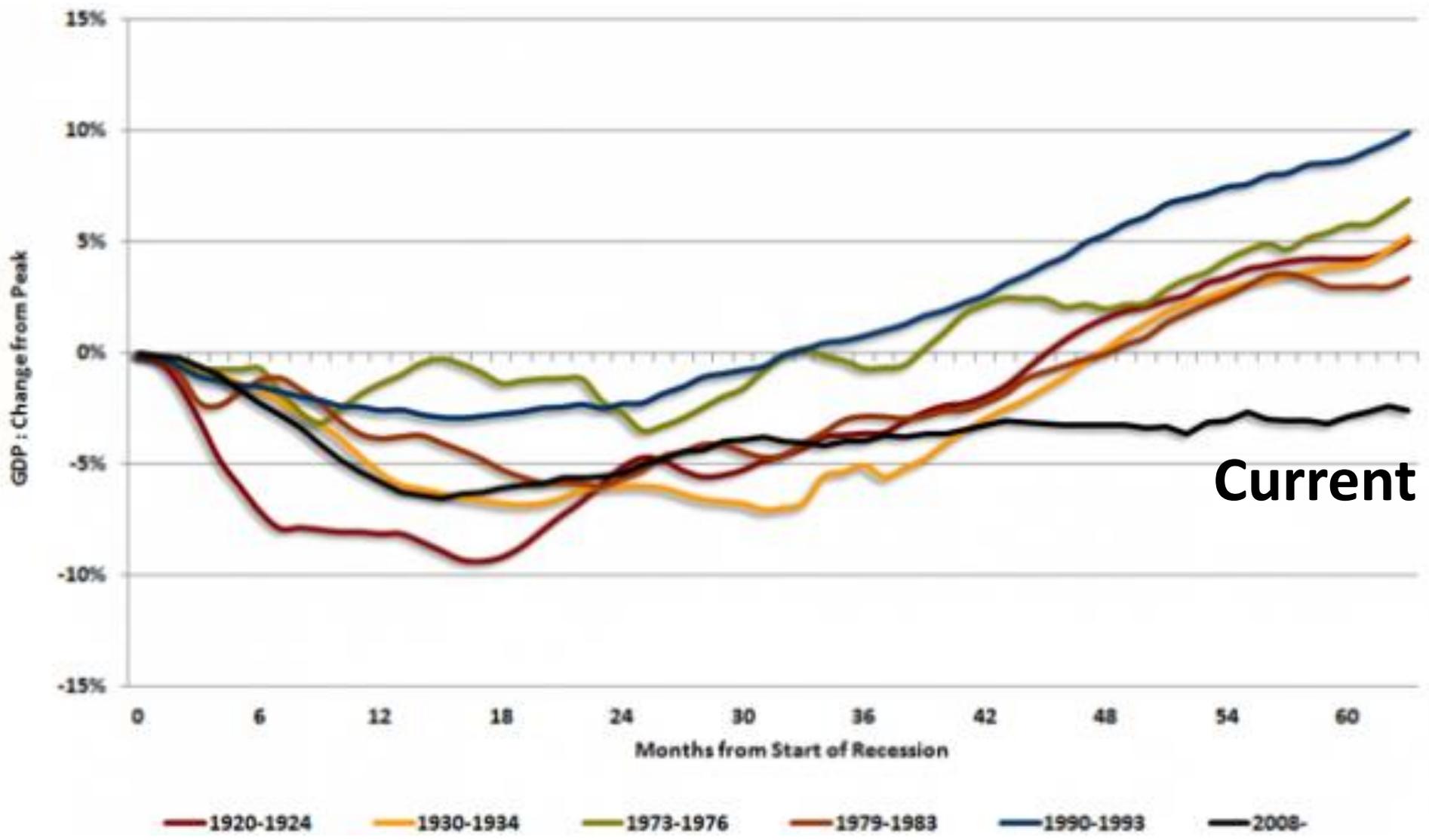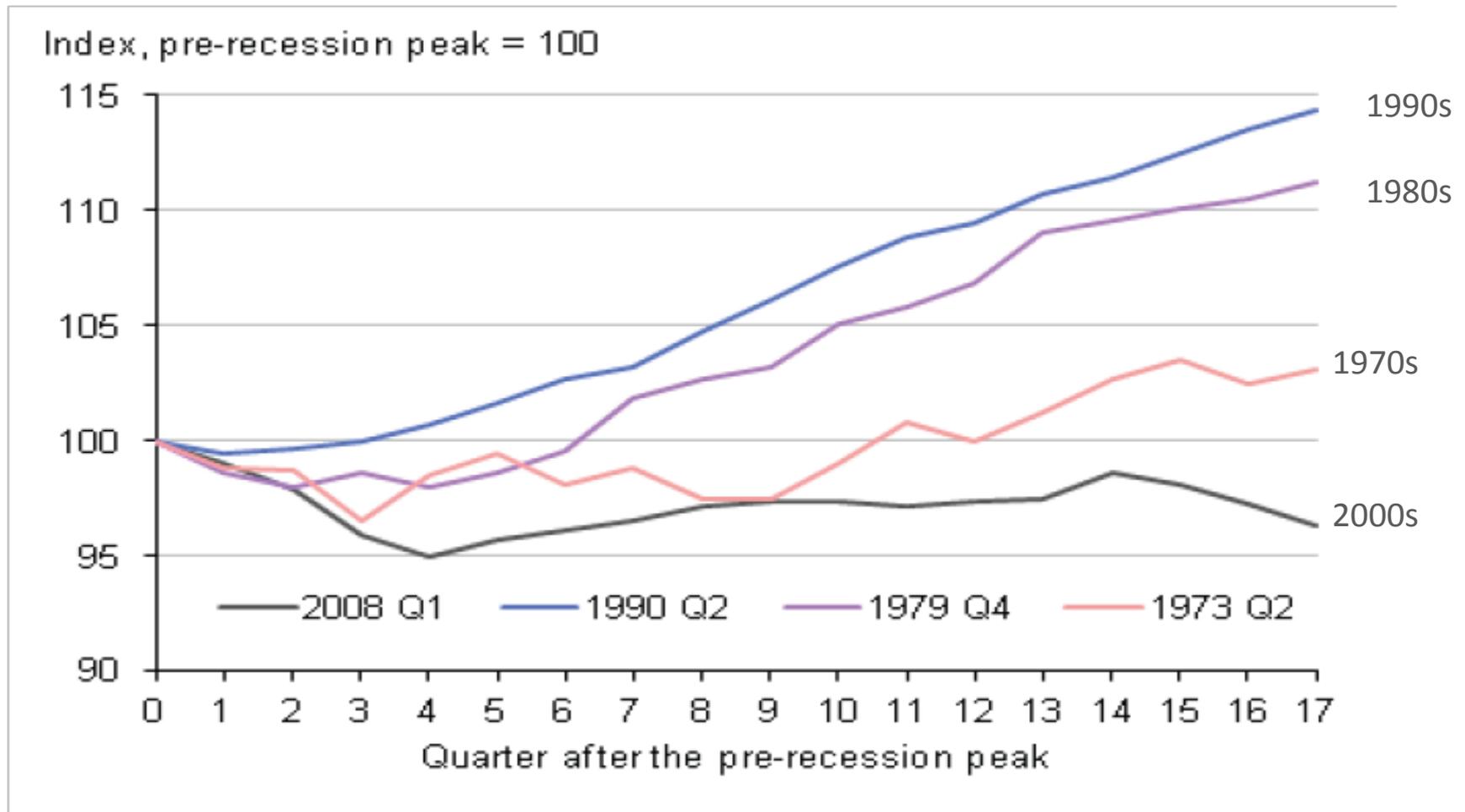
FIGURE 2: LABOUR PRODUCTIVITY (OUTPUT/WORKER)
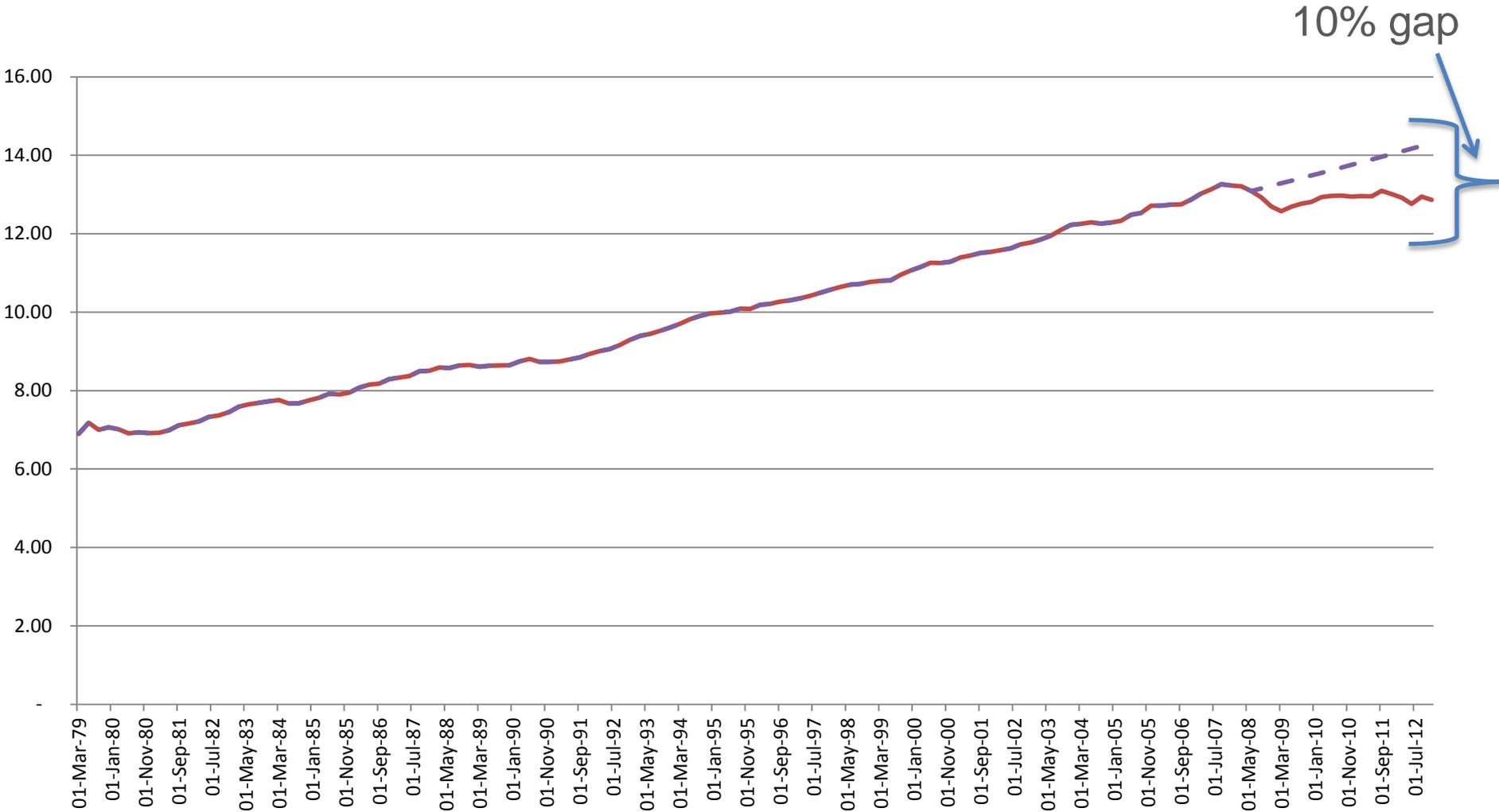
