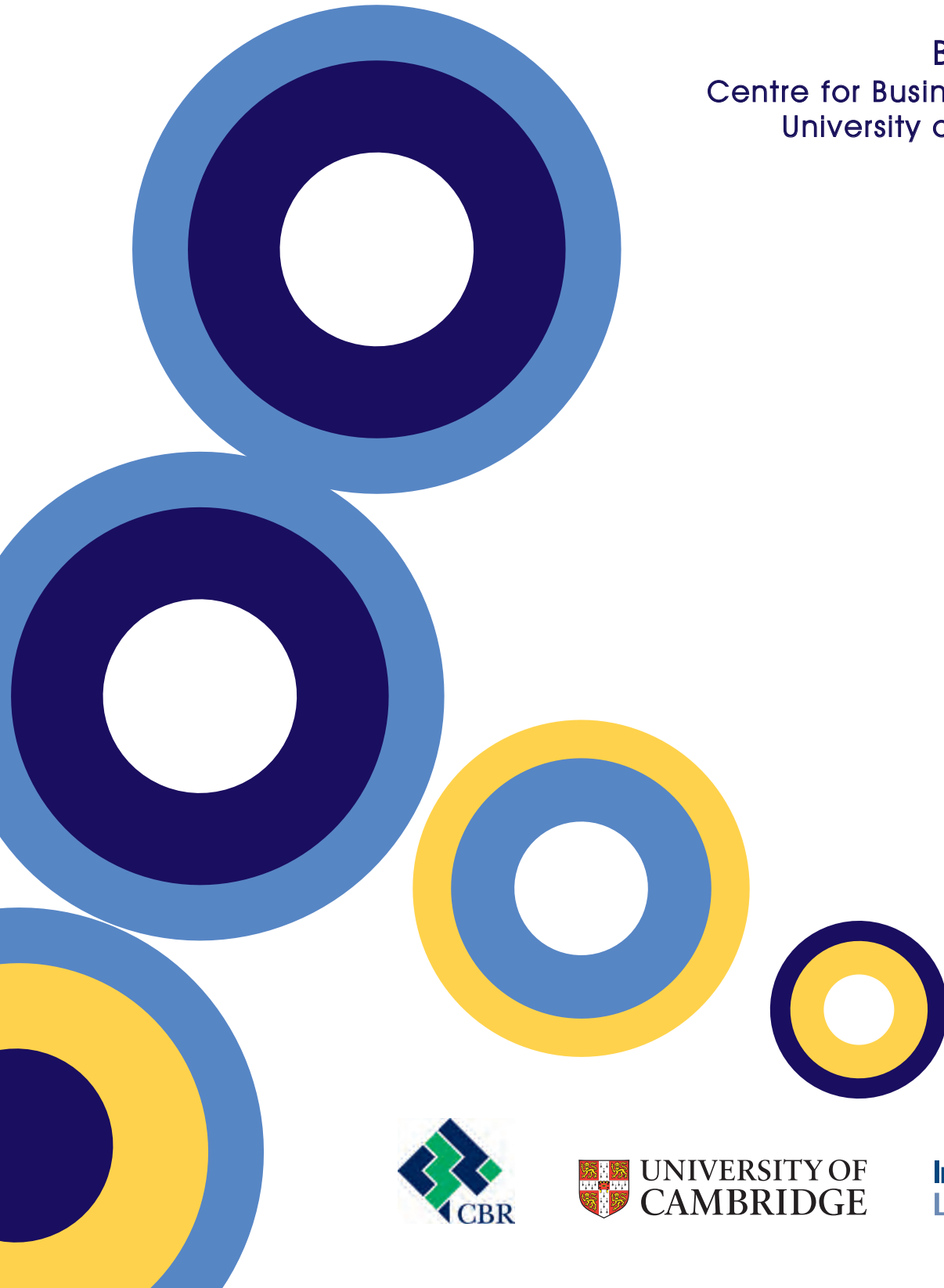


Is the British economy supply constrained?

A critique of productivity pessimism

By Bill Martin
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Postscript: 31st July 2011

The original version of this study was written in advance of the annual revisions to the US national income and product accounts published by the Bureau of Economic Analysis on 29th July 2011. Estimates of the US gross domestic product and private business activity in 2010 were revised down in volume terms by 1.2% and 1.7% respectively. These revisions are of sufficient size to warrant this postscript; much is made in the study of the strength of US productivity growth after 2007.

Even with these revisions, the post-2007 rates of growth of US GDP per worker and private business output per hour were on average still substantially positive and only a little below previous trend growth rates. The revised data suggest that the level of US productivity in 2010 was slightly below that consistent with a continuation of the earlier trend by between ½% and 1% depending on the productivity measure chosen. The revised productivity growth figures are up to ½ percentage point a year lower than the post-2007 estimates shown in Table 13 of the study, which records the pre-revision data. The latter indicated a modest acceleration of US productivity after 2007.

As an assistance to readers, some descriptive statements that were true of the previous data but are not true of the revised data have been amended in this version of the web-published study. The basic thrust of the analysis is unaffected by the BEA revisions.

Introduction and Summary

The goal of robust balanced growth has not been achieved. Since its low point in the autumn of 2009, the British economy has recovered, but by too little to make good the impact of the preceding contraction, consumer price inflation has risen well above the government's 2% target, unemployment has remained uncomfortably high, although not as high as the weakness of activity would have suggested, and large financial imbalances have persisted. The private sector – households and businesses together – has an abnormal financial surplus and the government an abnormal deficit. There appears to have been no substantive reduction in Britain's current account deficit on the balance of payments despite improved international cost competitiveness brought about by a low exchange rate.

There are two sharply contrasting explanations for the continuing malaise. The conjunction of weak activity, persistent inflation and disappointing trade performance adds weight to the common view that the economy has become bound to a lower trajectory, the result of a permanent loss of productive capacity. Others believe the economy is primarily constrained by weak demand, the result of a private debt overhang and a contraction in the flow of bank credit, deflationary forces made worse by an upsurge in world commodity prices. These contrasting explanations carry over to the policy debate: between those who emphasise supply-side reforms, fiscal rectitude, monetary tightening and sterling appreciation against others who champion demand management, a competitive currency and the relief of a credit crunch.

My 2010 study recognised both sides of the argument.¹ It analysed Britain's long-standing structural weaknesses that threaten balance of payments problems at full employment. But also emphasised was the *interconnection* between demand and supply: it was argued that a prolonged shortfall in demand may cause irreparable supply-side damage, in turn thwarting the full repair of overly-indebted balance sheets and initiating another turn of the screw: a vicious spiral. This is a message that may be taken from any number of historic studies of banking crises.

Possible escape, it was suggested, was offered by macroeconomic policies that encouraged a gradual revival of demand and elicited a favourable supply response: loose monetary policy, cycle-sensitive containment of the budget deficit, and the maintenance of a competitive exchange rate, which might take years to have full effect. Structural policies, it was argued, should encourage resource re-allocation towards exporting and import-competing activities.

The major challenge to this view comes from supply-siders who claim that the economy has already returned close to a normal level of capacity utilisation: that there is little or no demand deficiency. Such warnings need to be taken seriously. History is replete with examples of overly expansionary policy undertaken in the false belief that the economy was under-employed. But the bias towards policy restraint also carries a danger of a vicious spiral of weaker confidence, weaker demand and weaker supply.

This study examines the strength of evidence in support of the supply-siders' case in several detailed steps: examination of estimates of spare capacity and the implied developments in the economy's productive potential, the evidence for slack in the labour market and within businesses, as seen in the shortfall in productivity, the rationale offered for the alleged loss of underlying productivity, and the reliability of other evidence – notably business surveys and the inflation connexion - used in support of the supply-siders' claim.

¹ Rebalancing the British Economy: A Strategic Assessment, April 2010, CBR, Cambridge.

It is found that their view, so widely and influentially held, is based on surprisingly weak foundations.

Capacity and the output gap

The output gap is a conventional metric of the economy's excess or deficient capacity, typically measured as the difference between national output and its trend level, expressed as a per cent of that trend. Average expert opinion put Britain's output gap last year at about minus 3½%, an output shortfall. But national output was itself around 3½% below the 2007 level. So if the economy started from a zero output gap in 2007, economic capacity would not have grown for three years.

The normal rate of economic growth, achieved in the post-millennium years before the crisis, is about 2½% a year. So zero capacity growth after 2007 would put the level of capacity in 2010 some 7% below what might have been expected. The putative capacity loss relative to normal expectations is over three times larger than the damage inflicted by the average natural disaster.

Put another way, had capacity grown at 2½% a year, the output shortfall in 2010 would have been around 10%, not 3½%.

The challenge facing supply-siders is to explain why the economy should have suffered such sudden, profound and permanent loss.

Two explanations can be rapidly discounted.

The first is that the official figures understate activity, implying positive growth of capacity for the same output gap (and, perhaps, a smaller gap). The explanation has two weaknesses: the evidence for statistical bias is mixed (official statisticians report none of significance) and, second, plausible guesstimates of bias do not substantially change the picture.

Table A: UK growth and output gap measured against pre-crisis trends

| GDP* growth and gap, % | ---- Growth, year-on-year ---- | | -----Output gap**----- | |
|------------------------|--------------------------------|---------|------------------------|---------|
| | 2010 | 1Q 2011 | 2010 | 1Q 2011 |
| Official data | 1.4 | 1.6 | -10.2 | -11.0 |
| Adjusted data | 1.8 | 2.2 | -9.7 | -10.2 |

Sources and notes: Office for National Statistics (ONS), author's calculations. *Chained volume measure of the gross domestic product at market prices. The adjusted data allow for the long-term historic pattern of upward revisions and the ONS estimate (-0.5%) of the impact of unusually cold weather in 4Q 2010, an effect assumed to have been largely reversed in 1Q 2011. **Actual GDP less trend GDP, as a per cent of trend. The latter is set equal to actual or adjusted GDP in 4Q 2007 and mechanically extrapolated using average rates of growth of the major expenditure components between 2001 and end-2007. Average trend growth is about 2½% a year. See Tables 1 and 3 in the main text for more details.

Table A shows growth rates for the economy's gross domestic product after adjustment for the average pattern of upward revisions seen in official figures over a long historical period. Adjusted growth last year and in the year to the first quarter of 2011 is close to 2%, above the official estimate of 1½%.

The final two columns show mechanical estimates of the output gap, in which capacity is extrapolated at a normal rate of growth. The calculated GDP shortfall based on official figures is 11% in the first quarter of 2011. Even adjusted for possible revisions, the shortfall is still

very large, at around 10%. Revisions would have to be exceptional to account for much of the current shortfall.

A second line of argument is that the economy did not start from a zero output gap in 2007, or even near to zero. Instead it is argued that pre-crisis expansion was already unsustainable. An alternative Treasury calculation presented in the June 2010 Budget argued that the output gap might have been close to a positive 6% in 2007. If this were the case, an output gap of minus 3½% in 2010 would have been compatible with continued expansion of capacity.

This argument is weak because it confuses different concepts of sustainability. There was no boom before the crisis: average growth was normal and inflationary pressure was generally muted. Demand was not pressing against capacity, as it did in the late-1980s “Lawson Boom”. The Treasury calculation implies that the economy for many years prior to the crisis experienced a demand excess greater than during the Lawson Boom, but with few signs of serious inflation. Even allowing for a limited response of inflation to domestic capacity utilisation, the alternative Treasury story seems implausible. It is true that the pre-crisis expansion was unsustainably based on asset price bubbles and the extension of bank credit. But the problem was one of excess debt, not excess demand.

Employment and productivity

An output shortfall may arise because of shortfalls in employment and in labour productivity. Since employment has held up unusually well, the output shortfall has come with a large productivity shortfall, much of which is now generally regarded as a permanent loss, the collateral damage of the banking crisis.

An appreciation of the scale of productivity pessimism comes from a comparison of the regular analysis of the fiscal watchdog, the Office for Budget Responsibility, and the output, employment and productivity gaps implied by past trends.

In its March forecast, the OBR divided its estimate for an output shortfall of 3% in the third quarter of 2010 into a shortfall in employment, worth about 1 percentage point, and a shortfall in output per worker, worth 2 percentage points. Past trends imply much larger shortfalls: in excess of 9½% for output, 3% for employment and over 6½% for productivity, using comparable definitions.

Productivity shortfalls measured in terms of output per hour rather than output per worker are smaller by about 1 percentage point, because of a recession-related fall in people’s average hours of work. But the difference between the OBR’s estimate of the productivity shortfall and the one implied by past trends remains the same.

Were the OBR correct, over two-thirds of the shortfall in productivity, gauged against pre-crisis trends, would represent structural damage. The Bank of England’s Monetary Policy Committee appears to be almost as pessimistic: in May its central view was “that more than half of the shortfall in productivity, relative to a continuation of its pre-recession trend, reflects a persistent weakening in the level of underlying productivity”.² Such views influence fiscal and monetary policy decisions.

² Inflation Report, May 2011.

Although the main issue is the interpretation of the productivity shortfall, the OBR's estimate of the employment shortfall should not go unchallenged. At just 1%, the estimate is less than the rise in the unemployment rate since 2007. But the OBR believes there was an offset: notably an above-trend rate of participation by people in the labour market. On the OBR's estimates, the labour force – the employed plus unemployed - was around 1½% *above* trend in the third quarter of last year.

This view is questionable. After 2007, the overall participation rate fell somewhat relative to trend. There was a significant increase in the number of people who wanted a regular job but were not classed as unemployed; these included young adults who chose to stay on in higher education rather than risk joblessness.

An employment shortfall of 3% would be more plausible than the OBR's estimate of 1%. But with an unchanged estimate of the output gap, the estimated shortfall in output per worker would fall to zero, implying more structural productivity damage.

Another preliminary matter concerns the quality of the official figures on which productivity estimates are based. The official figures are derived from a regular survey of households, the Labour Force Survey. According to the LFS, over 440 thousand jobs were created between the summer of 2009 and this spring. Businesses' records present a different picture: a 110 thousand *reduction* in jobs over the same period. The difference between the records of job creation is equivalent to 1¾% of the LFS measure of employment, with a comparable impact on estimates of productivity. Businesses may be significantly more productive than the officially preferred figures suggest, although the shortfall against the pre-crisis trend would still be large.

The challenge for productivity pessimists is to explain why the level of underlying productivity should have suffered sudden and permanent damage. A careful reading of mainly official documents provides a range of reasons, some of which may be relevant to future productivity developments. But as explanations of what is already supposed to have transpired, none withstand close scrutiny.

The contraction of banking – the argument that attributes the national productivity shortfall to the contraction of “high-productivity” banking and a shift in employment to less productive sectors.

However, the accounting exercise in Table B shows that the shortfall in productivity measured against pre-crisis trends is a general phenomenon, seen across a wide range of industrial sectors, including manufacturing, distribution and business services. The impact of shifting employment patterns has been a minor consideration. Moreover, the contribution of banking is probably exaggerated: it is widely argued that official output figures overstate the importance of banking to the national economy.

Table B: Productivity gap accounting, measured against pre-crisis trends

| % and percentage points Output per job (LFS data) | ----- Productivity gap ----- | | | |
|--|------------------------------|------|------|---------|
| | 2008 | 2009 | 2010 | 1Q 2011 |
| Total | -1.9 | -6.5 | -6.8 | -7.9 |
| of which, contribution: | | | | |
| Job shift impact | -0.1 | -0.4 | -0.8 | -0.6 |
| Direct impact | -1.9 | -6.3 | -6.1 | -7.3 |
| of which (selected sectors): | | | | |
| Agriculture, mining & utilities | -0.1 | -0.4 | -0.5 | -0.6 |
| Manufacturing | -0.5 | -1.5 | -1.2 | -1.2 |
| Distribution, hotels & catering | -0.6 | -1.1 | -1.2 | -1.6 |
| Transport & communications | -0.1 | -0.6 | -0.6 | -0.6 |
| Business services “proper”* | -0.2 | -1.3 | -1.2 | -1.3 |
| Banking | -0.1 | -0.5 | -0.8 | -1.3 |

Sources and notes: ONS, author’s calculations. The job shift effect captures the impact on productivity of shifts in employment, relative to trend, between low and high productivity sectors. The direct impact is the productivity shortfall of each sector weighted by the share of each sector’s output in national trend output. * excludes the imputed output of residential owner-occupiers included in official figures. Totals are subject to rounding error and include a minor residual mixed shift share effect. See Tables 10 and 11 in main text and appendix for more details.

Inefficiency allocation of financial capital – the argument that an impaired financial system will not allocate credit to the most productive uses.

But the financial system was allocatively inefficient before the crisis, financing a property price bubble and underpricing risk. The extrapolation of trends from the pre-crisis period is unlikely to provide a baseline and measure of productivity shortfall that, under this hypothesis, are upwardly biased.

Capital investment shortfall – the argument that there has been a permanent decline in businesses’ capital intensity, the ratio of capital to labour employed.

But capital intensity, crudely measured, has probably *risen* since 2007 relative to the pre-crisis trend. The capital stock grew more slowly than before, but there was a larger shortfall in labour employed. Allowance for the productive quality of different capital assets slightly alters this conclusion – the ratio of the quality-adjusted capital stock to labour employed may have fallen slightly relative to trend. But the impact on underlying productivity would have been minor and could be regarded as a temporary feature of recession.

Labour skills – the argument that underemployment and unemployment may deprive workers of skills otherwise acquired through job-related training.

But the evidence does not conclusively show that job-related training has permanently fallen. Official figures suggest the quality of the employed labour force *rose* during the recession, a consequence of the disproportionately adverse impact on the pay and prospects of the less skilled. Long-term unemployment has risen, risking detachment from the labour market, but by less than in the early-1990s recession, after which trend growth resumed and low unemployment was achieved.

Company formation and liquidations – the argument that a fall in new company formation may reduce productivity, and that scrapping may have reduced capacity.