Note: Predicted value after 2008Q2 is dashed line assuming a historical average growth of 2% per annum.
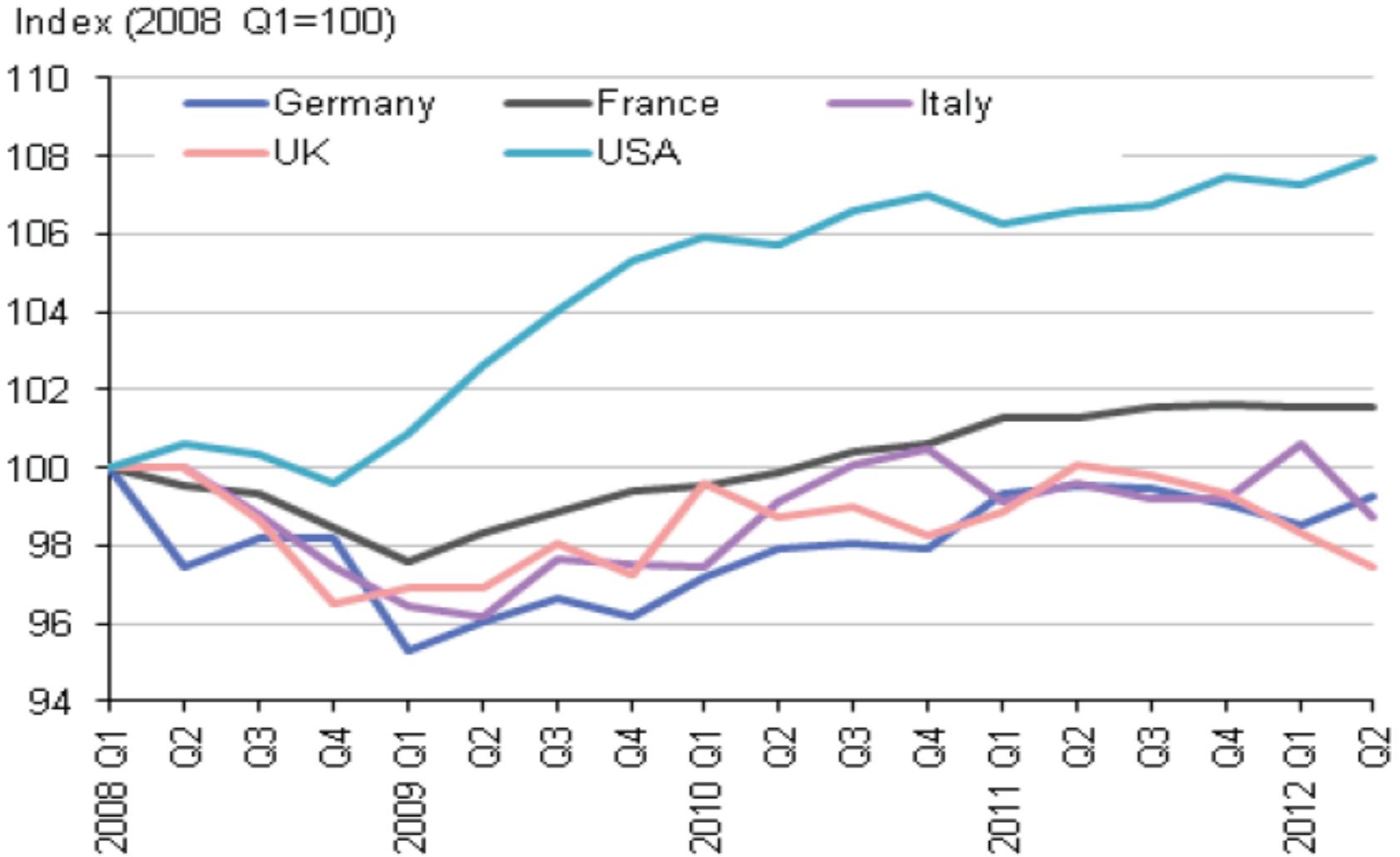
FIGURE 3:CUMMULATIVE GDP SINCE START OF DOWNTURN

Source: NIESR (May 2013)

FIGURE 4: LABOUR PRODUCTIVITY ALWAYS POOR IN RECESSIONS, BUT POST 2008 LOOKS WORSE

Index, pre-recession peak = 100

Legend: 2008 Q1 | 1990 Q2 | 1979 Q4 | 1973 Q2

Labels: 1990s, 1980s, 1970s, 2000s

X-axis: Quarter after the pre-recession peak

FIGURE 5: UK PRODUCTIVITY (GDP/HOUR) SINCE 2008 NOT SO BAD IN INTERNATIONAL CONTEXT

Index (2008 Q1=100)

Legend: Germany, France, Italy, UK, USA

FIGURE 6:
UK RELATIVE GDP PER CAPITA 1870 – 2007; UK=100
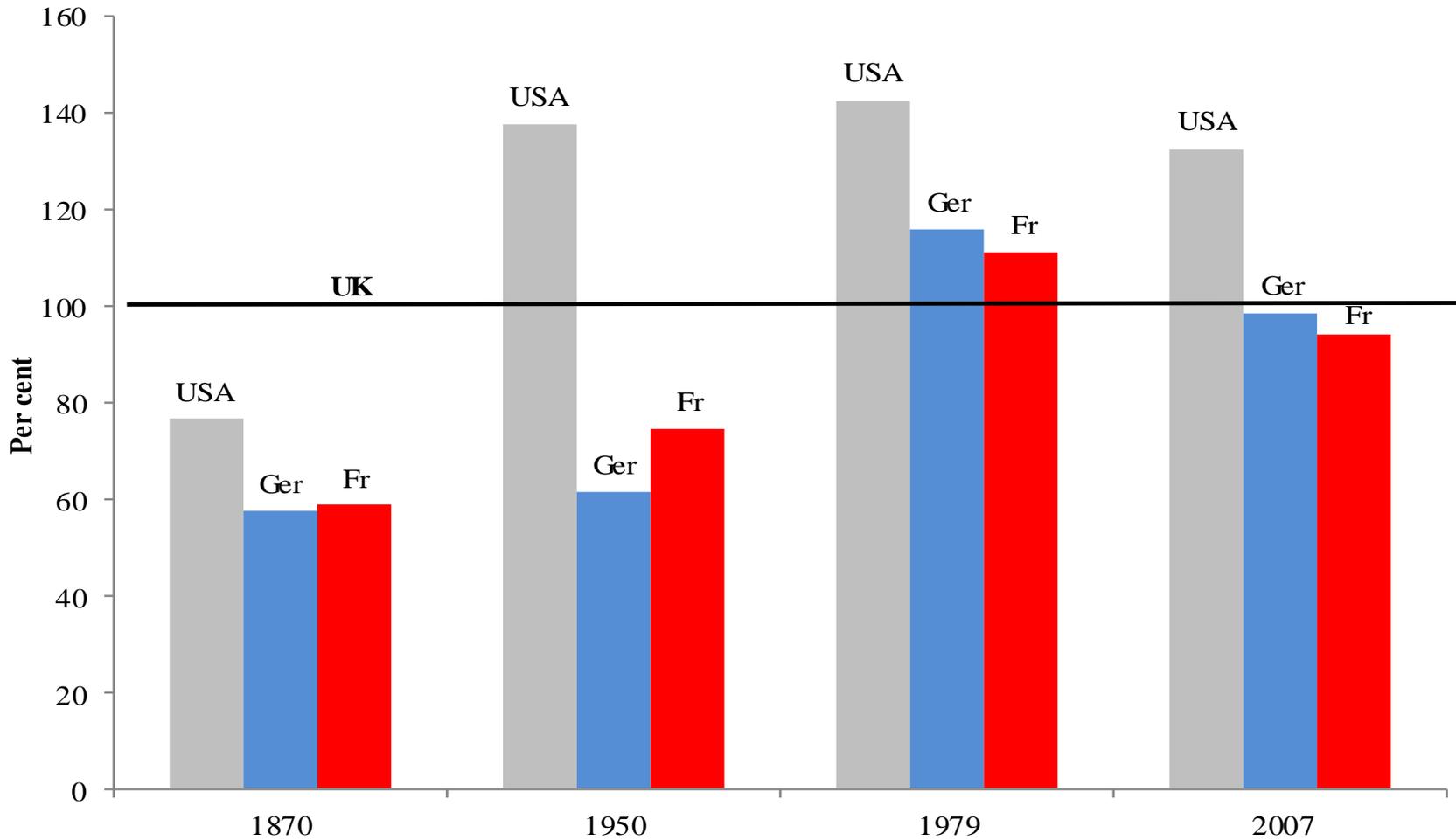
Source: Aghion et al LSE Growth Commission (2013), Crafts (2012)

FIGURE 7: GDP PER WORKER (1979 – 2012, 1997=100)
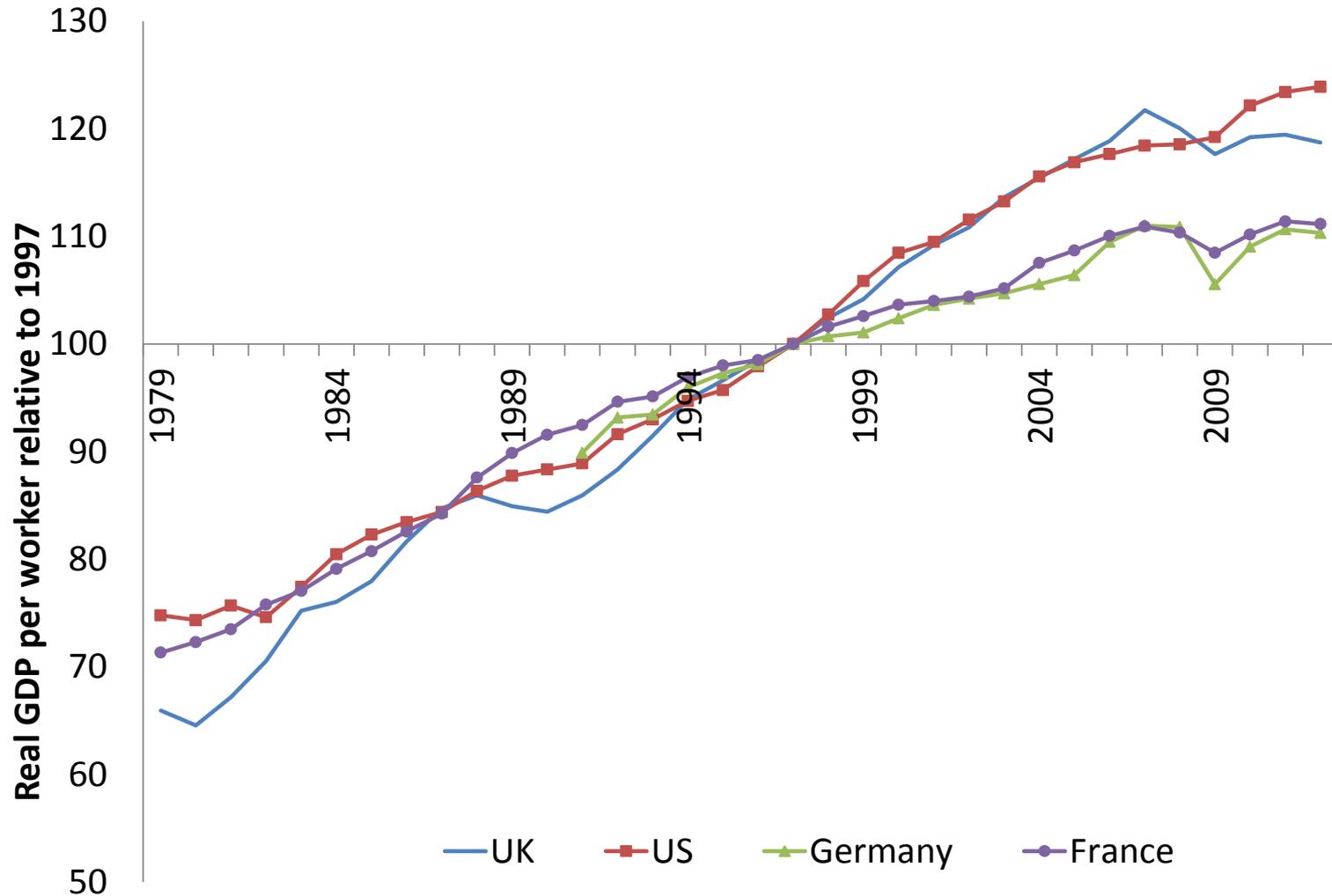
Note: Analysis based on CB data; GDP is US$, constant prices, constant PPPs

Source: Aghion et al LSE Growth Commission (2013).