But company registrations have recovered and liquidations have fallen back, the latter having never reached the levels seen in the early-1990s recession, which itself seemingly inflicted no lasting damage on productive potential.

American perspective

The broad conclusion is that the reasons frequently cited by the OBR, Treasury and Bank of England for productivity impairment can explain only a minor part of Britain's post-2007 productivity shortfall, and may, in any case, be consequences of demand deficiency, in principle, inflicting temporary rather than permanent damage.

This conclusion is reinforced when the same set of explanations is tested in an American context. A banking crisis, a major loss of output, a collapse of business investment: these blows the US and UK have in common. The same logic used to explain the UK's productivity developments would predict a similarly large shortfall in American productivity. Yet American productivity growth after 2007 was close to the pre-crisis period pace; at the national level, output per worker in 2010 was broadly consistent with the pre-crisis trend. The downside was a rise in the US unemployment rate between 2007 and 2010 double that seen in the UK.

The role of real wages

It is not novel to suggest that wage moderation in relation to prices enabled businesses to cushion profits against the impact of the recession and rising input costs, and thereby preserve jobs at the expense of productivity. The role played by the moderation of real wages is widely recognised, and acknowledged as a feature that distinguishes the post-2007 recession from the major recessions in the early-1980s and 1990s. But real wage moderation is not generally regarded as a force that would explain a permanent structural shortfall in productivity.

The UK and US economies share a common feature: the conjunction of an overall rate of profitability surprisingly resilient in the face of large shortfalls in activity, as measured against previous trends. The uncommon feature was the nature of the adjustment that helped to preserve profits: in the US, the adjustment burden fell on jobs; in the UK, the adjustment burden fell on real wages. America's demand deficiency is registered in a high unemployment rate coupled with high productivity. In the UK, greater real wage moderation averted the large increase in unemployment. Demand deficiency was instead registered in the post-2007 productivity shortfall.

The forces behind the moderation in UK real wages are not fully understood but it is likely that recession and the related fall, relative to expectations, of property prices prompted an abrupt re-appraisal of financial prospects. Overly indebted workers may have concluded that less well paid employment was preferable to unemployment and insolvency: mortgage prisoners may have become lower wage slaves.

For policy makers concerned with measures of the output gap, these developments create a daunting problem of interpretation. A demand deficient economy in which real wages fall sufficiently to contain the rise in unemployment and leave overall profitability at an acceptable level may manifest low levels of productivity that are also characteristic of a structurally weak economy. Unable to sell more because of lack of demand, industry may be

content to live with low productivity, which, being persistent, is mistakenly interpreted by policy makers as a downshift in the economy's productive potential.

Other evidence of capacity constraints

Crisis event studies

A large number of recent studies have built on earlier work documenting the substantial and long-lasting depressing impact on output associated with major banking crises. Some studies attempt to isolate the loss of productive potential rather than the general loss of GDP, which includes the impact of declining aggregate demand. The range of estimates of productive potential losses runs from negligible to moderate – up to a 4% loss for deep crises - but worse outcomes have been cited.

The attempt to draw lessons for the UK faces two difficulties. First, a “typical” crisis does not exist. Estimates and the nature of the crises vary considerably. Stephen Cecchetti and others have gone so far as to claim that the current crisis is “unique” and that it is “not possible to learn about the likely path of the current crisis by averaging outcomes across past crises”.³

Second, the crisis event studies shed little light on the reasons for any damage to productive potential. One possibility is that crises cause an autonomous downshift in productivity, occasioned, for example, by the reaction of business investment to increased financing costs, as financiers become more risk averse, or by the poor allocation of credit by the impaired financial system. But another possibility is that the depletion of supply is itself caused by a prolonged period of demand deficiency that leads, for example, to a depletion of business capital, tangible and intangible, the erosion of skills and the detachment from the labour force of the long-term jobless.

The finding that output losses persist does not therefore settle the central question – whether the UK's post-2007 output shortfall represents an ineluctable loss of capacity or the direct and indirect consequences of a general deficiency of demand.

Business surveys

Business survey evidence suggests the economy is not suffering from abnormally low capacity utilisation. According to the Bank of England's comprehensive assessment, manufacturing is back to at least normal capacity use with services only a little way behind. The survey evidence is key to the supply-siders' case.

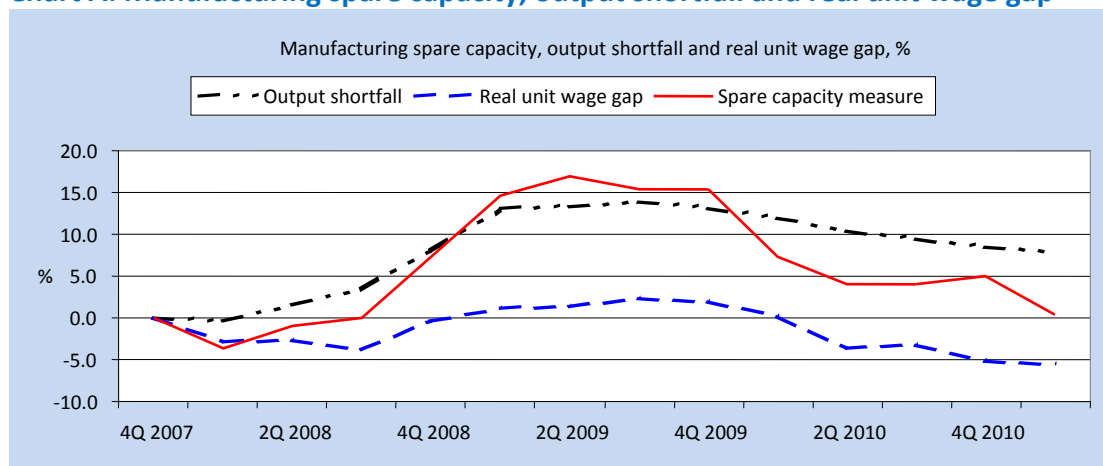
Close analysis suggests the following interpretation. There are, first, instances of capacity shortage, for example in specialised manufacturing export trades. But the surveys may generally understate spare capacity and potential output because some capacity is being mothballed, awaiting a more enduring recovery; because intensity of work effort, especially in service trades, is confused with productivity and because survey responses are influenced by changes in real unit labour costs.

Business output, despite being generally depressed, may have moved closer to a level at which short-run labour cost objectives can be met thanks to the recession-induced decline in

³ Cecchetti et al. (2009b).

real product wages – wages relative to output prices. Chart A illustrates in the context of manufacturing. With the impact on real unit labour costs attenuated, the shortfall in productivity may not be regarded by businesses as labour hoarding, even though they remain capable, like their American counterparts, of pre-crisis efficiency.

Chart A: Manufacturing spare capacity, output shortfall and real unit wage gap



Sources and notes: ONS, Confederation of British Industry, author's calculations. Spare capacity measure is the percentage of manufacturing firms responding to the CBI Industrial Trends Survey indicating below capacity working, difference from average 4Q 2007 level. Output shortfall is the output gap, sign reversed. Real unit wage gap refers to the gap in real product wages – nominal wages relative to sales prices - divided by productivity. See Tables 7 and 15 in the main text for details.

The persistence of inflation

Over the last three years, consumer price inflation has generally persisted at a level above the government's 2% target and above inflation in major competitor countries, a marked contrast to Britain's pre-crisis performance. The Bank's forecasts, conditioned by a belief that spare capacity would reduce inflation, have been too optimistic. A common conclusion is that poor inflation outcomes are symptomatic of limited spare capacity.

This general line of reasoning can be challenged on two grounds.

First, the increase in inflation has been mainly driven by escalating import prices associated with the fall in the exchange rate and, in 2011, additionally by the increase in the rate of Value Added Tax and resurgence in world commodity prices. Domestic sources of inflation, which would be sensitive to the level of spare capacity, have been generally subdued, and below pre-crisis levels. In the year to the first quarter of 2011, domestic wages and profits per unit of output rose by 2%.

Second, there was substantive evidence well before the crisis of a significant weakening of any link between the output gap and inflation and, in any case, of a limited response of firms' prices to the pressure of demand. A study by US Federal Reserve economists published in early-2007 noted, "There is general agreement that in many industrial economies, the responsiveness of inflation to domestic resource utilization has declined."⁴ The statistical relationship between inflation and unemployment – popularly known as the "Phillips Curve" – has therefore changed; in the words of the Federal Reserve study, "the slope of the Phillips Curve has become flatter". The UK's experience is no exception.

⁴ Ihrig et al. (2007).

A further consideration is that firms faced *conflicting* pressures during the crisis: higher import costs and lower productivity acted to inflate unit costs; the moderation in earnings acted to contain costs while the need to maintain sales may have encouraged firms to cut profit margins. The result may well have been a rather limited initial response of prices to the shortfall in demand, an outcome in keeping with past behaviour. Professors Layard, Nickell and Jackman note in their seminal work on unemployment, “Much of the evidence suggests that prices tend to be rather unresponsive to demand fluctuations.”⁵

The escalation in import prices, the flattening of the Phillips Curve, the limited rise in unemployment, and the predictably modest cyclical response of firms’ prices, thanks to contrasting recession impacts on firms’ unit costs and margins, provide a plausible set of explanations consistent with prior evidence for the limited response of inflation to the recession. The popular alternative hypothesis that infers a small output gap from the persistence of above-target inflation gives insufficient weight to the impact of higher import prices and assumes a relationship between spare capacity and inflation more powerful than the accumulated evidence warrants.

Evidence for and against the supply-siders’ arguments is provided in the second part of this study following a brief assessment of developments since 2007.

⁵ *Unemployment: Macroeconomic Economic Performance and the Labour Market*, 1991, Oxford University Press, Oxford.

Britain's Disappointing Recovery

A popular explanation of the business cycle emphasises the role played by changes in household and business confidence, buffeted by shocks and surprises, and the consequential impact on the timing of non-essential expenditure. During recessions, increased uncertainty about economic prospects may lead to the postponement of spending on consumer durables and business capital and the reduction in the holdings of inventories. The ensuing recovery comes as confidence rises and the postponed spending is reinstated. This simple mechanism might explain what some see as a key feature of business cycles: that “deeper recessions are almost always followed by steep recoveries” - a proposition sometime referred to as the “Zarnowitz rule”.⁶

Table 1: Recession & recovery

| GDP growth over year, % | 2008 | 2009 | 2010 | 1Q 2011 |
|-------------------------|------|------|------|---------|
| UK | | | | |
| Official data | -0.1 | -4.9 | 1.4 | 1.6 |
| Adjusted data | 0.1 | -4.6 | 1.8 | 2.2 |
| Memo: | | | | |
| US | 0.0 | -2.6 | 2.9 | 2.3 |
| Euro area | 0.3 | -4.1 | 1.7 | 2.5 |
| of which: | | | | |
| Germany | 0.7 | -4.7 | 3.5 | 4.8 |
| France | 0.1 | -2.7 | 1.4 | 2.2 |
| Italy | -1.3 | -5.2 | 1.2 | 1.0 |

Sources and notes: Office for National Statistics (ONS), US Bureau of Economic Analysis, European Central Bank, Organisation for Economic Co-operation and Development, author's calculations. UK GDP is the gross domestic product at market prices, chained volume measure. The adjusted data allow for the historic pattern of upward revisions and the ONS estimate (-0.5%) of the impact of unusually cold weather in 4Q 2010, an effect assumed to have been largely reversed in 1Q 2011.

By this criterion, Britain's performance disappoints: the pace of recovery achieved so far pales against the scale of the preceding contraction. On provisional figures, the gross domestic product in volume terms grew by 1½% in 2010. With rough, but not implausible, allowance for possible understatement of activity⁷ and for the disruption caused by an unusually cold winter, Table 1 suggests growth last year might have been closer to 2%, a figure still below the post-World War II, pre-crisis average of 2½% a year and modest set beside the contraction of output, of up to 5%, in 2009. Growth in the year to the first quarter of 2011 may have remained below trend.⁸

⁶ See Mussa (2009), who attributes the idea to the late Victor Zarnowitz, a business cycle historian.

⁷ Regular studies by the Office for National Statistics report no evidence of downward bias: the average revision to early estimates of quarterly GDP growth in recent years has been close to zero, and statistically insignificant. (See <http://www.statistics.gov.uk/statbase/Product.asp?vlnk=13560>.) However, an examination of revisions over a much longer period suggests a significant bias exists. The mean upward revision after ten years to quarter-on-quarter GDP growth initially recorded in the period 2Q 1961 to 2Q 1999 is 0.19 percentage point, with a serial correlation corrected t-value of 4.0 (data source: Brown et al. (2009)). The mean revisions after one and two years are 0.07 percentage point and 0.11 percentage point respectively. These mean revisions have been used to adjust the official series.

⁸ GDP growth between 4Q 2010 and 1Q 2011 was affected by large falls in construction and energy output. The Bank of England estimates that excluding these sectors, and abstracting from the impact of the cold winter, output rose modestly between the quarters (May 2011, Inflation Report, p24). The quarterly path of consumers' spending, business investment and imports may have been additionally affected by purchasing decisions that anticipated the January 2011 increase in the standard rate of Value Added Tax. The broad picture is better revealed by the annual average data.

Britain was not alone. With the notable exception of Germany, the recovery of many economies within the Euro area was similarly disappointing. Growth in the US in 2010 matched the output fall in 2009, but fell short of expectations based on the Zarnowitz rule and prompted further policy stimulus.⁹

Britain's recovery also appears unusually weak when set in historical context. Table 2 shows the scale of contractions and subsequent recoveries in the present cycle and during and after Britain's major recessions, which occurred in very different inflationary circumstances, in the mid-1970s, early-1980s and early-1990s.¹⁰ The fall in output from the onset of each of the previous recessions to their low points, around 3½% on average, is markedly less than the contraction, in excess of 6%, that occurred between the first quarter of 2008 and the third quarter of 2009. The scale of recoveries is less dissimilar measured over comparable periods from each cycle trough.

Table 2: Major UK recessions

| Recession periods (Duration in quarters) | Change in GDP, % | | GDP % of pre-recession level* |
|---|------------------|---------------|----------------------------------|
| | until trough | after trough* | |
| 2008 and after (6) | | | |
| official data | -6.4 | 2.5 | -4.1 |
| adjusted data | -6.1 | 3.3 | -3.0 |
| Post-war before 2008: | | | |
| simple average (7¼) | -3.5 | 4.2 | 0.6 |
| of which: | | | |
| early-1990s (8) | -2.5 | 3.9 | 1.3 |
| early-1980s (5) | -4.6 | 3.2 | -1.5 |
| mid-1970s (9) | -3.3 | 5.6 | 2.1 |
| Memo: | | | |
| early-1930s (6) | -7.6 | 2.7 | -5.1 |

Sources and notes: ONS, Central Statistical Office Cyclical Indicators (discontinued); Birchenhall et al. (2001); Mitchell et al. (2009); author's calculations. * six quarters after trough. The quarter periods marking the beginning of recession and the subsequent troughs are taken to be 1Q 1930 and 3Q 1931 ("early-1930s"); 2Q 1973 and 3Q 1975 ("mid-1970s"); 4Q 1979 and 1Q 1981 ("early-1980s"); 2Q 1990 to 2Q 1992 ("early-1990s"); 1Q 2008 and 3Q 2009 ("2008 and after"). See notes to Table 1.

The striking feature is that, with significant variation, major recession episodes in the post-war period had seen activity recover on average by roughly as much as it had fallen, apparently in keeping with the Zarnowitz rule. By contrast, GDP in the first quarter of 2011 was still below its pre-recession peak in early-2008 by between 3% and 4%, depending on the allowance made for any statistical understatement of activity. It is perhaps little comfort that the 1930s depression was worse. Detailed examination reveals that volumes of exports, household consumption and capital spending were all unusually low in the current cycle, judged by the earlier post-war episodes; only government spending on goods and services was more supportive.

The contraction of 2008 and 2009 had one saving grace: brevity. The fall in output lasted about a year and a half. And it appears that the recovery process may have begun rather

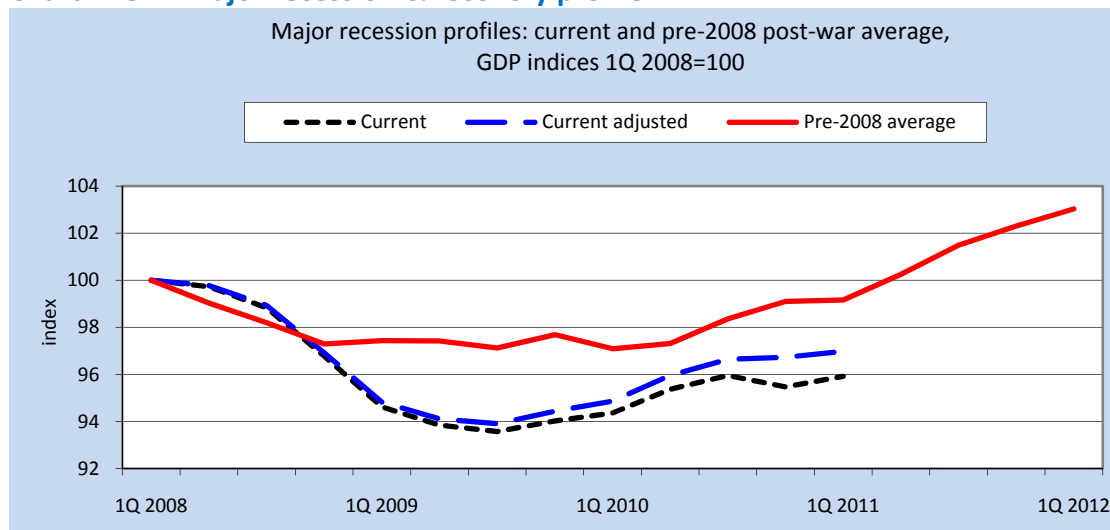
⁹ Mussa (2010) revised down his US growth forecast for 2010 and 2011 by about 1 percentage point.

¹⁰ The choice of quarter periods to denote recession onset and trough is open to debate. The dating used in Table 2 is informed by an examination of the path of GDP, cyclical indicators and econometric evidence. The qualitative conclusions drawn in the text are robust to modest changes in the dating.

sooner than was “typical” in previous major recession episodes, although this impression is sensitive to the precise dating of peaks and troughs.¹¹

But whether comparatively short-lived or not, the contraction was of such depth that the economy would have to grow very rapidly to return output to something close to normal. Chart 1 shows the level of GDP indexed at 100 at the onset of major contractions, a simple average in the case of the pre-2008 episodes. Notable is the comparative strength of the historic recovery path. To catch up during 2011 and 2012, the economy would need to expand by at least 4% a year – more than double the current consensus forecast.¹²

Chart 1: GDP major recession & recovery profile



Sources and notes: ONS, author’s calculations. The pre-2008 average is an average of GDP indices set at 100 at the start of each of the pre-2008, post-war major recessions. The current adjusted index allows for possible upward revisions to preliminary GDP estimates and the impact of the cold 2010 winter.

The metric used in these cycle comparisons is straightforward but not ideal. A better and more demanding measure is provided by the gap between output and its potential or trend level. Unlike the historic comparisons, which evaluate output in relation to the pre-recession peak, the output gap measures the severity of recession and the strength of recovery against a baseline that grows in line with the economy’s productive potential. However, there is a problem of measurement: trend output is unobservable and none of the many methods of estimation can claim superiority.¹³ As a rough but not implausible guide, Table 3 mechanically extrapolates trend output from the end of 2007 at a growth rate close to the post-war average of 2½% a year.

¹¹ The ONS, for example, sometimes dates the trough of the early-1990s recession as 3Q 1991 rather than 2Q 1992 reducing the estimated duration of the downturn from eight quarters to five quarters. Compare ONS (2011) with Chamberlin (2010).

¹² Consensus growth forecast of 1.5% in 2011 and 2.1% in 2012. Source: HM Treasury, “Forecasts for the UK economy”, June 2011.

¹³ Since the true level of potential is unknown, the relative merits of rival methods of estimation cannot be directly assessed. None may be reliable. Indirect evaluations based on the ability of alternative measures of the output gap to explain developments in inflation involves the testing of joint hypotheses with resulting increased scope for false inference. Miles (2011a) usefully notes the relative severity of the current recession judged partly on the basis of historic output gap comparisons. His estimate of the trend extrapolates from the start of each recession the trend growth estimated by Hills et al. (2010) using a statistical filter, the Hodrick-Prescott filter, described as “worse than useless” by Christiano and Fitzgerald (2003) whose preferred “band pass” filter can give “entirely spurious” results according to Benati (2001). Gordon and Krenn (2010) provide further criticism of statistical filters.

Table 3: Expenditure and the output gap

| Gap %; contributions percentage points | Output gap & contributions** | |
|---|------------------------------|-------|
| | 2009 | 2010 |
| GDP | -9.2 | -10.2 |
| of which: | | |
| Total final expenditure* | -15.9 | -15.8 |
| of which: | | |
| Exports of goods & services | -3.9 | -3.5 |
| of which (share of 2010 total, %): | | |
| Goods (62) | -1.8 | -0.3 |
| Services (38) | -2.1 | -3.1 |
| Consumption and investment: | | |
| Government | 0.1 | -0.3 |
| Private | -12.1 | -12.1 |
| of which: | | |
| Household consumption | -5.3 | -6.7 |
| Inventories | -1.6 | -0.2 |
| Fixed investment | -5.2 | -5.2 |
| of which: | | |
| Business | -3.2 | -3.1 |
| Housing | -2.1 | -2.0 |
| Imports: | | |
| Goods & services | 6.8 | 5.9 |
| of which (share of 2010 total, %): | | |
| Goods (76) | 5.2 | 4.0 |
| Services (24) | 1.6 | 1.9 |

Sources and notes: ONS, author's calculations. *Household consumption includes consumption of non-profit institutions serving households. Inventories expressed as a per cent of GDP. Business investment comprises non-dwelling, non-general government fixed investment plus the net acquisition of valuables and non-produced, non-financial fixed asset transfers. Housing investment comprises investment in new dwellings and the costs associated with the transfer of ownership of buildings and dwellings. ** Actual GDP, at market prices, less trend GDP, as a per cent of trend. The latter is set equal to actual GDP in 4Q 2007 and mechanically extrapolated using average rates of growth of the major expenditure components between 2001 and end-2007 with expenditure shares of consumption and investment in private expenditure held constant. The expenditure contributions to the GDP output gap are equal to the product of the shortfall of each expenditure type and its share in trend GDP. Apart from rounding error and the official statistical expenditure discrepancy, the sum of the contributions is equal to the GDP output gap.

On this arithmetic, the shortfall of GDP against potential in 2010 was about 10%, a gap larger than in 2009 for the simple reason that growth in 2010 fell short of the assumed trend (1½% plays 2½%). The comparable output shortfall in 2009 was about 9%. Were the term “recovery” taken to mean a period in which growth exceeds trend, there would have been, on these estimates, no recovery in 2010, only a deepening of recession. By the first quarter of 2011, the GDP shortfall had risen to 11%.

The allowance, described earlier, for possible statistical understatement of GDP and the impact of the cold winter reduces the scale of the output shortfall in 2010 to 9¼%, but the conclusion that the shortfall increased between 2009 and 2010 is unaffected. In the first quarter of 2011, the adjusted shortfall rose to over 10%.¹⁴

Table 3 presents a simple accounting exercise that apportions the GDP shortfall against major items of expenditure. Although all the spending categories in 2010 were below levels consistent with previous trends, the largest direct contributors to the GDP shortfall were

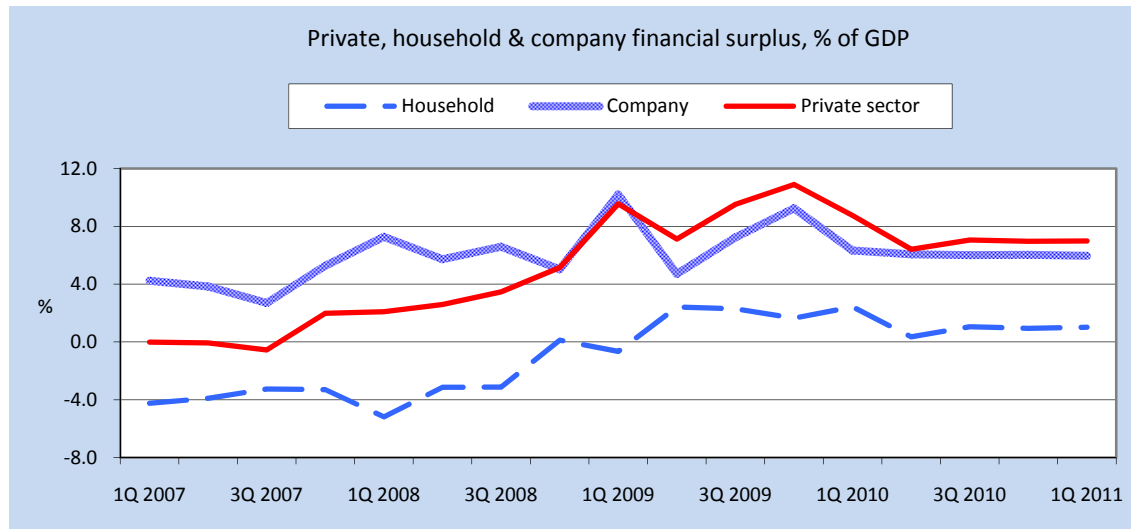
¹⁴ Note that the trend level of GDP using the adjusted data is higher than the trend using actual data, mainly because the 4Q 2007 adjusted GDP level is nearly ½ above the official figure.

household consumption (over 6½ percentage points) and private fixed investment (over 5 percentage points). Weak growth meant that the drag exerted by the shortfall in household consumption increased between 2009 and 2010. Despite some recovery through the year, business and housing fixed investment remained well below normal. Following large scale destocking in 2009, investment in inventories became much less of a drag, contributing ¼ percentage point to the overall activity shortfall in 2010 as against 1½ percentage points in 2009. The inventory uplift offset the extra drag from household consumption. The contribution of the shortfall in total private domestic expenditure remained the same between the two years.

Exports also remained depressed, despite a material rebound in the export of goods. A major factor was the continued weakness of exports of financial and business services, which had expanded rapidly for over a decade before the banking crisis.¹⁵ Imports provided an offset. Their depressed level relative to trend uplifted GDP by 6 percentage points in 2010. But the offset was less than in 2009, thanks to the sharp rebound in imports, especially of basic materials and manufactures. The import surge accounts directly for the increase in the GDP shortfall between 2009 and 2010. Import growth also exceeded export growth, thanks to the weakness of service exports and the greater weight of services in exports than in imports.

The inventory cycle partly explains the import resurgence. Information from official input-output tables that describe the structure of the economy suggests that inventory spending may be especially import rich.¹⁶ However, imports rose in 2010 by much more than can be explained by the import content of different types of spending, a mirror image of behaviour in 2009 when imports collapsed. Businesses have attributed the import resurgence to a lack of competitive domestic substitutes.¹⁷

Chart 2: Private sector financial balances



Sources and notes: ONS, author's calculations. See notes to Table 4.

¹⁵ Between 1995 and 2007, the share of goods in total exports fell by 15 percentage points from a previously fairly stable level of about 75%. Manufactures account for almost all the decline, matched by the rising share represented by exports of financial and business services.

¹⁶ Based on official input-output information for 1990 and 1995, the latest year available, Herzberg et al. (2002) estimate that every £1 of inventory building gives rise to 60p worth of imports. The comparable figures for household consumption, government consumption, fixed capital spending and exports are, respectively, 20p, 12p, 34p and 24p.

¹⁷ Bank of England Agent's Summary of Business Conditions, April 2011.

The unusual weakness of private domestic expenditure is registered in an abnormally high private sector financial surplus: the excess of private disposable income over private consumption and investment spending. In 2007, the private financial surplus was a little below the level, about 1% of GDP, to which in the post-war era the surplus had tended to revert.¹⁸ The surplus then rose, escalating as the banking crisis deepened. The surplus peaked at 11% of GDP in the final quarter of 2009, before subsiding to about 7% of GDP in 2010 and in the first quarter of 2011, still over six times the post-war norm.

As Chart 2 shows, the increase in the private sector surplus after 2007 was accompanied by an increase in an already high company financial surplus (the excess of retained profits over investment spending) and a shift from exceptionally large deficit to modest financial surplus by households (the excess of household disposable income over household consumption and investment spending). In 2010, the company surplus was about 6% of GDP; the household surplus about 1% of GDP.

Table 4 records the swing in financial balances as a per cent of GDP between 2007 and 2010. The private sector financial surplus ratio rose by 7 percentage points, most of this increase (5 percentage points) coming from households. Non-financial companies' excess profits retained in the UK more than accounted for the upward swing (2 percentage points of GDP) in the corporate financial surplus. There was no material change in the surplus of financial companies, which include rescued banks.

The main counterpart of the increased private financial surplus was a record budget deficit, which rose, excluding the temporary impact on public finances of bank bailouts, to 11% of GDP in calendar 2009, subsiding to 10% of GDP in 2010. As Table 5 shows, there was a large increase in the share of GDP represented by government spending on public sector pay, the procurement of goods and services and various transfers, notably welfare, and a small fall in the share of GDP represented by government receipts, mainly the result of weaker income tax-take.

Table 4: Private sector financial balances

| % of GDP unless stated | 2007 | 2010 | Change % points |
|------------------------------------|------|------|--------------------|
| Private sector financial surplus | 0.3 | 7.3 | 7.0 |
| of which: | | | |
| Households | -3.7 | 1.2 | 4.9 |
| Companies | 4.0 | 6.1 | 2.1 |
| of which: | | | |
| financial | 1.8 | 1.5 | -0.3 |
| non-financial: | | | |
| total | 2.2 | 4.6 | 2.4 |
| excluding reinvested FDI earnings* | -0.3 | 2.7 | 3.0 |

Sources and notes: ONS, author's calculations. Private sector financial surplus (also referred to in the national accounts as "net lending") is defined as the sum of the financial surpluses of households (including non-profit institutions serving households), financial corporations (which, in the national accounts, include state-rescued commercial banks), private non-financial corporations, and public corporations. The inclusion of publicly-owned corporations in the private sector definition aids comparison over periods affected by nationalisation and privatisation. The private sector financial surplus is measured inclusive of the national accounts residual error, the excess of the expenditure measure over the income measure of GDP, divided equally between the household and company sectors as an approximate method to allow for understatement of private income. * Re-invested UK foreign direct investment earnings do not add to cash flow in the UK, unlike the retained earnings of UK domiciled foreign-owned companies. Totals are subject to rounding error. The sum of the financial surpluses of the private sector, as defined, of general government and of the rest of the world sectors is equal to zero.

¹⁸ See Martin (2009 and forthcoming) for details.

Table 5: Public sector expenditure & receipts

| % of GDP unless stated | 2007 | 2010 | Change % points |
|---|-------------|-------------|----------------------------|
| Budget deficit* | 2.4 | 10.2 | 7.8 |
| of which: | | | |
| Total expenditure | 40.7 | 47.3 | 6.6 |
| of which: | | | |
| Current spending on goods & services | 21.0 | 23.0 | 2.0 |
| Capital spending | 2.1 | 3.0 | 0.9 |
| Transfers & subsidies including debt interest | 17.6 | 21.3 | 3.8 |
| Current receipts | 38.3 | 37.1 | -1.2 |
| of which | | | |
| Taxes & national insurance contributions | 23.4 | 22.3 | -1.0 |
| Indirect taxes including value added tax | 12.5 | 12.8 | 0.3 |
| Other receipts | 2.4 | 1.9 | -0.5 |

Sources and notes: ONS, author's calculations. *Public sector finances definition of public sector net borrowing excluding the temporary impact of bank bailouts. Totals are subject to rounding error.

The abnormal private sector financial surplus, the substantial shortfall in GDP and the abnormal budget deficit are intimately related. Causation can be seen running, at least initially, from the former to the latter. A large increase in saving by households and companies created a deficiency of demand: private spending was cut in relation to disposable incomes. The resulting collapse in GDP was not, however, matched by government spending, which therefore rose in relation to GDP, nor by tax revenue, which being somewhat progressive, fell relative to GDP. The large rise in the GDP share of government spending and, in absolute terms, smaller fall in the GDP share of government revenue caused the budget deficit to rise in relation to GDP and automatically cushioned the impact of the recession on private disposable incomes, in turn helping to stem the fall in private spending. Discretionary counter-cyclical fiscal policy measures undertaken in late-2008 bolstered these automatic fiscal stabilisers.

In normal circumstances, a fall in domestic demand would lead to a stronger trade balance, exports less imports, because of the consequential fall in imports. However, export volumes also fell, hit by the slump in world trade in 2008 and 2009, and recovered by less than imports in 2010. In addition, the terms of trade, export prices divided by import prices, declined by 1% over the same period. Between 2007 and 2010, the trade deficit rose slightly as a share of GDP, an increase directly attributable to the worsening terms of trade, as Table 6 shows. The balance of overseas investment income hardly changed while the deficit on transfers widened, largely as a result of increased government payments abroad. The overall deficit on the current account of the balance of payments increased slightly between 2007 and 2010, partly because of an erratic surge in imports in the final quarter of last year. In the first quarter of this year, the current account deficit was 2½% of GDP, similar to the position in 2007 and in line with the average seen in the post-millennium years before the crisis.

Table 6: Current account of the balance of payments

| % of GDP unless stated | 2007 | 2010 | Change % points |
|--|------|------|--------------------|
| Current account | -2.6 | -3.2 | -0.6 |
| of which: | | | |
| Overseas investment income | 1.5 | 1.6 | 0.1 |
| Current transfers* | -1.0 | -1.4 | -0.4 |
| Trade balance in goods and services | -3.1 | -3.4 | -0.3 |
| of which: | | | |
| Goods | -6.4 | -6.8 | -0.4 |
| Services | 3.3 | 3.4 | 0.1 |
| Memo: | | | |
| Trade balance at 2007 terms of trade** | -3.1 | -3.0 | 0.0 |

Sources and notes: ONS, author's calculations. *includes compensation of UK employees working abroad less compensation of UK based foreign workers. ** calculated assuming import prices move in line with export prices after 2007, with trade volumes as observed. Totals are subject to rounding error.

To conclude this sketch, consideration is given to the impact of the recession on industrial sectors' output. The shortfalls in exports, household consumption and private business and housing investment affected industries across the board. Despite significant recovery in 2010 in manufacturing, in construction (until the autumn) and in various services, such as wholesaling and computer consultancies, shortfalls in output below trend persisted across all major industrial sectors, as Table 7 shows.

A striking feature that marks out this episode from previous major recessions is the large decline in business services and finance. This group of services, a third of the economy, includes not only the banks and building societies at the centre of the financial crisis and the activities of estate agents affected by the downturn in housing and commercial property but also a wide range of trades that supply services to other businesses, often in the form of "intangible capital". Examples include firms that arrange the leasing of machinery and equipment, computer consultancies, research and development specialists, legal and accounting firms, market research organisations, and advertising and architectural agencies.

During the contraction, business services were hit in much the same way that engineering companies were depressed by the fall in businesses' expenditure on tangible capital equipment. The shortfall in business services output accounted for 3 percentage points of the 10% economy-wide output shortfall in 2010. By the first quarter of 2011, both figures were higher at nearly 3½% and 11% respectively.