FIGURE 8: NEGATIVE OUTPUT SHOCK & RIGID WAGES – LABOUR PRODUCTIVITY STABLE ("NORMAL")
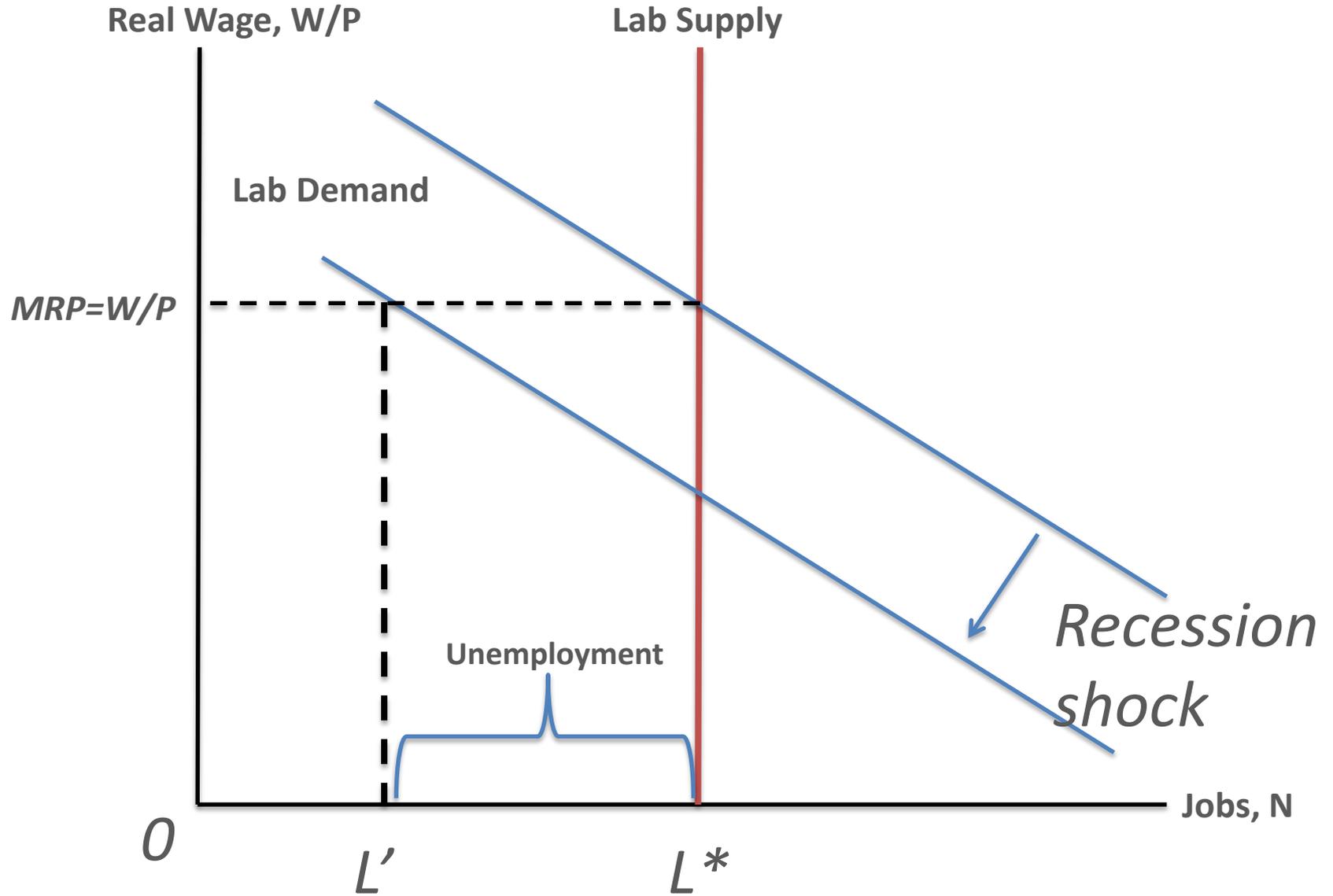
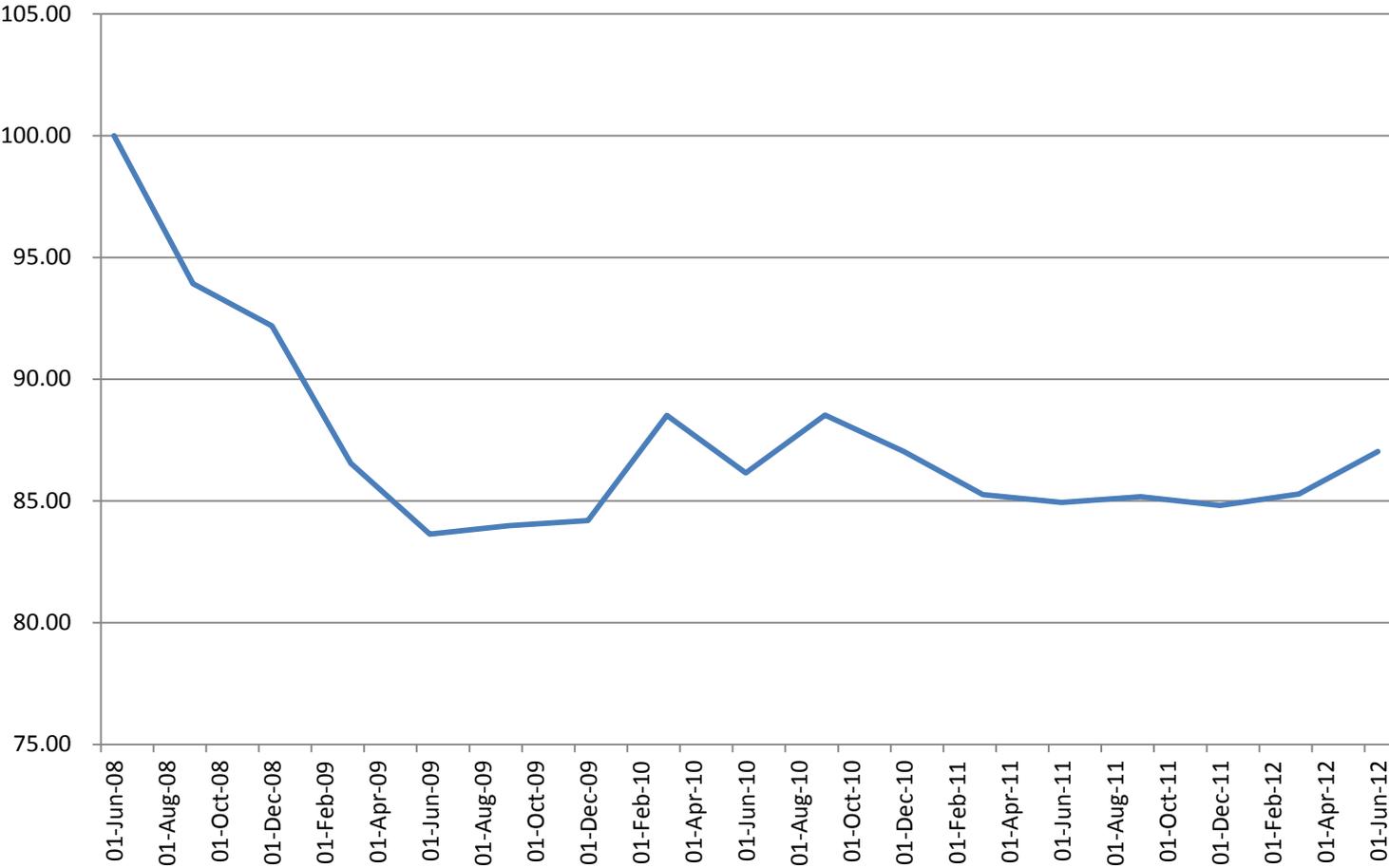# FIGURE 9: NEGATIVE OUTPUT SHOCK & FLEXIBLE WAGES – LABOUR PRODUCTIVITY FALLS (CURRENT?)