Also of interest is the output shortfall of firms that cater to the financial needs of households and businesses. Financial intermediaries in total, including insurance and pension fund management, contributed 1½ percentage points to the GDP shortfall in 2010 and nearly 2 percentage points in the first quarter of 2011. Banks alone made a similar contribution.¹⁹ These estimates may be too large, however. It is widely believed that the official figures exaggerate the value of the services that banks provide, and thus overstate the size of banking in the economy. More detailed calculations suggest that the large contraction of banking probably accounted directly for no more than 1 percentage point of the 10% GDP

¹⁹ This estimate includes the activities of building societies and some smaller financial intermediaries, such as investment and unit trusts, included within division 65 of the 2003 standard industrial classification. The official division 65 output volume series is classified as "experimental".

shortfall in 2010 and 1¼ percentage points of the 11% GDP shortfall in the first quarter of 2011.²⁰

Table 7: Industries' output gaps in 2010

| % , unless stated (sector share of national output*) | -----2010 Output gap** ----- | |
|---|------------------------------|-------------------------|
| | % | contributions, % points |
| GDP | -10.2 | -10.2 |
| of which (gross value added): | | |
| Agriculture, mining & utilities (4) | -8.3 | -0.4 |
| Manufacturing (12) | -10.1 | -1.2 |
| Construction (6) | -12.5 | -0.8 |
| Distribution, hotels & catering (16) | -12.0 | -1.7 |
| Transport & communications (7) | -12.1 | -0.9 |
| Government & other services (24) | -3.1 | -0.7 |
| Business services & finance (32) | -13.5 | -4.5 |
| of which: | | |
| Business services (24)*** | -12.1 | -3.0 |
| Business services "proper" (17) | -16.2 | -3.0 |
| Financial intermediation (8)**** | -17.4 | -1.5 |
| Of which: | | |
| Banking (5) | -24.4 | -1.5 |

Sources and notes: ONS, author's calculations. See notes to Table 3. * implied share of economy gross value added in 2010 at constant 2006 basic prices, total subject to rounding error. ** Actual output less trend output, as per cent of trend. *** comprises (approximate weights in parentheses): real estate and estate agent services (2), ownership of dwellings (7) – largely implicit rents that owner-occupiers are deemed to pay themselves (excluded under business services "proper") - and computer, legal, accounting, market research, architectural, advertising and other business services (14);**** comprises (approximate weights in parentheses): banking & finance (5), insurance & pension funds (2) and ancillary financial services, including fund management (1). Trend output is set equal to actual output in 4Q 2007 and for sectors mechanically extrapolated using average rates of growth of gross value added in constant basic prices (market prices net of taxes less subsidies on products) over the 2001 to end-2007 interval. This procedure produces estimates of the economy output gap similar to that derived from the expenditure trends measured at market prices used in Table 3. The industry gap contributions are equal to the product of the output gap in each sector and its share in whole economy trend output. Apart from rounding error and an implied statistical output discrepancy, the sum of the contributions is equal to the economy output gap.

Demand and supply

Details aside, the broad course of the economy since 2007 can be told in simple demand terms. The need by banks, other businesses and households to repair balance sheets overburdened with debt provoked a large rise in private saving. The loss of stock market and

²⁰ It is argued that the indirect measurement of the financial intermediation services (FISIM) of banks used in official statistics falsely attributes to banks the compensation that savers receive for bearing risk, which is not part of banks' value added. The latter should be confined to the services that lending banks perform, assessing the risk characteristics of loans and monitoring borrowers. Estimates of the value of these services are put at 54% of the official FISIM estimate in the US (Basu et al. (2008)) and about 60% of FISIM in the euro area (Colangelo and Inklaar (2010); Mink (2008)). Haldane et al. (2010) argue that even these refined estimates overstate banks' value added when risk is generally underpriced, as it was prior to the crisis. Were the true level of FISIM 40% of the official estimate, the shortfall of GDP attributable to the contraction of the banks would be 1 percentage point in 2010 and 1.2 percentage points in 1Q 2011. These figures would also be subject to upward bias were past "trend" growth of banks' output overstated. Measured over the long term from the expenditure side, the volume growth of official estimates of GDP as a whole would only be affected to the extent that a downgrade to banks' output reduced estimates of final expenditure on banking services.

housing wealth was a contributing factor, made much worse by a credit crunch.²¹ The withdrawal of credit by overseas and domestic banks obliged borrowers to seek more equity and non-bank debt finance, but for most households and small and medium-sized companies the only option was to postpone expenditure, saving longer²² or more. Higher saving was “forced” as well as “desired”. Weak demand prospects also adversely affected the confidence and investment intentions of businesses not immediately constrained by lack of bank credit.

Directly and indirectly then, the rise in private saving depressed activity, and in so doing inflated the budget deficit as automatic fiscal stabilisers came into play. The fall in exports, the result of the simultaneous drop in world trade, added to the depressing impact of declining domestic demand. Recovery of sorts came as world trade revived, helped by the strong rebound of emerging economies, by domestic policy stimulus and by the partial repair of private sector balance sheets.

What are the implications? In the simplest demand-side stories, balance sheet repair causes a *temporary* loss of activity, not the permanent loss that is generally feared. In this story, once excess debt has been eliminated, the private sector’s saving rate reverts to normal levels, and so does the level of demand and output. The normal level of private sector saving may be higher than before, however: the private sector may well wish to sustain, relative to income, an increased level of financial wealth. If so, the main counterpart would be a somewhat higher budget deficit and a permanently higher level of government debt in relation to income.²³ But that debt would be willingly held by a more financially secure private sector.

It was the burden of my 2010 study that this simple story may well be confounded by a number of factors: even a “temporary” loss of demand, if long enough sustained, could lead to irreparable supply-side damage; the increased level of government debt would be resisted by a government constrained by considerations of solvency, leading to budget retrenchment; the private sector’s balance sheet repair might thus be thwarted, raising the danger of a deflationary deleveraging spiral between the state and private sectors - a “*battle of savers*”; the combination of slow growth and rising government indebtedness could impugn the government’s creditworthiness, risking a capital market hiatus; structurally the depletion of Britain’s oil and gas resources and its relatively high propensity to import pose a balance of payments barrier to full employment, notwithstanding the fall in sterling since 2007.

These considerations were captured in my 2010 study by two medium-term scenarios, one depicting fast recovery, the other a slow recovery. Under the first, the economy enjoyed a major export revival, import-competing producers responded significantly to low-sterling competitiveness gains; private sector wealth rose and the impact of the bank credit crunch gradually abated. Under the slow recovery scenario, exporters and import-competing producers were less buoyant, the stock market and housing market remained depressed and the credit crunch had a lasting detrimental impact. Both scenarios embedded the government’s June 2010 fiscal plans, which were not materially changed in the March 2011 budget.

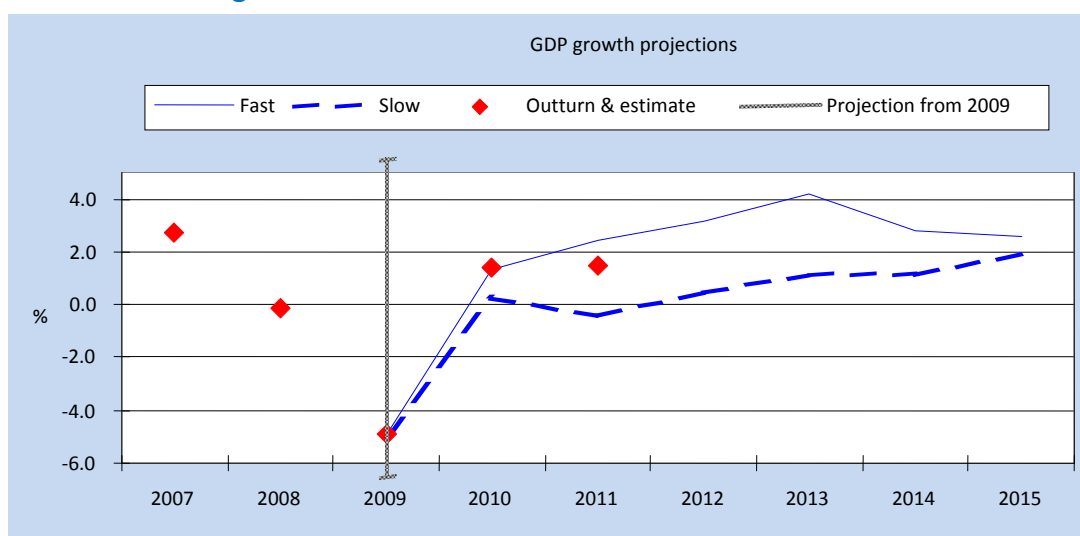
²¹ Martin (2010a) summarises the then available evidence. Writing in the Bank of England’s Quarterly Bulletin, Bell and Young (2010) subsequently concluded that “tight credit supply is likely to have been the dominant influence” behind the weakness of bank lending. In the first five months of 2011, bank lending to households and non-financial businesses remained low at about 3% of pre-crisis flows.

²² Miles (2011b) neatly illustrates the dramatic impact on the duration of saving undertaken by first-time house buyers in response to changes in the required deposit.

²³ If nominal GDP grows at 5% a year, a government debt to GDP ratio of, say, 60% rather than 40% would be sustained by a budget deficit running at a little less than 3% of GDP rather than 2%.

Although neither scenario was intended as a short-term forecast, there is some consolation in the fact that the outturn for growth in 2010 and consensus forecast for this year are closer to the fast recovery scenario than to the slow recovery scenario, as Chart 3 shows. Consensus expected growth in 2011 of 1½% is 2 percentage points above the modest contraction shown under the slow recovery scenario and 1 percentage point below the expansion under the fast recovery scenario. The failure of growth to attain the higher trajectory can be partly attributed to the negative impact on real incomes of the recent and unexpected escalation in import prices, a terms of trade shock much greater than inflicted by the temporary world commodity price hike in 2008.²⁴ Loss of consumer confidence in reaction to news of budget retrenchment might also have contributed to weak growth outcomes.²⁵

Chart 3: Previous growth scenarios and estimated outturns



Source and notes: ONS, Martin (2010b), HM Treasury "Forecasts for the UK Economy" June 2011. Fast and slow recovery scenarios projected from 2009.

My 2010 study argued that the support of growth and, in particular, the avoidance of the slow recovery scenario should be regarded as a policy priority: the scenario was a trap in which weak demand begat weak supply and budgetary impairment. Possible escape, it was suggested, was offered by macroeconomic policies – loose monetary policy, cycle-sensitive containment of the budget deficit, the maintenance of a low exchange rate - that encouraged a gradual revival of demand and elicited a favourable supply response. Structural policies, it was argued, should encourage resource re-allocation towards exporting and import-competing activities.

The major challenge to this view comes from supply-siders who claim that the economy has already returned close to a normal level of capacity utilisation: that there is little or no demand deficiency. But what is the strength of evidence? This question is the focus of the next section.

²⁴ In the year to the first quarter of 2011, the terms of trade fell by 2½%, equivalent to a loss of national income over the year of ¾%. In 2008 as a whole, the terms of trade were unchanged.

²⁵ Consumer confidence fell between summer 2010 and spring 2011. According to a Bank-commissioned survey in September 2010, about 20% of households intended to save more as a result of the government's fiscal plans; another 25% were working longer hours or looking for a new job (Nielsen et al. (2010)). Any related weakness of consumers' spending in late-2010 or early-2011 would have affected the trajectory of consensus forecasts in 2011. My medium-term scenarios did not allow for confidence effects that effectively bring forward the demand impact of the budget measures.

Capacity and the Output Gap

Most estimates of the economy's spare capacity in 2010 are much less than 10%, the figure in Table 3 implied by the continuation of normal growth. In its March 2011 forecast, for example, the UK's independent fiscal watchdog, the Office for Budget Responsibility, put the 2010 output shortfall at just 3½%, a figure within a range of what the OBR regarded as "credible external estimates."²⁶ The latest external estimates recorded in Table 8 show, on average, a shortfall of just under 4%.

Table 8: Output gaps in 2007 and 2010

| Output gap % of trend GDP | ----- 2007 ----- | | 2010 |
|------------------------------|-------------------|-----------------|-----------------|
| | Original estimate | Latest estimate | Latest estimate |
| HMT | 0.2 | 0.2 | -5.5 |
| OBR | n.a. | n.a. | -3.4 |
| EC | -0.1 | 2.5 | -5.2 |
| IMF | 0.2 | 1.0 | -2.7 |
| OECD | 0.4 | 2.7 | -3.6 |
| Memo: | | | |
| Average EC, IMF, OECD | 0.2 | 2.1 | -3.8 |

Sources and notes: author's calculations, HM Treasury - Pre-Budget Report, October 2007, Chart A3 (inferred), Budget Report, March 2010, Chart B3 and OBR Output gap data file, 30 June 2010; Office for Budget Responsibility (2011a); European Commission - European Economy Economic Forecast, Autumn 2007 and European Economic Forecast, Spring 2011; International Monetary Fund, World Economic Outlook, October 2007 and April 2011; Organisation for Economic Co-operation and Development, Economic Outlook, December 2007 and May 2011. The HMT and OBR output gap estimates refer to non-oil GDP.

The general presumption is that capacity was lost during the recession and will not be recovered, thus reducing the size of the true gap between output and capacity. The British Treasury was explicit about the scale of loss: in its last published economic forecast for the March 2010 Budget, trend (non-oil) GDP was assumed to have fallen by 5¼% between mid-2007 and mid-2010 below a level that it would otherwise have reached. On Treasury arithmetic, the loss of capacity implied an output shortfall in 2010 of 5½%.²⁷ The almost concurrent OBR pre-Budget estimate in June 2010 was even more pessimistic. Based on its interpretation of business surveys, the OBR put the 2010 output shortfall at just 3½%, little different from its latest estimate.²⁸

The implications for capacity are dramatic. Were the output gap in 2007 close to zero, a GDP shortfall of 3½% in 2010 would imply there had been, on average, no expansion of capacity between 2007 and 2010 and a permanent loss of capacity of about 7% measured against a level consistent with trend growth of 2½% a year.

On this reckoning, the damage to capacity was remarkable in both scale and speed, comparable to a major natural disaster. A recent World Bank study of earthquakes, volcanic eruptions, floods, cyclones and droughts found that the ensuing loss of GDP across a range of

²⁶ OBR (2011a), paragraph 3.15. The OBR's 1Q 2011 projected output shortfall was a little higher at 3.8%, still much lower than the 11% shortfall consistent with the latest GDP estimates and past trends.

²⁷ The Treasury assumed normal productive potential growth of 2¾% a year.

²⁸ The OBR's output gap estimation methods are detailed in OBR (2011b).

countries was, on average, less than 2% three years after the event.²⁹ The UK's putative post-crisis capacity loss is more than three times as much.

Pessimism about capacity loss has also prompted a re-evaluation of the position of the economy *before* the crisis. Instead of starting from a near-zero output gap in 2007, as most estimates at the time suggested, it has become more common to argue that output was well above its sustainable trend. External estimates have been materially revised to suggest, on average, that output was 2% above trend in 2007. The revision is partly the result of estimation difficulties: the collapse in output after 2007 drags down the estimated output trend over years during and *preceding* the crisis.³⁰

However, such revisionism also reflects an alternative view, expressed, amongst others, by Robert Chote, the OBR's Chairman.³¹ Before taking up that position, he entertained the view that the economy may have run consistently above potential before the crisis, with inflation held down by favourable global developments. On his alternative estimate, output may have been 3% and 4% above potential between 2000 and 2007.³² A similar calculation by the Treasury put non-oil output on average 4% or more above trend through the same period, rising in 2007 close to a 6% excess.³³

On this alternative view, the decline in output after 2007 would be consistent with a continued expansion of capacity. A swing in the output gap of, say, 9½ percentage points, from 6% in 2007 to minus 3½% in 2010, set against the observed fall in GDP of 3½%, would imply an *increase* in trend output over the three years of nearly 6%, equivalent to an annual rate of capacity growth close to 2%.

But while avoiding the depiction of a sudden collapse of capacity growth after 2007, the alternative view offers an implausible description of the aggregate relationship between the demand and supply of goods and services. The period before the crisis was marked by modest overall growth and few signs of adverse domestic inflation developments. Moreover, the influence of world inflation, as exerted through import and export prices, was rather less favourable in the 2000 to 2007 interval than during the second half of the 1990s. The putative inflation-dampening impact of imports from China, a frequently cited influence, was also overrated.³⁴ Yet the alternative Treasury estimate of the output gap would have meant the UK had for many years experienced a demand excess larger than the late-1980s "Lawson Boom", but with few signs of serious inflation. Even allowing for a limited response of inflation to domestic capacity utilisation, the alternative Treasury story is unconvincing.

It is nevertheless true that the pre-crisis expansion was, in the event, unsustainable. The primary causes were a sequence of asset price bubbles and the associated excess build-up of debt by banks and non-banks, especially households. The stock market bubble in the second half of the 1990s, the subsequent bank-credit fuelled property price bubble, and the licence both gave to the rapid expansion of public expenditure uplifted the level of demand

²⁹ Hochrainer (2009). The author's estimates are based on a comparison of observed and projected (no-disaster) levels of GDP for 225 large natural disasters between 1960 and 2005 in developed and developing countries. The average (median) loss rises to 4% five years after a disaster event.

³⁰ See, for example, OECD (2009) for a discussion of the so-called "end-point" estimation problem.

³¹ See also Sentance (2008).

³² Chote (2009).

³³ HM Treasury, June 2010 Budget, Box 1.4.

³⁴ Wheeler (2008) finds the switch to imports from China lowered UK inflation, an effect offset by a higher rate of inflation of the prices of exports from China than from other UK trading partners. On balance, the author finds "the overall effect of Chinese imports on UK CPI inflation from 1997–2005 was positive." – that is, UK inflation was raised, not lowered.

throughout this period. Tentative calculations presented in my 2010 study suggested the combined impact was to raise the level of activity in 2007 by 6½%.³⁵ But this is not a measure of the excess of aggregate demand over supply but rather an indication of the impact of excess debt.

In summary, the conventional view holds that today's GDP shortfall is materially less than the 10% figure consistent with the continuation of normal trend growth. The OBR estimate of a 3½% shortfall is representative of the conventional view, which implies a massive loss of capacity after 2007 measured against the pre-crisis trend.

Further examination of the evidence can be usefully considered under two heads: employment and labour productivity. Estimates of a small negative output gap and a large capacity loss imply that the economy is close to full employment and, or, a normal level of output per worker. This decomposition is a regular feature of the OBR's analysis. In its March 2011 forecast, the OBR attributes an output shortfall of 3% in the third quarter of 2010 to a below-trend level of employment, worth about 1 percentage point, and to a shortfall in output per worker, worth 2 percentage points.³⁶ Unsurprisingly, estimates of the much larger output gap consistent with the continuation of pre-crisis trends imply larger shortfalls in jobs and in productivity.

Regrettably, the scale of these differences and the split between shortfalls in employment and productivity are obscured by inconsistencies in the official data. Figures based largely on the regular Labour Force Survey of households shown in the top part of Table 9 suggest a very large shortfall in productivity whereas estimates based on businesses' records of job creation, shown as a memorandum item in Table 9, point to a smaller productivity shortfall. If true, businesses' records of job creation would imply a larger shortfall in employment than conveyed by the LFS figures.

The LFS based estimates suggest that the 10% GDP shortfall in 2010 comprised an employment shortfall in excess of 3%, rather larger than the 1% OBR estimate, and a productivity shortfall of about 6¾%, much larger than the 2% OBR estimate using roughly comparable definitions.³⁷

Estimates based on businesses' records of jobs reveal productivity gaps that are similar to those estimated using LFS job figures (which include workers with second jobs) in 2008 and 2009 but are materially different in 2010. The shortfall in the level of output per job based on businesses' records is 5½% in 2010, significantly smaller than the near 7% figure based on LFS household jobs data.

The difference reflects contrasting records of job creation. According to businesses, the number of jobs in the economy *fell* by over 230 thousand between the summer of 2009 and winter of 2010. The household Labour Force Survey, however, records an *expansion* of jobs: an extra 370 thousand over the same period.

³⁵ See Martin (2010a), Table 8.

³⁶ Gaps in employment and productivity do not determine the OBR's estimate of the output gap, which is instead derived from an interpretation of measures of spare capacity and labour shortages taken from business surveys.

³⁷ The Table 9 decomposition for the third quarter of 2010, the period cited by the OBR, combines a 3.1% employment shortfall, comprising a labour force shortfall of 0.4% and a rise in the unemployment rate of 2.6 percentage points, with a 6.6% shortfall in total economy output per LFS worker (6.7% excluding oil output). The OBR's preferred definition of productivity is non-oil gross value added per hour worked, using LFS figures. The equivalent non-oil output per worker figure cited in the text can be derived from the OBR estimates of the productivity gap and of the gap between actual and trend average weekly hours worked.

The difference in the record of job creation – cumulatively 600 thousand jobs to the end of 2010 – is equivalent to over 1½% of the average level of employment in 2010 and 2% of its December level.³⁸ The discrepancy has since narrowed, but only slightly: in the first quarter of 2011, the shortfalls in output per job based on LFS and businesses’ records were respectively nearly 8% and 6%.

Table 9: Output gap, productivity gap & unemployment

| %, unless stated | 2008 | 2009 | 2010 |
|--|-------------|-------------|-------------|
| GDP output gap | -2.2 | -9.2 | -10.2 |
| of which: | | | |
| Employment gap: | -0.4 | -2.9 | -3.5 |
| of which: | | | |
| Labour force gap | 0.1 | -0.4 | -0.7 |
| Change in unemployment rate (% points, reverse sign) | -0.5 | -2.5 | -2.6 |
| Productivity gap (output per worker) | -1.8 | -6.4 | -6.7 |
| Memo: alternative measures of productivity gap | | | |
| Non-oil output per worker | -1.8 | -6.5 | -6.7 |
| Output per job (mainly household survey based) | -1.9 | -6.5 | -6.8 |
| Output per job (mainly business survey based) | -1.8 | -6.3 | -5.4 |

Sources and notes: ONS, author’s calculations. GDP gap – see notes to Table 3. Each gap expresses the difference between the prevailing level and a trend, expressed as a per cent of trend. The trend level is an extrapolation of the 4Q 2007 level using the average rate of growth between 2001 and end-2007. The labour force is the sum of the Labour Force Survey measures of employed workers and the unemployed. The change in the unemployment rate is the increase (sign reversed) in unemployment, as a per cent of labour force, compared with 4Q 2007. Output per worker is the official estimate of whole economy real gross value added per LFS worker. The non-oil equivalent is derived using the same measure of employment and the official index of GVA excluding oil and gas production. Output per job is whole economy GVA either per LFS job (mainly household survey based) or per “workforce job” (mainly business survey based). The contributing changes shown do not exactly sum to the GDP output gap because the underlying identity is multiplicative and the productivity measure uses the GVA rather than the GDP measure of output.

Were businesses’ records taken to be correct, the 2010 shortfall in employment in terms of jobs would be about 5%, as against the shortfall in excess of 3% based on LFS figures. The employment and productivity shortfalls using businesses’ records of jobs still exceed the OBR estimates, but unlike those based on LFS statistics, the excesses are similar in scale and are not dominated by the contrasting productivity estimates. Official statisticians, it should be noted, prefer the LFS figures.

Although the official data are worryingly divergent, the broad picture remains clear. Consensus estimates of the output gap typically imply smaller employment and productivity shortfalls compared with estimates based on the continuation of pre-crisis trends. Which, if any, of these rival estimates is plausible? In answer, an assessment is made below, considering the employment and productivity gaps in turn. In view of its importance for fiscal policy, particular attention is paid to the OBR’s assessment.

³⁸ Official statisticians have identified about thirty reasons to explain the differences in these records, and attempt regularly to quantifying about a dozen of them, but the cause of the post-summer 2009 divergence remains uncertain. See, for example, *Labour Market Overview*, ONS, June 2011.

Employment gap

The behaviour of unemployment is possibly the least controversial aspect of the rival estimates. Compared with pre-crisis levels, the increase in unemployment, while significant, has been much less than experienced during and after the early-1980s and early-1990s major recessions, notwithstanding the more pronounced fall in output through 2008 and 2009. In the 1980s episode, the unemployment rate rose by 6½ percentage points; in the 1990s episode, unemployment rose by nearly 4 percentage points. In each case, unemployment continued to increase well after the trough in activity. But in the three years to the end of 2010, the rate of unemployment rose by “only” 2¾ percentage points, from 5¼% to nearly 8%, and has since fallen back.³⁹ On this account, it appears that the economy is much closer to a level of full employment than the decline in output alone would indicate.

This fact can be turned on its head in support of smaller estimates of the output shortfall. Invoking “Okun’s law” – a rule-of-thumb relationship that links changes in unemployment to the output gap - it could be argued that the output shortfall is likely to lay between 5½% and 6¾%, in any case, materially less than 10%.⁴⁰ The difference of view is much greater than could be plausibly attributed to downward bias in recent GDP data. However, an argument reliant on Okun’s law is open to the criticism that excessive weight is thereby put on an uncertain statistical relationship, which shows wide variation over time as labour market behaviour and institutions change.⁴¹ International experience during the downturn provides a cautionary tale: as in the UK, unemployment rose by less than expected in Canada and in Germany, where unemployment fell partly thanks to job support schemes, but by more than predicted in Ireland and America.⁴²

A separate question is whether the increase in unemployment since 2007 is structural rather than cyclical. Were the rise structural, it would not count towards an output gap. In the US, some commentators have pointed to an apparent shift in the relationship between job vacancies and unemployment – popularly known as the Beveridge Curve - as a possible sign of structural labour market distress.⁴³ Vacancies in America had risen without a matching fall in unemployment.

In the UK, a similar feature emerged after autumn 2009. But as Chart 4 shows, the increase in the ratio of vacancies to unemployment lies well within the range of experience for which reliable figures exist, and may, as in the US case, be the result of normal labour market frictions: vacancies respond more quickly than unemployment as the economy starts to

³⁹ Centred monthly figure for the International Labour Organisation measure of unemployment from continuous quarterly Labour Force Survey. The unemployment rate was 7.7% in March 2011 and averaged 5.1% in the pre-crisis period 2001 to 2007. The LFS figures omit the discouraged unemployed receiving incapacity benefit, around 3% of the workforce in January 2007 according to Beatty et al. (2007).

⁴⁰ Named after the late Arthur Okun, the law can be expressed as the quotient of the rise in the unemployment rate divided by the shortfall in GDP. According to ten long-sample estimates detailed by Petkov (2008), the UK coefficient is 0.38, similar to the result in Chamberlin (2011, Table 3). Until the recession, there was evidence of a higher ratio. The average of four estimates in Petkov using sample periods beginning in the late-1980s is 0.53, similar to the result in IMF (2010, figure 3.7) and the rule of thumb used for simulation purposes by the OBR (OBR (2011a), Box 3.7). Coefficients of 0.4 and 0.5 applied to the 2.7 percentage point rise in the unemployment rate between end-2007 and end-2010 imply output gaps in 2010 of, respectively, 6.8% and 5.4%.

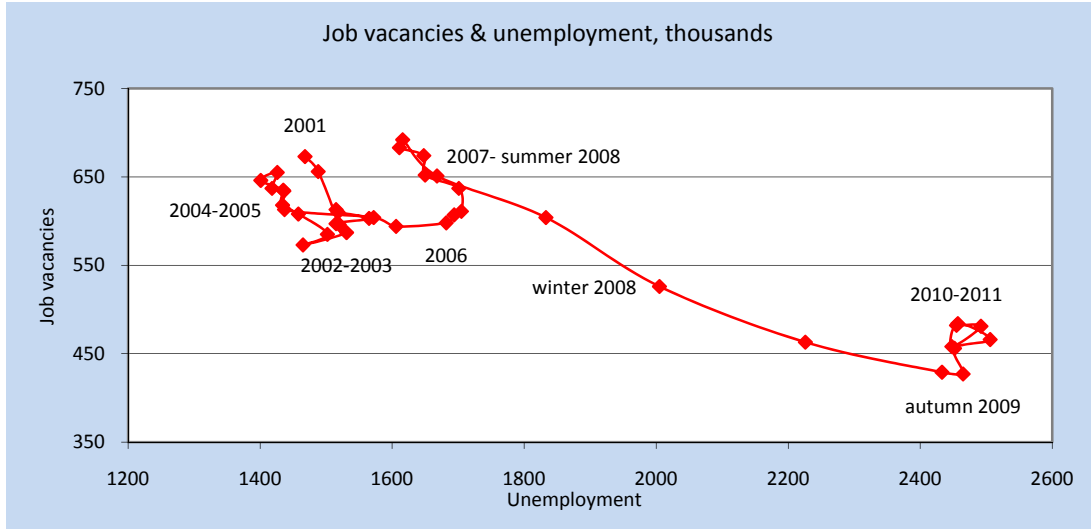
⁴¹ Okun coefficients for the UK range from 0.24 to 0.75 (sample of 15). Across countries, the Okun coefficients estimated in IMF (2010) range from near zero to over 0.8.

⁴² See IMF (2010) figure 3.8 for details.

⁴³ See, for example, Tasci and Lindner (2010).

improve.⁴⁴ The substantial movement to the right along the notional Beveridge Curve in Chart 4 is consistent with the presence of considerable cyclical unemployment.

Chart 4: Beveridge Curve



Sources: ONS Labour Force Survey and Vacancy Survey, with matched dates.

The OBR similarly takes the view that the rise in unemployment has been largely cyclical rather than structural, a judgement justified in part by reference to Britain’s comparatively light employment protection legislation.⁴⁵ The OBR assumes the structural rate of unemployment has remained close to the pre-recession average rate of unemployment of around 5¼%. If so, there would have been a cyclical unemployment rate of about 2½% in the third quarter of 2010, the latest period for which the OBR provides an output gap decomposition.

In addition to the rise in measured unemployment, there may well have been an increase in *disguised unemployment*, as people discouraged by the absence of job opportunities stopped actively seeking employment. The impact is reflected in the labour force gap estimate in Table 9, which shows the extent to which the labour force – the sum of people employed and unemployed – has fallen below a level consistent with the pre-crisis upward trend. This labour force gap combines with the increased rate of unemployment to produce the employment shortfall of over 3% in 2010.

In the pre-crisis period between 2001 and 2007, the labour force grew by a little less than 1% a year, slightly in excess of the growth of the adult population, implying a modest increase in the rate at which people participated in the labour market.⁴⁶ The trend in overall participation reflected long-standing divergent trends across gender (the participation rates of women rising, those of men falling), and more recently divergent trends across ages (the participation rates of young adults falling, those of adults in their mid-50s and 60s rising). Higher rates of

⁴⁴ OECD (2011) similarly concludes that the Beveridge relationship “does not provide clear evidence” of any adverse shift during the crisis in the efficiency of labour market job matching. The OECD’s international study could find no strong evidence of geographical mismatch, “even in countries that have been particularly hard hit (e.g. Spain, the United Kingdom and the United States).”

⁴⁵ OBR (2010), paragraph B.15. The term structural unemployment is shorthand for the “non-accelerating inflation rate of unemployment” or NAIRU.

⁴⁶ This definition of the overall participation rate (or “activity rate”) is the same as that used by the OBR: the level of the labour force divided by the level of the adult population aged 16 and over.

enrolment in further education, increased life expectancy and inadequate pensions were driving factors.

After 2007 adult population growth continued unabated, but the growth of the labour force slipped during 2009. The overall participation rate therefore fell slightly, stabilising during 2010 at a level a little below that implied by the previous modest uptrend. Participation rates of young adults fell sharply but, in marked contrast to the early-1990s major recession, participation rates of others increased. The comparatively generous early retirement packages and state disability benefits that made withdrawal from work a less financially painful course of action in the early-1990s recession were, for many, no longer available.⁴⁷

As a result of the apparently modest fall in the overall participation rate, the labour force in 2010 was about ½% below a level consistent with its previous trend, equivalent to an increase in disguised unemployment of around 210 thousand. This fits with other household survey evidence. Between 2007 and 2010, the number of people who wanted a regular job but who were not counted as unemployed rose by nearly 210 thousand.⁴⁸ The increase is partly explained by the rise in the number of young adults staying on in education.⁴⁹ However, there were also increases in the number of people from other groups of the apparently economically inactive who wanted regular employment: those with long-term health problems, those discouraged by an absence of jobs, retirees and people with pressing family responsibilities.⁵⁰

The estimates of disguised unemployment based on LFS figures may be too low, however. As previously described, businesses' records, unlike the LFS figures, reveal a fall in the number of jobs since the summer of 2009. If businesses' records of the change in jobs were correct, the 2010 shortfall in the labour force measured against previous trends would be over 2%.

In the light of this evidence, the OBR's assessment of the employment gap is surprisingly low. The OBR puts the employment shortfall in the third quarter of 2010 at 1%, as against a 3% shortfall consistent with previous trends.⁵¹ The difference of view does not arise because of markedly different assumptions about the level of cyclical unemployment. The difference arises, instead, because of different estimates of the level of the labour force relative to its trend.

On the OBR's own assumptions, the unemployment rate in the third quarter of 2010 was nearly 2½ percentage points above its structural level. This excess approximately measures the contribution of unemployment to the shortfall in employment. The other contribution comes from any shortfall in the labour force. However, the OBR's estimate of the employment shortfall is *less* than the contribution arising from cyclically high unemployment. It follows as matter of arithmetic that the OBR's estimate of the labour force contribution is of opposite sign: a longfall rather than shortfall. The OBR's figuring implies that the labour force was of the order of 1½% *above* trend in the third quarter of 2010.

⁴⁷ Blundell and Johnson (1997) detail the impact on participation rates of early retirement packages and the availability of invalidity and sickness benefits in the early-1990s recession.

⁴⁸ Respondents to the Labour Force Survey who say they would like a regular paid job at the moment but are not counted as unemployed, having not looked for work in the last four weeks and, or, being unable to start work within two weeks.

⁴⁹ See, for example, Gregg and Wadsworth (2010); Bell and Blanchflower (2011).

⁵⁰ Source: micro-analysis of LFS combined responses to questions "LIKEWK" ("...would you like to have a regular paid job at the moment?..") and "NOLWM" ("Main reason for not looking for work..."), with adjustment for seasonality.

⁵¹ I am indebted to Mr Tom Pybus, an OBR economic adviser, for his guidance on the methodology used by the OBR to decompose the output gap, but he is not implicated by my interpretation.

Why should the labour force have been above its trend level? One reason might be excess population growth: according to the OBR the adult population was a ¼% above its trend level in the third quarter of 2010.⁵² But the lion's share of the explanation must rest on the presence of abnormally high labour market participation. The OBR's estimates imply that the overall rate of participation in the third quarter of 2010 was around ¾ percentage point above its trend rate.

This assessment is highly questionable. The OBR's estimate puts the trend rate of participation at a low level not seen in actual rates of participation since 1998. Yet the overall rate of participation has been gradually trending upwards for many years. Of special note is the increased rate of participation amongst older workers since 2001. After the preceding global stock market crash, companies radically scaled back their provision of defined-benefit, typically final salary, occupational pensions, offering in lieu defined-contribution pensions in which the risks of poor investment performance were borne by the employee. The reduced generosity of pension provision, including scope for early retirement, low saving rates, and the gradual increase in life expectancy may well have encouraged older workers to defer full retirement.

This shift is of great significance. It is conventionally assumed that the participation rate will fall secularly as "baby-boomers" – the large cohort of workers born in the first two decades after 1945 – reach retirement age. Benito and Bunn, two Bank of England economists, calculate that the changed age structure of the population could lower the overall participation rate by 2 percentage points between 2010 and 2020.⁵³ The OBR similarly projects a declining rate of participation in its forward assessment of the economy's productive potential. However, as Benito and Bunn also show, the participation-depressing impact of population ageing in recent years has been more than offset by the increased participation rate of older workers. The authors calculate that little more than a continuation of that uptrend would be sufficient fully to offset the participation-depressing impact of population ageing in the period to 2020.