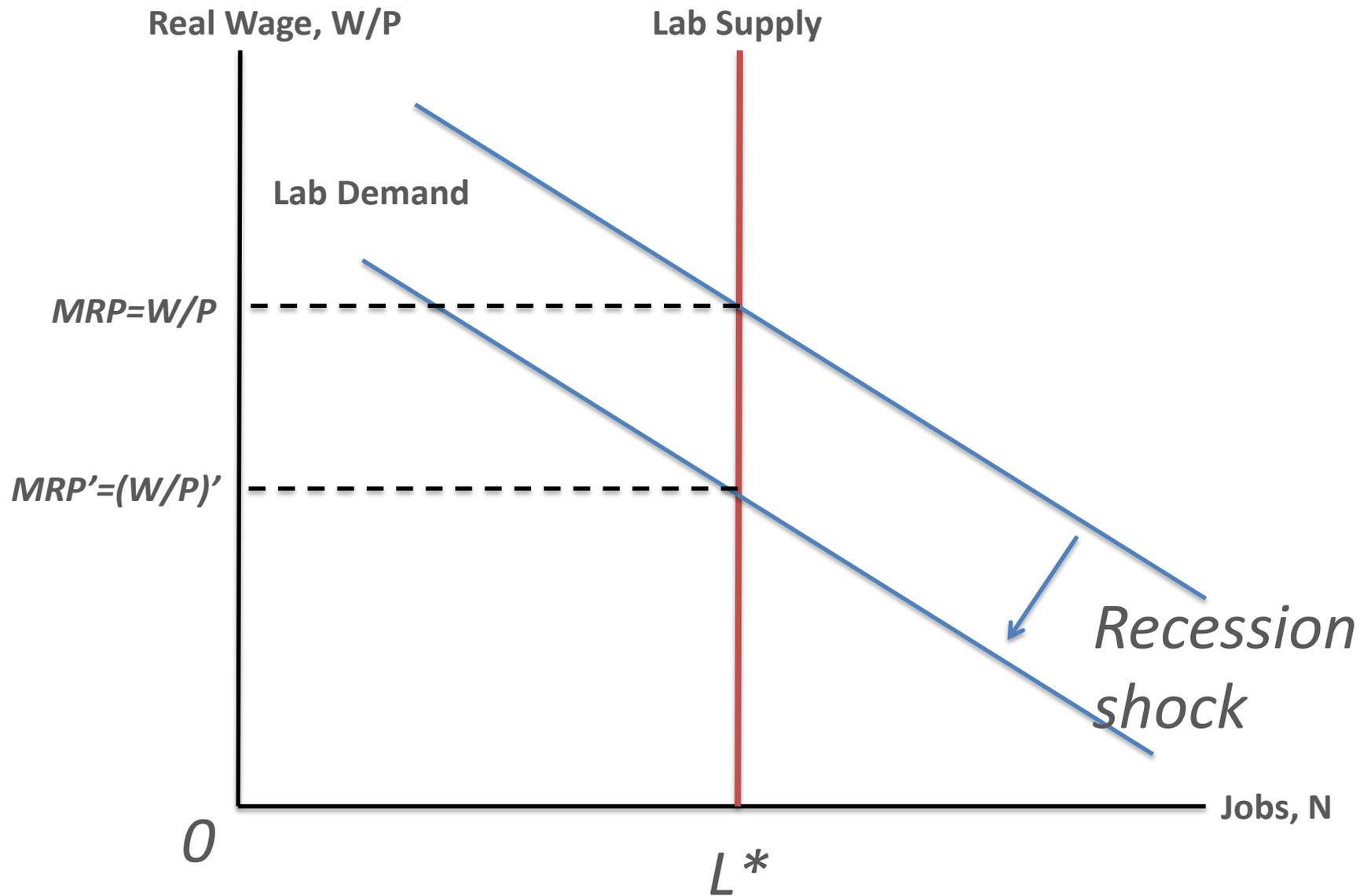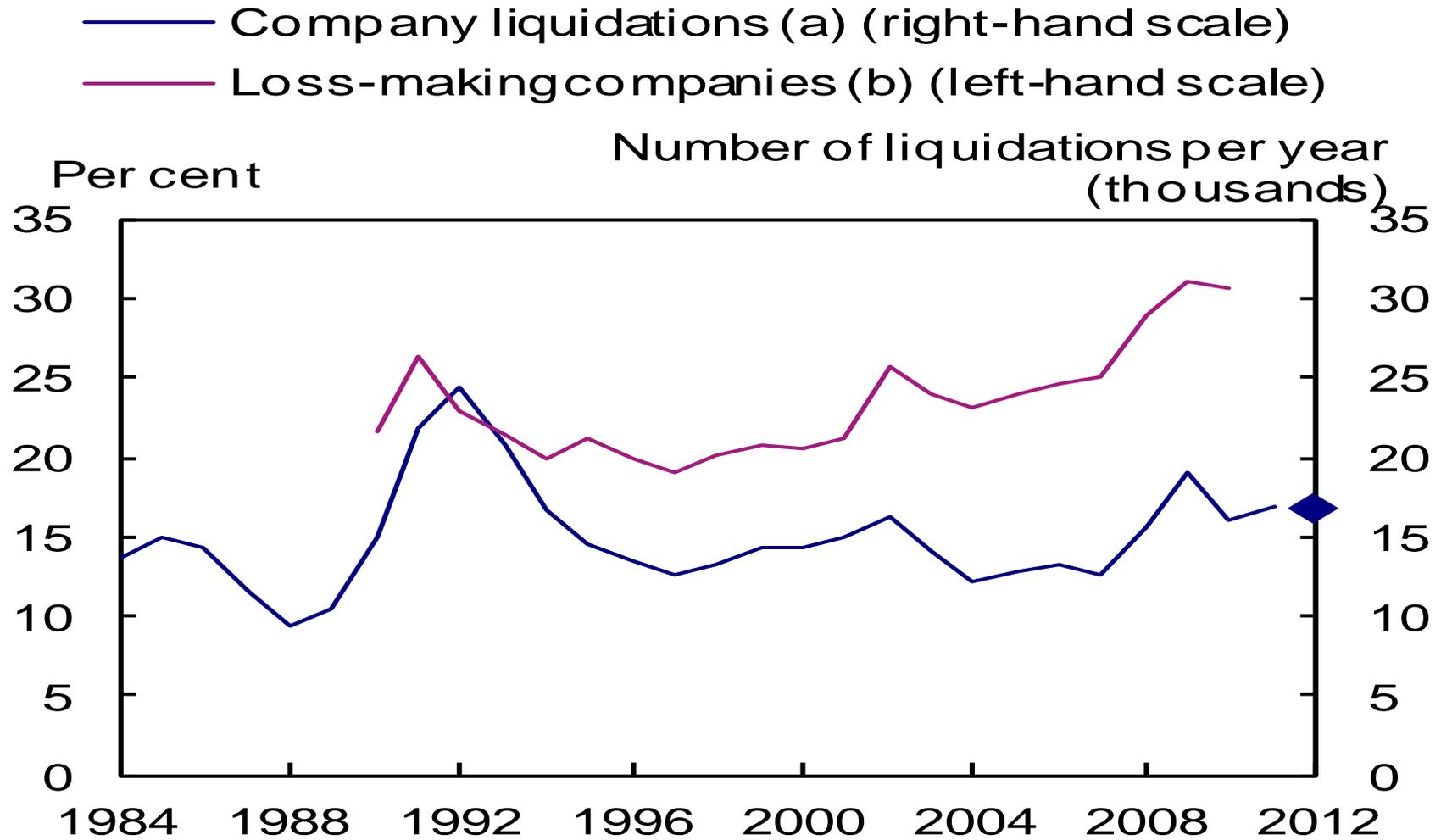
FIGURE 10: INCREASING COST OF CAPITAL FOR LARGE FIRMS
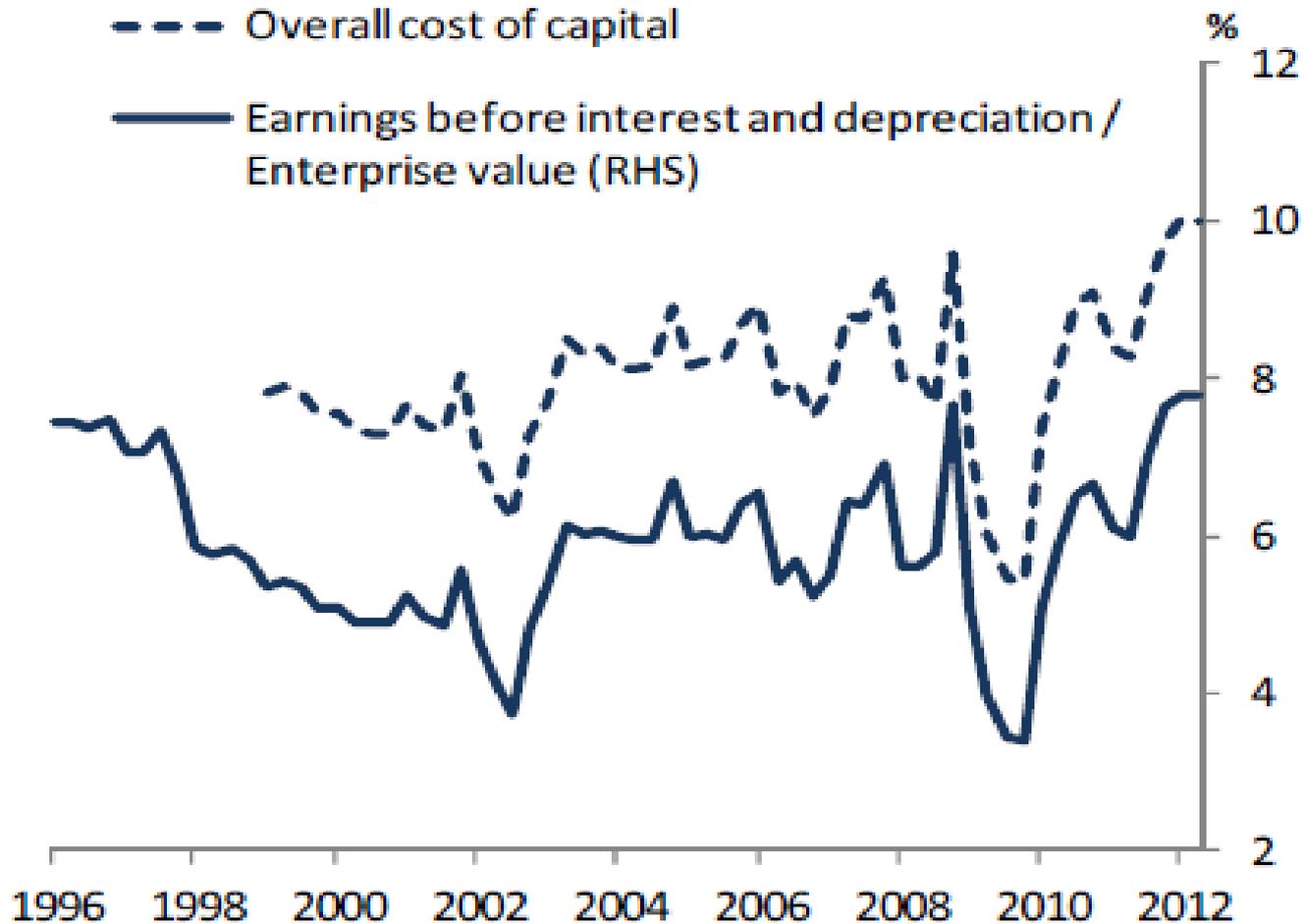
Source: Bank of England (2012)