Since 2007 disappointing levels of pensions,⁵⁴ of housing wealth, of interest and annuity rates, and of real income have added to the financial pressures encouraging all but the young to increase their participation in the work force. Some pressures are cyclical, but others will last. The fall in participation by younger workers who chose further education in lieu of likely unemployment is more clearly cyclical in nature.

It is, then, difficult to think of convincing reasons to justify the OBR's belief that the level of labour market participation has been above trend. The presumption that recessions tend to depress participation rates below trend is far more convincing. It seems probable that the OBR has materially under-estimated the shortfall in the labour force and in employment, the latter by at least 2 percentage points. The evidence from the behaviour of unemployment, vacancies and households' responses to the Labour Force Survey suggest an employment shortfall in excess of 3% in 2010.

⁵² Predictions that the downturn would reduce immigration and thereby the size of the working-age population (see, for example, Barrell, Gottschalk, Kirby and Orazgani (2009)) have not so far proved correct: provisional official figures show net immigration was higher in 2010 than in 2007.

⁵³ Benito and Bunn (2011).

⁵⁴ OECD (2010) details the high proportion of UK retiree's income that comes from capital gains.

Productivity gap

Attention is now turned to the puzzling shortfall in productivity. Output per worker was 6¾% below a level consistent with the pre-crisis trend in 2010, and 7½% below trend in the first quarter of 2011.⁵⁵ Explanations for this collapse stress both cyclical and structural factors. One view emphasises a cyclical fall in average hours worked and large-scale labour hoarding, implying the existence of spare, albeit employed, labour resources available to meet a recovery of demand. The contrasting view is that productivity has slumped to a permanently lower level, implying a much smaller cyclical productivity gap.

The OBR is in the second camp. The shortfall in overall output per worker is put at just 2% in the third quarter of 2010, a figure that would fall to zero were the OBR's estimate of the employment gap revised to 3% from the arguably too-low 1%.⁵⁶ The central view of the Bank of England's Monetary Policy Committee is not dissimilar: it reckons that "more than half of the shortfall in productivity, relative to a continuation of its pre-recession trend, reflects a persistent weakening in the level of underlying productivity."⁵⁷

To assess these competing schools of thought, evidence is considered of the role played by any changes in average hours worked, of the impact on national productivity of the contraction of the banking sector and of a range of more general factors that have been cited in official reports as structurally detrimental. The conclusion drawn is that the structural explanations are thin, and cannot plausibly account for a sudden and permanent shortfall in labour productivity.

Average hours worked

A fall in workers' average hours could depress output per worker, even if there were no change in productivity measured in terms of total hours worked. Following a fall in sales that threatens cash flow, a firm that expected demand eventually to revive may decide it financially preferable to retain key staff but, if contractually feasible, reduce their hours of work, or offer only part-time and temporary contracts to new workers. The firm's staff would be under-utilised. At the same time, workers suffering financial difficulty may well seek longer hours to compensate, as Bank of England economists Benito and Saleheen find.⁵⁸ The overall result would be a gap between the supply of, and demand for, average hours of work. Writing in the *National Institute Economic Review*, Bell and Blanchflower argue that the cut in average hours worked accounted for a much larger part of the reduction in total hours worked in the post-2007 recession than in the major recessions of the early-1980s and early-1990s.⁵⁹

Evidence of the reduction in hours is seen in the increase in the number of people who, in the absence of full-time opportunities, felt obliged to accept part-time employment. In 2007, part-time workers in this position represented about 2½% of the employed workforce, a little above the post-millennium, pre-crisis average. The proportion rose steadily from the end of 2008, reaching about 4% by late 2010, and 4¼% in March 2011. The increased proportion suggests that between 450 and 500 thousand extra people became involuntary part-timers because of recession.

⁵⁵ Using LFS employment data.

⁵⁶ The calculation assumes an unchanged estimate of the output gap.

⁵⁷ Bank of England Inflation Report, May 2011, p44.

⁵⁸ Benito and Saleheen (2011).

⁵⁹ Bell and Blanchflower (2011).

The problem of constrained hours is not confined to those who felt obliged to take part-time work, however. Last year, around 2¼ million workers, 9½% of the employed workforce, wanted to work longer hours in their current jobs, part-time and full-time together, at their existing basic rates of pay.⁶⁰ This group represents by far the largest of various categories of workers who desire longer hours, and accounts for the bulk of the increase in the total number of workers in this position since 2007. That year about 6¼% of the employed workforce wanted to work longer hours in their current jobs, similar to the proportion in 2001.⁶¹

The increased proportion of workers who were hours-constrained after 2007 indicates under-utilisation of labour and the emergence of a recession-induced gap between desired and actual weekly hours of work. The extra weekly hours desired by the hours-constrained typically represent about a third of weekly hours, in excess of 30, worked on average by all workers.⁶² It follows that the 3¼ percentage point increase in the proportion of workers who were hours-constrained between 2007 and 2010 may have led to an overall weekly hours shortfall, related to the recession, of about 1%. The OBR offers a similar estimate, albeit derived by different means.

But while there is a measure of agreement regarding the cyclical shortfall in hours of work, the underlying divergence of view remains. A 6¾% productivity gap measured in terms of output per worker, based on the continuation of pre-crisis trends, would translate to a 5¾% productivity gap in terms of output per hour.⁶³ By contrast, the OBR's estimate in the third quarter of 2010 is just 1% - a 4¼ percentage point difference, even before correction for the OBR's probable understatement of the employment shortfall.

Other threats to productivity

What other forces could have emerged after 2007 that may have fundamentally impaired productivity? A careful review of mainly official reports provides the following list of frequently cited structural factors:

- a) The contraction of the high-productivity banking sector, depressing the national average.⁶⁴
- b) A loss of productivity due to a less efficient allocation of financial capital.⁶⁵

⁶⁰ Source: micro-analysis of LFS responses to question "UNDEMP" ("Whether would like to work longer hours, at current basic rate of pay ..."), four-quarter average.

⁶¹ Walling and Clancy (2010) also detail the number of employed people looking either for an additional job or for a replacement job with longer hours and impose two criteria - a maximum threshold level of hours, beyond which the worker seeking longer hours would not be categorised as under-employed, and, second, a two-weeks availability to work longer hours threshold. These criteria reduce the level of measured under-employment but do not affect the general trend.

⁶² Source: micro-analysis of LFS joint responses to question "UNDEMP" and "UNDHRS" ("Extra hours wished to work").

⁶³ This is true of 2010 as a whole and of the third quarter, including or excluding oil industry output.

⁶⁴ See, for example, Weale (2009); HM Treasury, April 2009 Budget Report, Box B4 and March 2010 Budget Report, Box B4; OBR June 2010 Pre-Budget Forecast, p76; Giles (2011).

⁶⁵ OBR June 2010 Pre-Budget Forecast, p76; Bank of England, Inflation Report November 2009, p42; Haugh et al. (2009).

- c) A reduction in business investment in response to an increase in the cost of finance, driven up by financiers' risk aversion and banks' capital needs.⁶⁶
- d) Loss of skills due to unemployment and less job-related training.⁶⁷
- e) Fewer new company formations and increased capital scrapping.⁶⁸

Some of these explanations are forward-looking, relevant to a *prediction* of the economy's productive potential. An example is the impact of higher capital requirements for banks.⁶⁹ The focus here, however, is on the past. Evidence is examined to determine the extent to which these threats to productivity may have *already* and *permanently* reduced its level.

The contraction of banking

Martin Weale, now a member of the Monetary Policy Committee, argued in 2009 that the rebalancing of the economy away from the high-productivity banking sector could reduce the sustainable level of output in the whole economy by around 2%, an analysis cited with approval by the OBR.⁷⁰ In similar vein, Chris Giles, Economics Editor of the Financial Times, has more recently argued that much of the economy's apparent labour hoarding is attributable to "job reductions in the sectors with the highest levels of output per job – financial services and the oil industry ...".⁷¹

A general hypothesis, then, is that the large shortfall in economy-wide productivity since 2007 is due to the contraction of some previously high-productivity sectors, notably banking, and a shift in employment to lower productivity sectors. This hypothesis can be tested by an examination of sectoral productivity developments and an accounting exercise that traces the resulting impact on national productivity.

Table 10 repeats for convenience the productivity gap estimates measured in terms of output per worker and output per job (based on LFS figures including workers with second jobs), as shown in Table 9, and additionally shows average rates of growth in the pre-crisis period and subsequently for the whole economy and major sectors.

It is immediately apparent that the reduction in productivity is *not* confined to a few high productivity industries. Although some of the estimates (notably for construction and the public sector) are of questionable reliability, the general pattern is striking: there was an across-the-board deceleration in productivity growth after 2007.⁷²

⁶⁶ See, for example, Barrell (2009); OBR June 2010 Pre-Budget Forecast, p76; Barrell and Kirby (2011).

⁶⁷ See, for example, Weale (2010); Barrell and Kirby (2011).

⁶⁸ Bank of England, Inflation Report February 2011, p28.

⁶⁹ Independent Commission on Banking (2011) provides a summary of the wide range of estimates.

⁷⁰ Weale (2009); OBR June 2010 Pre-Budget Forecast, p76. In a change of view, Weale (2010) puts more emphasis on the *positive* impact on productivity that would arise from a rebalancing from the public sector to manufacturing. The effect of a reduction in banks' value added is downplayed.

⁷¹ Giles (2011).

⁷² With the exception of construction, the same pattern of widespread deceleration is revealed in productivity estimates based on businesses' records of jobs. Construction industry data are especially uncertain, partly because of the high rate of self-employment (van den Brink and Anagboso (2010)).

Table 10: Productivity growth & 2010 productivity gap – sector detail

| Annual average growth, %, unless stated | 2001 to 2007 | 2008 to 2010 | Gap (%) 2010 |
|---|--------------|--------------|--------------|
| Whole economy: | | | |
| Output per worker | 1.7 | -0.9 | -6.7 |
| Output per job | 1.7 | -0.9 | -6.8 |
| of which (sector share of economy): | | | |
| Agriculture, mining & utilities (4) | -2.2 | -10.1 | -21.4 |
| Manufacturing (12) | 4.3 | 0.4 | -10.4 |
| Construction (6) | 1.1 | 0.9 | -3.0 |
| Distribution, hotels & catering (16) | 3.0 | -0.7 | -8.5 |
| Transport & communications (7) | 2.4 | -0.9 | -8.4 |
| Government & other services (24) | 0.0 | -1.2 | -3.4 |
| Business services & finance (32) | 2.0 | 0.0 | -4.3 |
| of which: | | | |
| Business services (24) | 1.2 | 0.0 | -1.8 |
| Business services “proper” (17) | 2.3 | -0.6 | -6.3 |
| Financial intermediation (8) | 5.4 | 0.3 | -13.3 |
| of which: | | | |
| Banking (5) | 7.7 | 2.5 | -12.9 |

Sources and notes: ONS, author’s calculations. See notes to Tables 7 and 9. Note that the extrapolated growth rates used to calculate productivity gaps are taken from the seven-year period ending 4Q 2007 and therefore differ from the annual average figures shown in the first column. Industry estimates of productivity are measured in terms of real gross value added per job. Jobs data are derived from businesses’ records (“workforce jobs”) but scaled so that their summation equals LFS estimates of economy-wide jobs. The ONS refers to these scaled estimates as “productivity jobs”. To ensure consistency, estimates of productivity jobs are inferred from scaled workforce jobs data and official indices for output and output per job for the whole economy, agriculture (annually), manufacturing, production industries (manufacturing, mining and utilities), total services and the sub-sectors shown excluding government and other services. Quarterly estimates of productivity jobs for agriculture are interpolated and inferred by residual in the case of government and other services, construction, and mining and utilities. The data for these sectors are more than usually uncertain. Seasonally adjusted quarterly workforce jobs estimates consistent with the 2003 standard industrial classification were derived from seasonally unadjusted data for workforce employees and the self-employed helpfully supplied by Ms Angela Barry of the ONS.

Several features of the estimates are worth noting:

- Average productivity growth in the whole economy turned from positive to negative: 1¾% a year pre-crisis plays *minus* 1% a year subsequently.
- The economy’s primary sector, which includes the oil industry, experienced the largest productivity deceleration of the sectors shown, but the sharpest falls were in agriculture and the utilities, rather than in mining.
- In manufacturing, which typically enjoys relatively fast productivity growth, the deceleration was sizeable: from 4¼% a year to ½% a year. But decelerations of similar magnitude were experienced by the distribution and transport and communications sectors.
- A smaller deceleration was seen in business services and finance, the largest of the aggregate sectors. Productivity growth in this sector as a whole stagnated after 2007, having previously grown at 2% a year. But this observation is affected by the statistical treatment of home ownership included in the official measure of business services output.⁷³ More revealing are the productivity decelerations of 3 percentage

⁷³ The business services and finance output index, on which the official output per job index is based, includes the imputed production of housing services for the final consumption of owner-occupiers, an imputation included

points in business services “proper” (excluding home ownership) and of 5 percentage points in banking.

The result was widespread productivity shortfalls, measured against the pre-crisis trend. In 2010, the shortfalls were in excess of 10% in the primary sector, manufacturing and banking. Smaller but still large shortfalls, in excess of the economy average, occurred in distribution and transport and communications. Business services “proper” registered an approximately average shortfall. Below average shortfalls occurred in construction and government and other services.

Table 11: Sector contributions to the national productivity gap in 2010

| Output per job productivity gap % and percentage points | Direct impact | Job shift impact | Total Gap |
|--|------------------|---------------------|--------------|
| Whole economy: | -6.1 | -0.8 | -6.8 |
| of which (sector share of economy): | | | |
| Agriculture, mining & utilities (4) | -0.5 | 0.4 | -0.2 |
| Manufacturing (12) | -1.2 | 0.5 | -0.8 |
| Construction (6) | -0.2 | -0.4 | -0.6 |
| Distribution, hotels & catering (16) | -1.2 | 0.0 | -1.3 |
| Transport & communications (7) | -0.6 | -0.1 | -0.6 |
| Government & other services (24) | -0.8 | 0.8 | 0.1 |
| Business services & finance (32) | -1.6 | -2.0 | -3.5 |
| of which: | | | |
| Business services (24) | -0.4 | -1.8 | -2.2 |
| Business services “proper” (17) | -1.2 | -1.4 | -2.4 |
| Financial intermediation (8) | -1.2 | -0.1 | -1.3 |
| of which: | | | |
| Banking (5) | -0.8 | -0.6 | -1.3 |

Sources and notes: ONS, author’s calculations. See notes to Table 10 and appendix. The total includes a negligible mixed shift share effect and rounding error.

To examine the hypothesis, it is necessary to attribute the national productivity shortfall to each sector. Table 11 performs this task for the shortfall in national output per job in 2010. A distinction is made between a sector’s direct contribution – the product of the sector’s productivity shortfall and its share of national trend output – and an indirect effect that comes from the sector’s loss or gain of jobs.

The size of this indirect effect depends on the sector’s labour productivity relative to the national average. The effect is larger for sectors, such as oil extraction and banking, with above-average levels of trend productivity and smaller for sectors, such as distribution and public services, with below-average levels of productivity. A sector would make a negative indirect contribution to national productivity were the sector’s share of national employment below trend, and a positive contribution were the sector’s employment share above trend. Because the impact of employment gains and losses on national productivity is indirect, the attribution to a particular sector is artificial and shown in the table, along with the similarly artificial total impact, only for completeness. What matters for the hypothesis under

in the national accounts partly to aid international comparisons. The imputed production accounts for about 20% of the total output of business services and finance.

investigation is the direct impact of each sector's productivity shortfall and the *overall* effect on national productivity of shifts in the pattern of employment.⁷⁴

Several features of these calculations stand out:

- At the economy level, only a minor part (¾ percentage point) of the near 7% productivity shortfall is attributable to shifts in employment between sectors.
- Contributing to this small overall effect is the loss of jobs in business services, previously a rapidly expanding source of employment, and in banking, an above-average productivity sector in which employment had not previously grown. The expansion since 2007 of jobs in health and education and associated increase in employment share was an offsetting influence.
- Six percentage points of the near 7% national productivity shortfall is accounted for by the direct impact of sectors' productivity shortfalls.
- Direct contributions to the national productivity shortfall are widespread and not confined to above-average productivity sectors. The large productivity shortfall in banking contributed about ¾ percentage point to the national figure. Larger contributions came from manufacturing, distribution and business services "proper".

The hypothesis is thus rejected: the calculations show that the banking collapse and shifts in the pattern of employment do not explain the bulk of the national productivity shortfall since 2007.⁷⁵ The same pattern is seen in provisional figures for the first quarter of this year.⁷⁶ Although not a forecast, it is relevant to note that a future labour shakeout from state-owned banks and the re-employment elsewhere of former public sector workers would be developments likely to be auspicious for national productivity, at least as measured by current statistical conventions.⁷⁷

Inefficient allocation of financial capital

The OBR believes that "a restricted supply of credit may have impaired the financial sector's role in efficiently allocating resources and spreading risk." The impact, the OBR notes, is "difficult to quantify" but "it may have *had* a substantial effect on trend productivity" (emphasis added).⁷⁸ The Bank of England has also noted that "riskier, but potentially more productive, enterprises [may] find it more difficult to borrow".⁷⁹

Evidence is thin. The Treasury⁸⁰ cites an OECD study, which, alas, offers no insight on the matter of allocative efficiency but concludes from an analysis of major banking crises that there is "little evidence of a systematic effect on potential growth".⁸¹

⁷⁴ An alternative decomposition considered in the appendix produces a similar estimate of the impact of employment shifts at the economy level despite materially different indirect sectoral contributions.