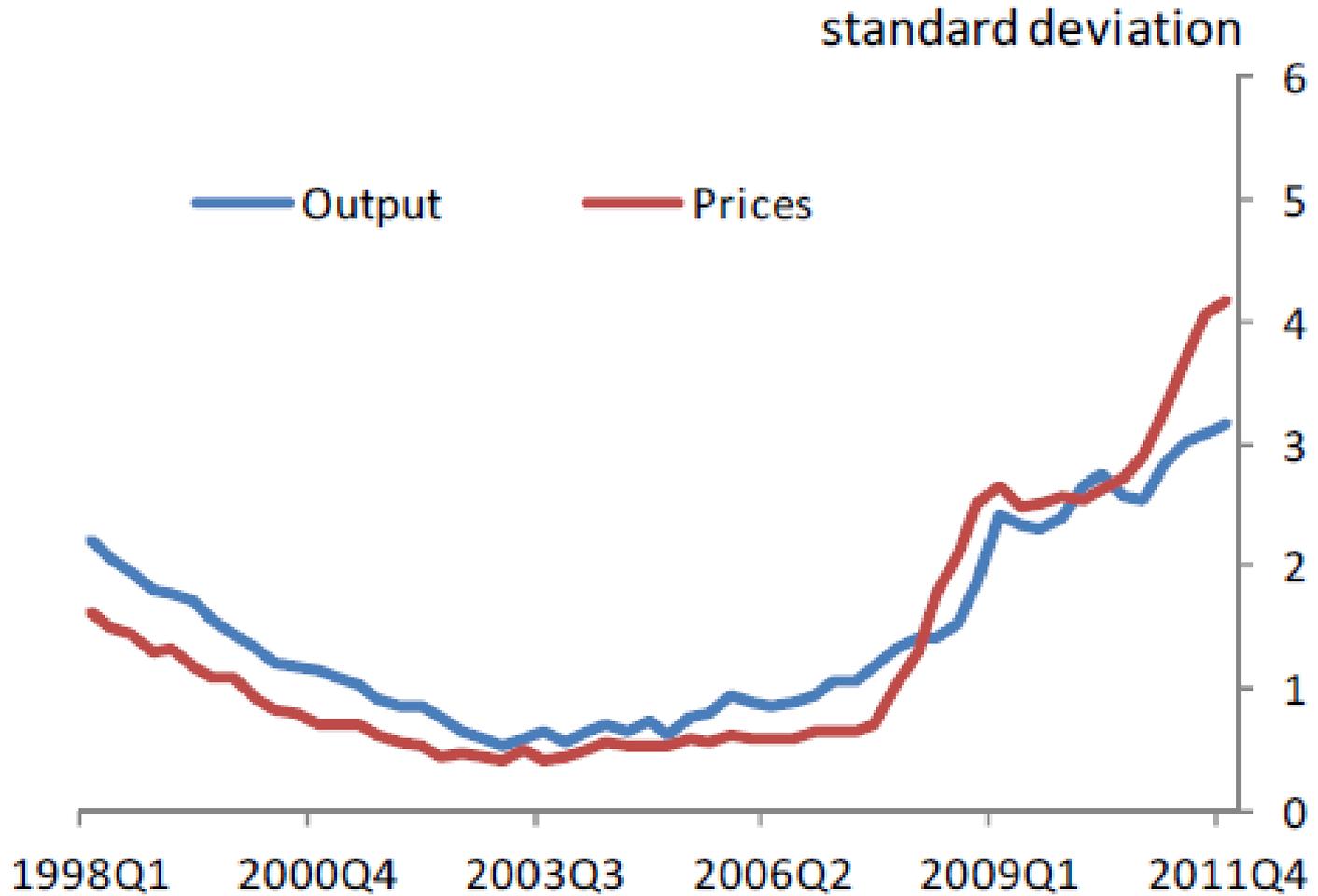# FIGURE 11: THE COLLAPSE OF REAL INVESTMENT, 2008-2012 (2008Q2=100)