⁷⁵ As the appendix shows, Giles's (2011) contrary conclusion based on growth accounting is highly sensitive to his choice of period.

⁷⁶ Of the near 8% shortfall in output per LFS job, only ½% point comes from shifts in employment patterns. Manufacturing, business services proper and banking each contribute directly 1¼ percentage points to the national shortfall and distribution 1½ percentage points.

⁷⁷ There are, for example, well-known problems of measuring the productivity of public services.

⁷⁸ OBR June 2010 Pre-Budget Forecast, p76.

⁷⁹ Bank of England, Inflation Report November 2009, p42.

⁸⁰ HM Treasury, April 2009 Budget Report, Box B4.

⁸¹ Haugh et al. (2009), p24.

First principles suggest that the impact of the impaired financial system on the economy's allocative efficiency is unlikely, as yet, to have had a material damaging effect: such influences would take time to build. Moreover, there is ample evidence that the financial system was allocatively inefficient *prior* to the crisis, underpricing risk and financing a bubble in property, commercial and residential, and in complex financial assets.⁸² The extrapolation of trend growth derived from this period of allocative inefficiency is unlikely to provide a baseline and measure of output shortfall that, under this hypothesis, are upwardly biased.

Capital investment

Labour productivity would fall permanently were capital employed per worker to fall permanently. The emphasis on permanent changes is important: a decline in capital spending that was a response to demand deficiency would, in principle, reverse should demand recover. The supply-side story depends on the presence of an autonomous downshift in investment that is independent of the state of aggregate demand.

Influential analysis by the National Institute of Economic and Social Research provides an assessment of such an autonomous downshift arising from an increase in businesses' investment financing costs. It is argued that financiers will take a view of lending risks more realistic than was the case in the pre-crisis period, and charge accordingly. As businesses reduce capital employed, the National Institute suggests that output per hour in the UK might fall permanently by around 3%.⁸³ The impact would not be instantaneous. Nevertheless, it has been asserted that the adjustment may be taking place "relatively quickly" thanks to the collapse in capital spending.⁸⁴

It is improbable, however, that this mechanism has yet had any significant effect. Most of the fall in business investment since 2007 is likely to be for reasons other than higher financing costs: the National Institute's estimates suggest that businesses' cost of capital *fell* during the crisis, reaching a low point in 2010.⁸⁵ And while, on current estimates, the volume of business investment in 2010 was more than 15% below the level in 2007,⁸⁶ the stock of private fixed capital probably continued to grow. A low level of investment still adds to the capital stock while investment exceeds depreciation. Furthermore, government investment was nearly 50% above its 2007 level, thanks partly to discretionary budget measures. The volume of the economy's overall productive capital stock appears to have grown in each year since 2007, recording an average rate of advance of a little less than 2½% a year.⁸⁷

This rate of expansion was slower than pre-crisis, implying a capital stock shortfall by 2010, measured against the previous trend, of close to 3%. But since the shortfall of the capital stock was less than that for hours worked, the ratio of capital to labour employed ended 2010

⁸² See, for example, Turner (2009, 2010).

⁸³ Barrell and Kirby (2011). The National Institute evidence was cited in the 2009 Budget and Pre-Budget Reports and in the OBR June 2010 Pre-Budget Forecast.

⁸⁴ Barrell, Davis, Karim and Liadze (2009).

⁸⁵ Barrell and Kirby (2011), Table 1. The estimated average "user cost of capital" over the three years to 2010 was 15.1% as against 16.7% in the preceding three years.

⁸⁶ The first quarter 2011 business investment data are probably distorted by purchasing decisions that anticipated the change in the standard rate of Value Added Tax but the same broad description holds.

⁸⁷ Economy-wide, non-dwelling, capital stock in constant prices to 2009 taken from ONS "Capital Stocks, Capital Consumption and Non-Financial Balance Sheets, 2010". 2010 estimate based on author's estimate of dwelling stock and the capital stock estimates in Barrell and Kirby (2011) adjusted for revisions to the fixed investment data.

a little *above* trend, a development, were resources fully utilised, that would serve to *uplift* labour productivity relative to its previous trend.

In principle, a more telling calculation is provided by estimates of the capital stock that make allowance for the quality and efficiency of the capital employed. Official statisticians provide regular, though not timely, figures for “capital services”, a measure of the supply-side role played by investment that gives greater weight to capital assets that achieve a high rate of return.⁸⁸ Boosted by spending on computers and software in the first half of the decade, capital services grew more quickly than the quality-unadjusted capital stock before the crisis, but more slowly afterwards. Figures available to 2009 show capital services grew close to 4% a year between 2001 and 2007, but by 1½% a year subsequently. The deceleration was widespread and not confined to banking, as Table 12 shows.

Table 12: Capital services growth & 2009 gap – sector detail

| Annual average growth, %, unless stated | 2001 to 2007 | 2008 to 2009 | Gap (%) 2009 |
|---|--------------|--------------|--------------|
| Whole economy: | 3.9 | 1.4 | -4.7 |
| of which: | | | |
| Agriculture, mining & utilities | -0.7 | 1.2 | 3.9 |
| Manufacturing | -0.7 | -1.4 | -1.4 |
| Construction | 7.7 | -0.8 | -15.0 |
| Distribution | 6.5 | 1.8 | -8.5 |
| Hotels & catering | 8.4 | 4.6 | -6.8 |
| Transport & communications | 4.7 | 2.8 | -3.6 |
| Government, education & health | 3.9 | 2.4 | -2.9 |
| Other social & personal services | 7.6 | 4.0 | -6.5 |
| Business services “proper” | 6.7 | -0.9 | -13.7 |
| Financial intermediation | 4.8 | 1.2 | -6.6 |

Sources and notes: Acheson (200b), author’s calculations. The trend used for the calculation of the capital services gap is the 2007 level extrapolated at the 2001 to 2007 growth rate. Capital services are a measure of the quality-adjusted capital stock.

Measured against the pre-crisis uptrend, the result was a 4½% shortfall in economy-wide capital services in 2009, somewhat in excess of the shortfall in hours worked. The ratio of capital services to labour employed may therefore have fallen relative to the pre-crisis trend for the economy as a whole by a little over ½%, a development, were it to persist with resources fully utilised, that would serve permanently to depress labour productivity relative to its pre-crisis trend.

But the scale of impact on productivity would be negligible. The effect of a shortfall in the ratio of capital to labour depends on the contribution to the economy’s capacity growth of the growth in capital, a contribution typically gauged by reference to the share of profits in value added (profits plus labour income). In 2007, profit share was 28%.⁸⁹ Even supposing it to be permanent rather than a passing feature of the recession, the shortfall in the 2009 ratio of capital services to labour would depress economy-wide output per hour by a minor ¼%. A similar point applies to the stock of inventories, which was severely cut in 2009 but began to recover from spring 2010.⁹⁰

⁸⁸ Appleton and Wallis (2011).

⁸⁹ Profit share consistent with ONS “multi-factor” (“total factor”) productivity estimates (Acheson (2011b)). I am indebted to Ms Jean Acheson for the provision of the detailed figures.

⁹⁰ The ratio of the quality-unadjusted stock of inventories to hours worked was over 10% below the pre-crisis trend by end-2010. Inventories are not included in the ONS figures for capital services but based on US data,

In summary, the impact on underlying productivity of the fall in capital investment is likely so far to have been minor, a conclusion also drawn by the Bank of England.⁹¹ Nor is there substantive evidence that such detriment would prove permanent, the result of an autonomous downshift in investment impervious to a recovery of demand.

Labour skills

Underemployment and unemployment may deprive workers of skills that they would otherwise have acquired through job-related training, formal or informal. The Bank of England notes that “This ‘learning by doing’ channel will [sic] lead to a persistent effect on supply if it is difficult for these missed learning opportunities to be fully recovered over coming years.”⁹² Martin Weale calculates that the impact could eventually reduce aggregate labour productivity and the trend level of GDP by over ½%.⁹³ The question is whether productivity has *already* been adversely and permanently affected as a result of the claimed loss of labour skills.

The evidence is mixed. According to the Labour Force Survey, the proportion of adult workers receiving job-related training remained unchanged in 2008, declined slightly in 2009 and recovered by a similar amount in 2010. Evidence from Employer Skills Updating Surveys suggests a more significant detrimental impact. The proportion of surveyed employers providing on-the-job training for the majority of key staff halved between mid-2008 and mid-2009. There was larger reduction amongst those using external training facilities. From their detailed analysis, Geoff Mason and Kate Bishop suggest “.. many establishments’ training plans were essentially blown off course by the recession” a conclusion which does not preclude the possibility of a repair of recession-induced skill losses during recovery.⁹⁴

Moreover, there is evidence pointing to an *increase* in the average level of skills of workers, a consequence of the disproportionately adverse impact of the recession on the pay and prospects of the less skilled. According to official figures, changes in labour composition favouring the better qualified and paid *uplifted* the productive quality of the employed labour force by an average 1% a year in 2008 and 2009, twice the rate of growth of the pre-crisis (2001-2007) period. Amongst the major sectors, the largest gains were seen in construction and transport and communications.⁹⁵

The Bank of England and OECD also emphasise the risk of a loss of skills amongst the unemployed, especially the long-term unemployed, who may become “detached from the labour market.”⁹⁶ People who have been unemployed for over a year represent just over 2½% of the labour force, up from 1¼% at the start of the recession. The impact on skills and the economy are unclear, however. There was a larger rise, from 2½% to 4½%, in the rate of long-term unemployment in the major recession of the early-1990s.⁹⁷ Treasury estimates of trend GDP growth fell during that recession to a low of 2% a year, but rose substantially in later

the weight of inventory capital in capacity growth could be about 2%. If so, the end-2010 shortfall in the UK ratio of inventories to hours would depress labour productivity by ¼%.

⁹¹ February 2011 Inflation Report, p29, argues “.weak investment must be sustained in order to have a significant impact on the level of supply. So the impact of this to date should be relatively small.”

⁹² February 2011 Inflation Report, p29.

⁹³ Weale (2010).

⁹⁴ Mason and Bishop (2011).

⁹⁵ Official data are provided in Acheson (2011a).

⁹⁶ May 2011 Inflation Report, p29; OECD (2011).

⁹⁷ Early-1990s data from Bank of England, May 2011 Inflation Report, Chart 3.11.

years as unemployment fell. If this is a guide, it appears that levels of long-term unemployment higher than today did not then prevent the economy from returning to full-employment capacity growth.

In summary, there is little compelling evidence to suggest any recession loss of skills has permanently depleted the productive efficiency or those in work, or seeking it, on a scale that could materially explain that post-2007 shortfall in labour productivity.

Company formation

The evidence that productivity has been harmed by the scale and nature of company births and deaths is similarly unconvincing. The Bank of England argues that new companies tend to be more productive than existing companies, raising a threat to productivity should the rate of company formation decline.⁹⁸ Company registrations fell during the recession but have since recovered to levels seen in 2006 and 2007.

Scrapping of capital by liquidated companies may also have reduced capacity, but not necessarily its efficiency if the failing businesses were also the less productive. Liquidations increased during the recession, but have since fallen back. They never reached the much higher level of liquidations in the early-1990s recession, from which the economy recovered without apparently lasting capacity damage.

American perspective

The broad conclusion is that the reasons frequently cited by the OBR, Treasury and Bank of England for productivity impairment can explain only a minor part of Britain's post-2007 productivity shortfall, and may, in any case, be consequences of demand deficiency, in principle, inflicting temporary rather than permanent damage.

This conclusion is reinforced when the same set of explanations is tested in an American context. A banking crisis, a major loss of output, a collapse of business investment: these blows the US and UK have in common. The same logic used to explain the UK's productivity developments would predict a similarly large shortfall in American productivity. Yet American productivity growth after 2007 was close to the pre-crisis period pace; at the national level, output per worker in 2010 was broadly consistent with the pre-crisis trend. The downside was a rise in the US unemployment rate between 2007 and 2010 double that seen in the UK.⁹⁹

As Table 13 shows, most of the post-2007 productivity advance in the US private sector is attributed in the official figures to an increase in capital intensity: a rise in the ratio of capital services to labour employed. But it may be safer to assume that the contribution of capital intensity was no greater after 2007 than before, in which case, post-2007 productivity growth can be attributed in addition to an efficiency-raising shift in the composition of the employed labour force, similar to the compositional shift seen in the UK, and to a modest rate of fundamental productivity advance. The growth in private sector productivity not accounted for by labour composition and capital intensity - residual "total factor productivity" - may

⁹⁸ February 2011 Inflation Report, p28.

⁹⁹ The US unemployment rate was 9.1% in May 2011.

have remained modest but positive in America after 2007, while, cycle-unadjusted, it apparently collapsed in the UK.¹⁰⁰

The US experience shows that a major banking crisis-led output collapse need not give rise to permanently weak productivity and technical regress. If this were a guide, the forces behind the UK's productivity shortfall would not be structural. The most plausible explanation for the UK shortfall stresses the role played by pay moderation, the resulting real wage gap, and the preservation of businesses' return on capital.¹⁰¹

Table 13: American productivity growth & 2010 productivity gap

| Annual average growth, %, unless stated | 2001 to 2007 | 2008 to 2010 | Gap (%) 2010 |
|--|--------------|--------------|--------------|
| Whole economy: | | | |
| Output | 2.4 | 0.0 | -6.8 |
| Output per worker | 1.4 | 1.7 | 0.4 |
| Private business sector: | | | |
| Output | 2.7 | -0.3 | -8.6 |
| Output per hour worked | 2.7 | 2.8 | 0.3 |
| Of which, contributions: | | | |
| Labour composition* | 0.2 | 0.4 | 0.5 |
| Capital intensity** | 1.0 | 1.6 | 1.8 |
| Residual total factor productivity | 1.5 | 0.8 | -1.9 |
| Memo: contributions with crude adjustment for capital under-utilisation*** | | | |
| Capital intensity | 1.0 | 0.9 | -0.3 |
| Residual total factor productivity | 1.5 | 1.5 | 0.2 |

Sources and notes: US Bureau of Economic Analysis; US Bureau of Labour Statistics; author's calculations. The whole economy gaps are calculated against trends extrapolated from 4Q 2007 using average growth rates over the 2001 to end-2007 interval, assuming a zero gap in 4Q 2007. This estimation method is comparable to that used for UK data. The methodology used to calculate private business sector gaps is similar, but adapted for annual data. *contribution of shifts in the age, education and gender composition of workers. **capital services per hour worked multiplied by profit share. ***utilised capital services assumed to equal the product of measured capital services and a proxy for capital utilisation based on the post-2007 increase in the national unemployment rate.

The role of real wages

It is not novel to suggest that wage moderation in relation to prices enabled businesses to cushion profits against the impact of the recession and rising input costs, and thereby preserve jobs at the expense of productivity. The role played by the moderation of real wages is widely recognised, and acknowledged as a feature that distinguishes the post-2007 recession from the major recessions in the early-1980s and 1990s. But real wage moderation is not generally regarded as a force that would explain a permanent structural shortfall in productivity.¹⁰²

¹⁰⁰ UK market (non-public) sector total factor productivity growth averaged 1% a year between 2001 and 2007 and minus 3% a year in 2008 and 2009. Source: Acheson (2011b).

¹⁰¹ Increased US efficiency may set the frontier to which competitor countries are likely to be drawn, subject to their ability to adapt. In this respect, the UK may be better placed than more regulated European economies, although long-standing shortfalls in physical and human capital remain a constraint. Crafts (2007) provides an excellent summary of the barriers to productivity convergence,

¹⁰² See, for example, Bank of England Inflation Reports: August 2009, p29; November 2009, p28-29; HM Treasury 2009 Pre-Budget Report, p149; March 2010 Budget, p65; OBR Economic and Fiscal Outlook, November 2010,

The scale of real wage moderation is impressive, seen from the perspective of either workers or employers. For workers, a relevant measure of the real wage is the purchasing power of nominal earnings in relation to consumer goods and services – the real consumption wage. After 2007, real consumption wages fell as nominal average earnings decelerated even as consumer price inflation picked up.

By 2010, real wages in terms of consumer prices were nationally some 9% below a level consistent with the pre-crisis trend, as Table 14 shows. Private sector workers experienced a larger shortfall than those in the public sector. Amongst the major industrial sectors, the real earnings of construction workers registered the largest shortfall, but shortfalls were widespread across the economy and continued generally to increase in the early months of 2011. The real consumption wage shortfall in the UK's private sector was notably much larger than experienced in the US, where the pre-crisis rate of real wage advance was already modest.

Table 14: Real consumption wage growth and 2010 gap

| Annual average growth, %, unless stated | 2001 to 2007 | 2008 to 2010 | Gap (%) 2010 |
|--|--------------|--------------|--------------|
| Whole economy | 2.5 | -1.1 | -9.3 |
| Of which: | | | |
| Public sector (excluding nationalised banks) | 2.6 | -0.2 | -7.1 |
| Private sector | 2.5 | -1.5 | -9.5 |
| Memo: US private business sector | 1.3 | 0.7 | -1.0 |

Sources and notes: ONS, US Bureau of Labour Statistics; author's calculations. UK real wages are nominal average weekly earnings (including bonuses) relative to the consumer price index. US real wages are hourly compensation, including employer contributions to employee benefit plans, relative to consumer prices. An alternative measure limited to US private sector wages and salaries shows slower growth in both periods and a negligible gap in 2010. For gap calculation see notes to Table 13.

From employers' perspective, a more relevant measure of the real wage is the cost of workers' pay in relation to the prices of the goods and services produced – the real product wage.¹⁰³ This measure of the real wage is relevant to businesses' profits. The real product wage will differ from the real consumption wage when the relationship between consumer prices and output prices changes.