Source: ONS

FIGURE 12: LIQUIDATIONS MUCH LOWER THAN WE WOULD EXPECT

Per cent

Number of liquidations per year (thousands)

— Company liquidations (a) (right-hand scale)
— Loss-making companies (b) (left-hand scale)

Source: Bank of England (2012)

FIGURE 13: MISALLOCATION ACROSS SECTORS

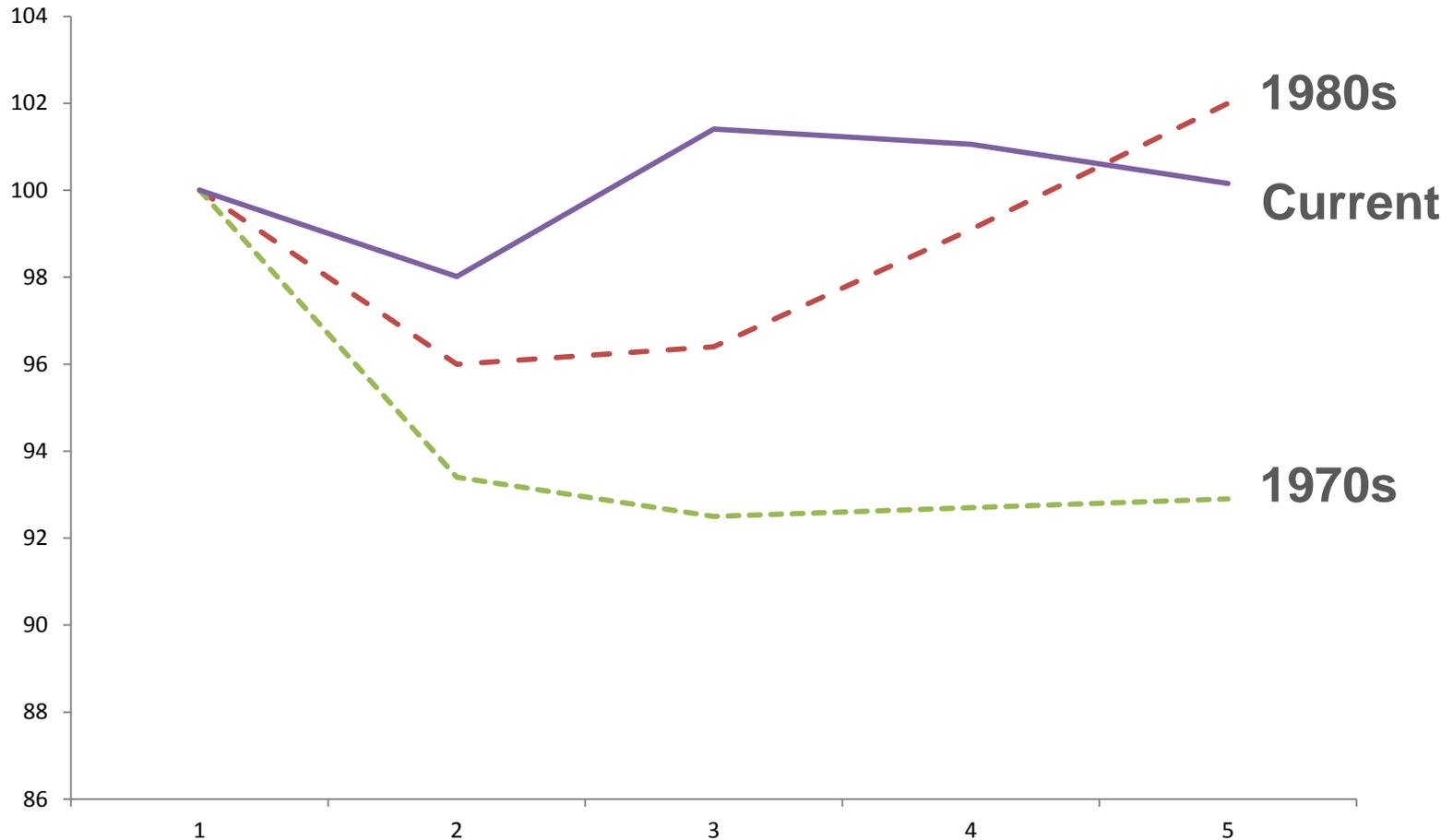
standard deviation

Legend: Output, Prices

Source: Bank of England (2012)

FIGURE 14: DECOMPOSITION OF FALL IN GDP PER WORKER IN CAPITAL, HOURS & TFP
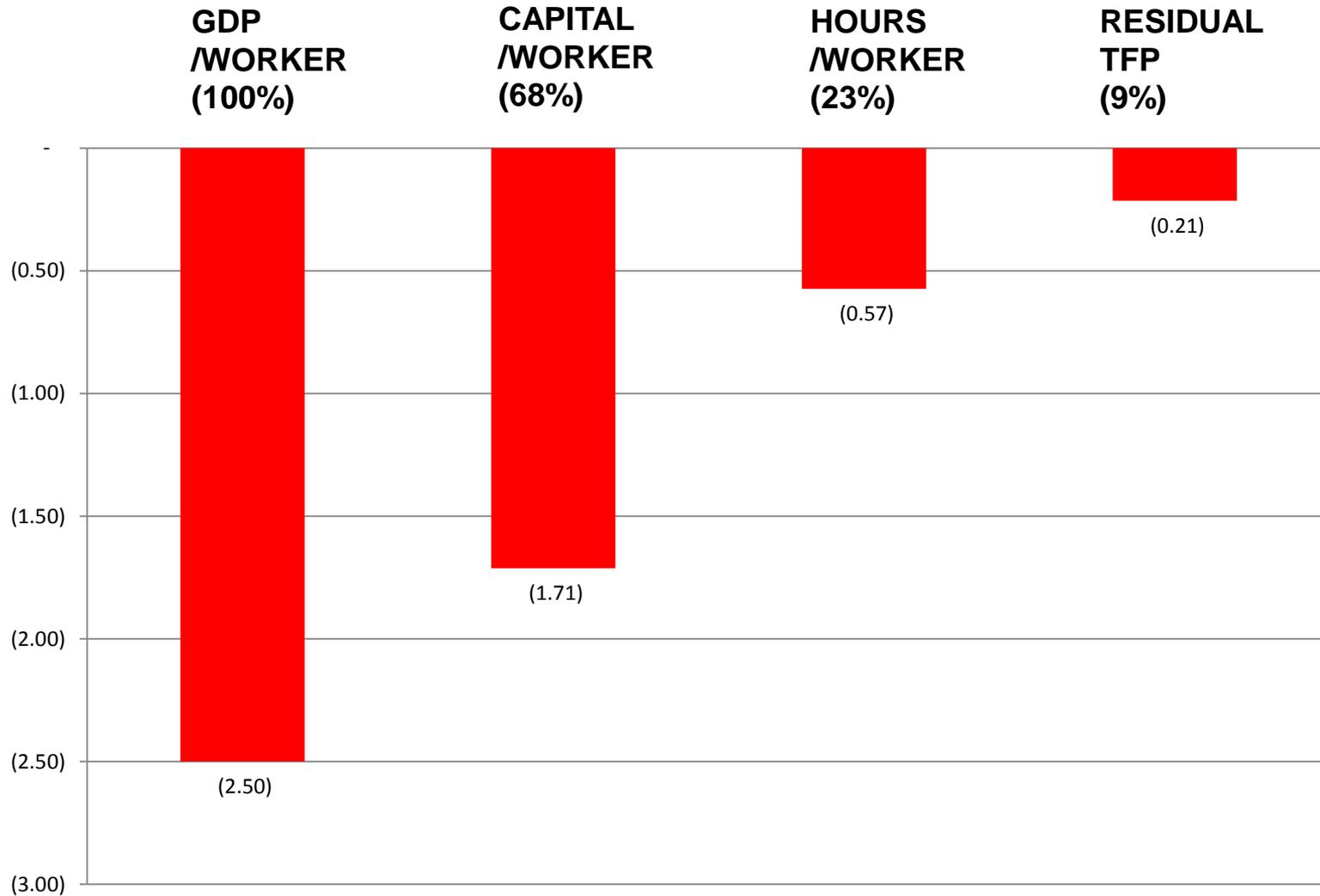
Note: Fall in GDP per worker (2.5% 2008Q2-2012Q2) decomposed into component parts: capital, hours and TFP (% of fall in GDP per worker "accounted for" by each element in brackets).

# FIGURE 15: CHANGE OF TFP IN THREE RECESSIONS

Note: TFP = "Total Factor Productivity" (productivity after controlling for capital and hours); 1970s recession is 1973-1978 (so 1 = 1973, 2 = 1974, etc); 1980s recession is 1979-1984; "Current" is 2008Q2-2012Q2. 1970s and 1980s TFP data from EU KLEMS. 2000s authors' estimates from ONS data.

TABLE 1: EXAMPLE OF AGGREGATE GROWTH ACCOUNTING EXERCISE

	(1) Change in GDP	(2) Change in labour productivity (GDP per worker)	(3) Change in effective Capital-labour ratio	(4) Contribution of capital to change in labour productivity	(5) % labour productivity change accounted for by capital-labour changes
1. Baseline , 2008Q2-2012Q2	-3.6	-2.5	-5.0	-1.7	68%
2. Use changes in factor prices, 2008Q2-2012Q2	-3.6	-2.5	-6.1	-2.1	83%
3. Baseline over 2008Q2-2012Q4	-2.1	- 1.7	-6.4	-2.2	125%
4. Lower depreciation rate 2008Q2-2012Q4	-2.1	- 1.7	-3.4	-1.2	67%

Note: Assumes labour costs are two-thirds of value added & Constant Returns to Scale ; Capital stock estimated From ONS 2008 whole economy net capital stock updated with real investment series as ONS has not published More recent capital stock estimates (depreciation=2.2% per quarter except in row 4 where it is 2%).

APPENDIX FIGURE 1: FIRM-LEVEL DISTRIBUTION OF MANAGEMENT SCORES WITHIN COUNTRIES
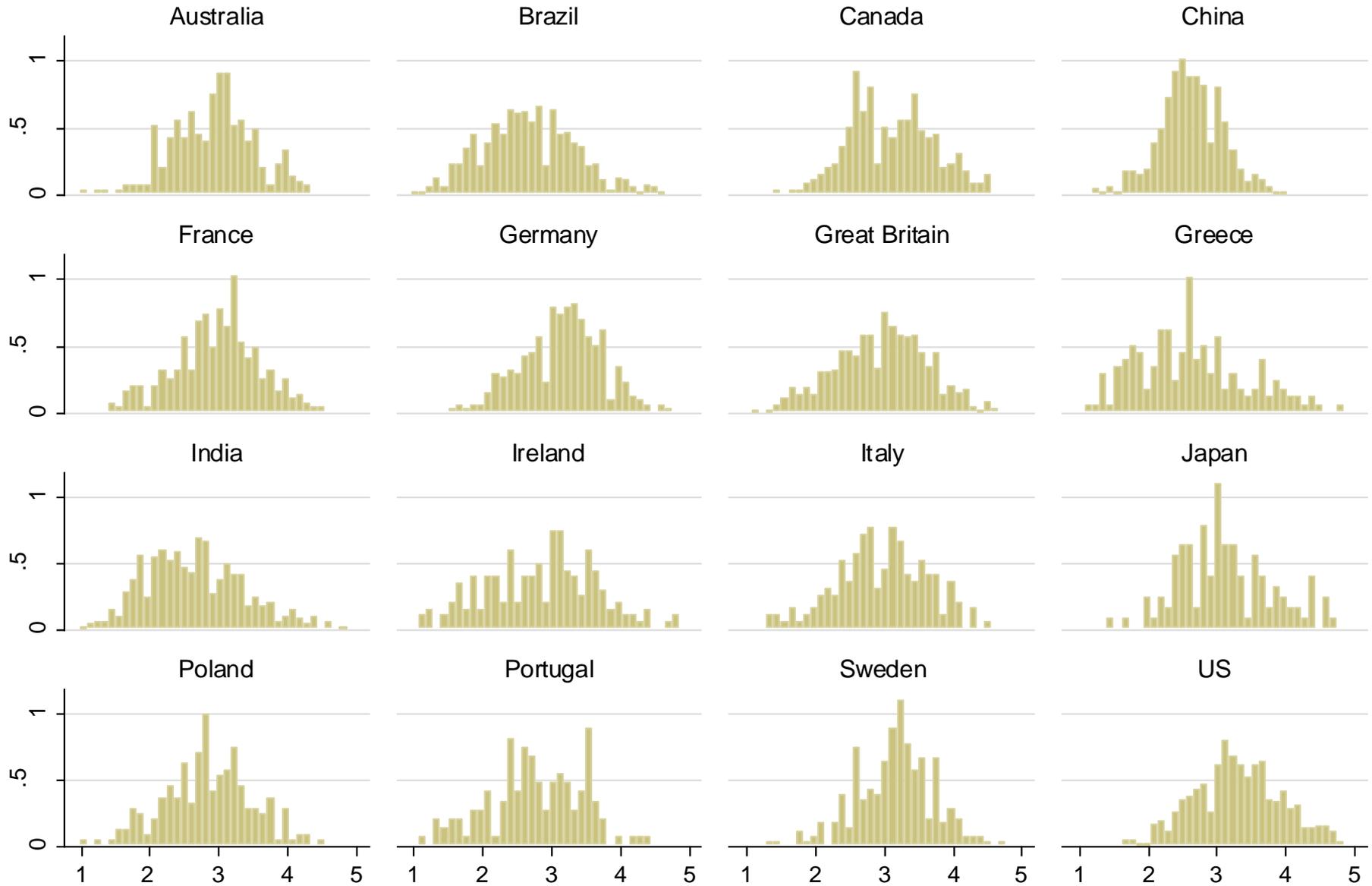
Source: Bloo , Sadun and an eenen   ; **Note:**   orst practice,   best practice