Table 15 shows developments in real product wages in manufacturing, for which a reasonably comprehensive picture is most easily constructed.¹⁰⁴ After 2007, nominal earnings decelerated modestly while output prices accelerated abruptly, thanks largely to the sharp rise in export prices, a reaction to the substantial fall in the exchange rate. The result was a collapse in the real product wage and a very large shortfall measured against the pre-crisis trend. By 2010, the real product wage shortfall was 13%, in excess of the shortfall in productivity. This excess helped manufacturers absorb the escalation, also partly related to sterling's fall, in the cost of bought-in materials and components, a high proportion of which are imported.

p72. I have been unable to find an official report that cites real wage moderation as a force behind the alleged structural impairment of productivity.

¹⁰³ Ideally, allowance should also be made for labour on-costs – employers' contributions to workers' pension and other benefits, and any employment taxes.

¹⁰⁴ The common practice of deflating national earnings or employment costs by the economy gross value added price deflator is unsatisfactory (see, for example, OBR March 2011 Economic and Fiscal Outlook, p75.) The value added price is not one that businesses would recognise, and falls relative to output prices when component prices – imports at the national level – rise relative to output prices.

Table 15: Productivity and real product wages in manufacturing

| Annual average growth %, unless stated | 2001 to 2007 | 2008 to 2010 | Gap, % points 2010 |
|---|-----------------|-----------------|-----------------------|
| Output per job | 4.3 | 0.4 | -10.4 |
| Real product wage* | 3.3 | -2.2 | -13.2 |
| of which: | | | |
| Average weekly earnings | 3.9 | 2.8 | n.a. |
| Output prices | 0.6 | 5.2 | n.a. |
| of which: | | | |
| Domestic sales | 1.0 | 3.9 | n.a. |
| Exports | 0.0 | 6.9 | n.a. |
| Memo: | | | |
| Prices of purchased materials & fuels | 3.1 | 8.9 | n.a. |

Sources and notes: ONS, author's calculations. The gaps are calculated in a manner exactly comparable to that described for output per job in Table 9. n.a. - not applicable. *Average weekly earnings divided by output prices, the latter being a weighted average of the output price (excluding excise duty) of home sales of manufactured products and of the export price of manufactures. The weights are the shares of home sales and exports in manufacturing gross output, including manufacturers' intermediate consumption. Historic weights are based on official input output tables until 1995 and extrapolated in line with the historic trend and checked against the value of manufactured exports as a share of estimated gross output. The product wage data are consistent with the 2007 standard industrial classification.

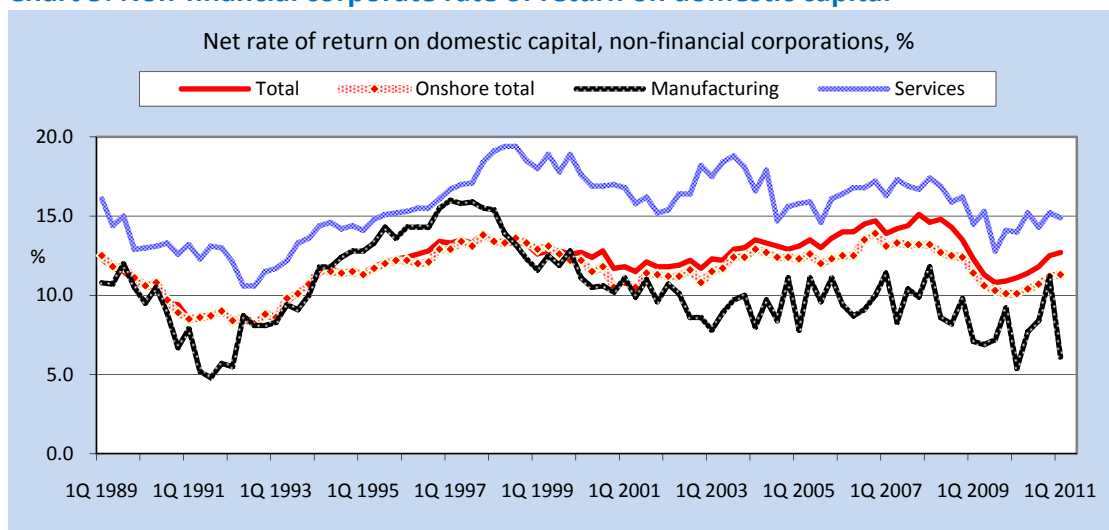
The overall impact on manufacturers' profitability is traced in Chart 5, which shows official measures of companies' return on capital arising from domestic operations. By the end of 2010, manufacturers' net rate of return had recovered to well above 10%, the 2007 level, which itself was a little above the average level in pre-crisis years earlier in the decade. The sharp and unexpected jump in commodity prices adversely affected manufacturers' profitability in the first quarter of 2011, reducing the average return over the 2010 winter to 8¾%,¹⁰⁵ 1 percentage point below the pre-crisis norm. The achieved return is nevertheless notable in view of both the large shortfall in output and rise in the relative price of raw materials and energy.

Less affected by the swing in commodity prices, the recovery of profitability of non-financial private sector service companies has been broadly sustained since the low point of 2009, although the 2010 winter average remains about 1½ percentage points below the pre-crisis average rate of return. As a result, the overall profitability of non-financial companies (and excluding those involved in North Sea oil extraction) had not by the first quarter of 2011 fully regained the pre-crisis level, but remained well above rates of return seen at a similar stage of the early-1990s recovery.

The story was not dissimilar in America. The available annual figures traced in Chart 6 show the domestic rate of return of US non-financial corporations moving back to pre-recession levels, and above rates of profitability seen in previous recessions.

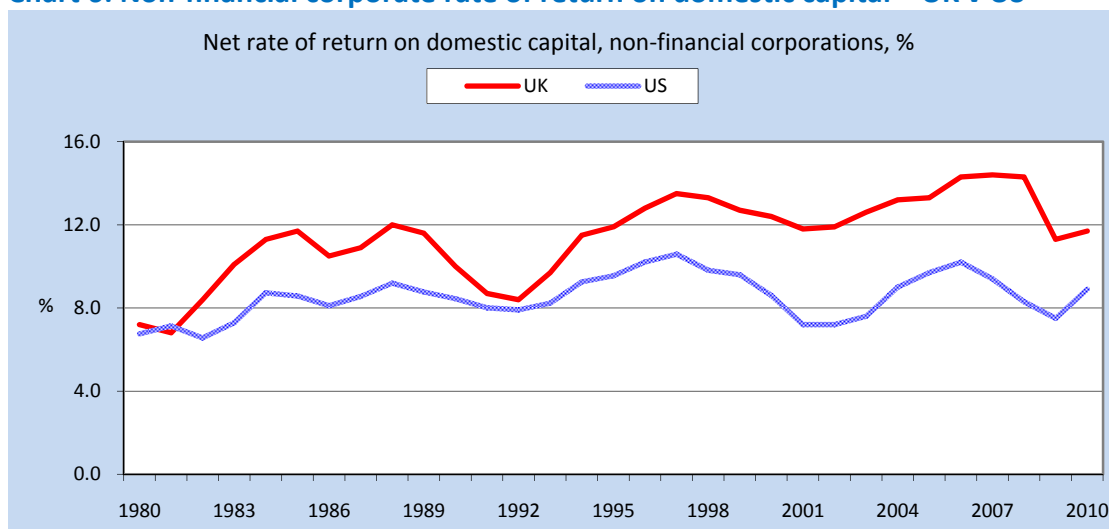
¹⁰⁵ Average of 4Q 2010 and 1Q 2011 figures. The prices of materials and fuels purchased by manufacturers rose by over 6% relative to overall output prices between 4Q 2010 and 1Q 2011.

Chart 5: Non-financial corporate rate of return on domestic capital



Sources and notes: ONS. Private non-financial corporations' pre-tax operating surplus net of depreciation from UK trading activities as a per cent of net capital employed. The onshore total excludes companies involved in oil and natural gas extraction.

Chart 6: Non-financial corporate rate of return on domestic capital – UK v US



Sources and notes: ONS, Hodge et al. (2011). See notes to Chart 5. UK and US definitions differ, although both are based on national accounting concepts.

The UK and US economies thus share a common feature: the conjunction of an overall rate of return on capital surprisingly resilient in the face of large shortfalls in activity, as measured against previous trends. The uncommon feature was the nature of the adjustment that helped to preserve profits: in the US, the adjustment burden fell on jobs; in the UK, the adjustment burden fell on real wages. America's demand deficiency is registered in a high unemployment rate coupled with high productivity. In the UK, greater real wage moderation averted the large increase in unemployment. Demand deficiency was instead registered in the post-2007 productivity shortfall.

The reasons for the different adjustment mechanisms are not fully understood. Aggressive job cutting was also a feature of America's comparatively minor early-2000s recession, an unexpected development which might be partly attributed to the importance of stock options in executive remuneration packages and the secular shift in corporate objectives that increasingly emphasise the delivery of high stock market returns: shareholder capitalism.

These new incentives for managers, combined with a reduction in the bargaining power of American workers, may have permanently altered the response of employment and productivity to shortfalls in demand: features of American economist Robert Gordon's "disposable worker hypothesis".¹⁰⁶ The same forces operate in the UK, although, compared to US counterparts, UK executives' rewards have been less geared to stock market developments.¹⁰⁷

The large shortfall in UK real wages remains puzzling, however. In its November 2010 and March 2011 reports, the OBR noted that workers may have been caught out by an unexpected jump in inflation, giving the *impression* of downward real wage flexibility that would prove temporary should workers seek recompense.¹⁰⁸ But pay settlements have remained quiescent notwithstanding a doubling since early-2009 in the average inflation rate expected over the next year by those responding to the Bank of England's regular omnibus survey.¹⁰⁹ Households' longer-term expectations of inflation have also risen, albeit modestly. Responses to special questions in the February 2011 survey indicated that only 9% of households would respond to higher near-term inflation expectations by requesting higher wages. The majority of respondents said they would "hunker down" in one way or another. Nearly a quarter said they would look for a different or second job, or work longer hours.

The latter response fits with the findings of Benito and Saleheen that British employees increase their supply of labour – seek longer hours of work, especially by changing jobs - in response to financial disappointments.¹¹⁰ A rightward shift in Britain's labour supply schedule may well have come as recession and the related fall, relative to expectations, of property prices prompted an abrupt re-appraisal of financial prospects. The competition for jobs may have been made more intense by continuing high levels of immigration.

Whether the psychological shock exerted by the banking crisis was greater in the UK than in the US is not known, but banks' assets represent a higher proportion of UK GDP than of America's, making the UK more vulnerable to a systemic banking collapse. In addition, UK households are more indebted than their American counterparts, and less able to expunge financial liability in the event of repossession and foreclosure.¹¹¹ Mortgage prisoners may have become lower wage slaves.

For policy makers concerned with measures of the output gap, these developments create a daunting problem of interpretation. A demand deficient economy in which real wages fall sufficiently to contain the rise in unemployment and leave profitability at an acceptable level may manifest low levels of productivity that are also characteristic of a structurally weak economy. Unable to sell more because of lack of demand, industry may be content to live with low productivity, which, being persistent, is mistakenly interpreted by policy makers as a

¹⁰⁶ Gordon (2010a and 2010b).

¹⁰⁷ Conyon and Murphy (2000).

¹⁰⁸ OBR Economic and Fiscal Outlook: November 2010, paragraph 3.115, p72; March 2011, paragraph 3.119, p81.

¹⁰⁹ Bank of England/Gfk NOP Inflation Attitudes Survey.

¹¹⁰ To measure disappointment, Benito and Saleheen (2011) use the British Household Panel Survey to contrast individuals' financial experiences with what they had previously expected.

¹¹¹ In 2007, consolidated banking group assets of domestically-owned banks represented over 400% of annual UK GDP but less than 100% of annual US GDP. (Source: Bank of England Financial Stability Report, June 2009, Chart 3.17; author's calculations.) Outstanding mortgage debt in 2007 represented nearly 140% of household disposable income in the UK, as against just over 100% in the US. (Source: OECD Economic Outlook). In a number of US States – "Walkaway States" – insolvent mortgagors may be absolved in certain circumstances from personal liability for lenders' losses arising from defaults on primary, first charge, mortgages not covered by house sale proceeds.

downshift in the economy's productive potential. A graphical explanation of this point is offered in an appendix.

A fundamental problem of interpretation and the absence of convincing structural explanations of the post-2007 productivity shortfall together raise a serious question mark over the conventional presumption that Britain's output shortfall is small, and much lower than implied by past growth trends. But policy makers are also swayed by other pieces of important empirical evidence, to which attention is now turned.

The evidence falls under three headings. First, post-banking crises *event studies* typically find lasting damage to output, which is frequently taken to be a sign of structural supply-side damage. Second, *business surveys* indicate the existence of much less spare capacity than conveyed by output gaps calculated on the basis of pre-crisis trend growth. Third, the *persistence of high inflation* is taken to be a sign of limited capacity. Each of these pieces of evidence is considered in turn.

Other evidence of capacity constraints

Crisis event studies

Sparked by the banking collapse and the seminal work of Carmen Reinhart and Kenneth Rogoff, a large number of recent studies have built on earlier work documenting the substantial and long-lasting depressing impact on output associated with major banking crises.¹¹² Persistent output losses, compared to a previous peak or some measure of trend, of between 5% and 10% have frequently been found across a range of countries. Estimated losses rise close to 30% when banking and currency crises combine.¹¹³ Some studies attempt to isolate the loss of productive potential rather than the general loss of GDP, which includes the impact of declining aggregate demand. The range of estimates of productive potential losses runs from negligible¹¹⁴ to moderate – up to a 4% loss for deep crises¹¹⁵ – but worse outcomes have been cited.

The attempt to draw lessons for the UK faces two difficulties. First, a “typical” crisis does not exist. Estimates and the nature of the crises vary considerably. Stephen Cecchetti and others have gone so far as to claim that the current crisis is “unique” and that it is “not possible to learn about the likely path of the current crisis by averaging outcomes across past crises”.¹¹⁶

Second, the crisis event studies shed little light on the reasons for any damage to productive potential. One possibility is that crises cause an autonomous downshift in productivity, occasioned, for example, by the reaction of business investment to increased financing costs, as financiers become more risk averse, or by the poor allocation of credit by the impaired financial system. But another possibility is that the depletion of supply is itself caused by a prolonged period of demand deficiency that leads, for example, to a depletion of business capital, tangible and intangible, the erosion of skills and the detachment from the labour force of the long-term jobless.

¹¹² For example, Balakrishnan et al. (2009); Barrell, Davis, Karim and Liadze (2010); Carmen and Rogoff (2009); Cerra and Saxena (2008); Cecchetti et al. (2009a).

¹¹³ Bordo et al (2001); Hoggarth, Reis and Sapporta (2002). Barrell, Davis, Karim and Liadze (2010) provide a comprehensive summary of the evidence.

¹¹⁴ Haugh et al. (2009).

¹¹⁵ Furceri and Mourougane (2009); Barrell, Davis, Karim and Liadze (2010).

¹¹⁶ Cecchetti et al. (2009b).

The finding that output losses persist does not therefore settle the central question – whether the UK’s post-2007 output shortfall represents an ineluctable loss of capacity or the direct and indirect consequences of a general deficiency of demand.

Business surveys

Business survey evidence suggests the economy is not suffering from abnormally low capacity utilisation. According to the Bank of England’s comprehensive assessment, reproduced as Chart 7, manufacturing is back to at least normal capacity use with services only a little way behind. The survey evidence is key to the current debate. The contradictory signals about the output gap coming, on the one hand, from surveys and, on the other hand, from the extrapolation of past trends is a persistent theme of the Bank’s Inflation Reports and divides monetary policy makers.¹¹⁷ The surveys also hold great sway over fiscal policy judgements. The OBR’s assessment of the output gap, which informs the distinction between the cyclical and structural budget deficit, is heavily reliant on the OBR’s interpretation of business survey evidence.

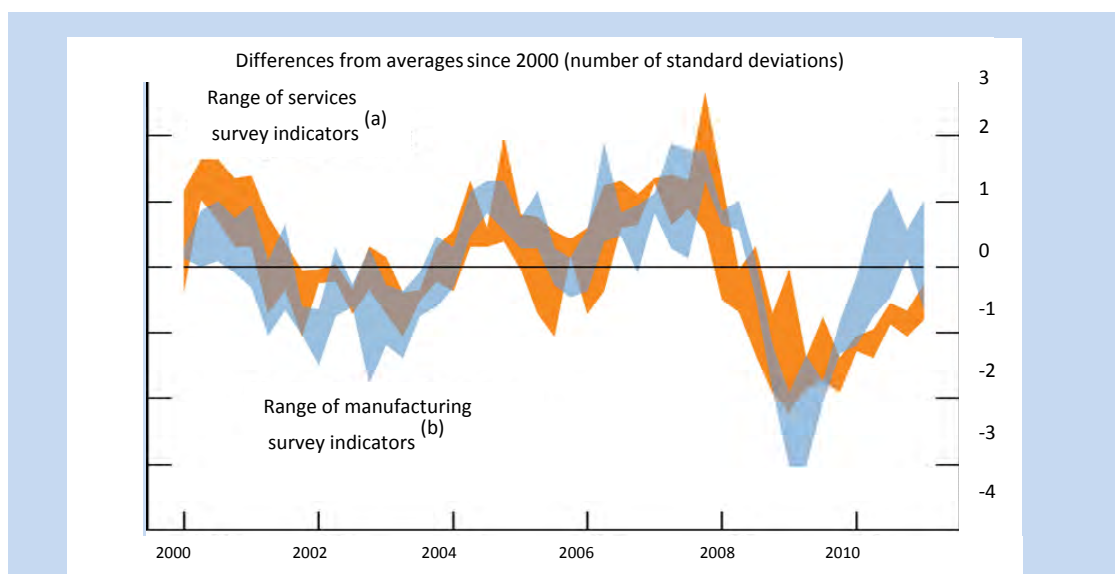
Charles Bean, Deputy Governor of the Bank, notes that the contradictory signals about capacity utilisation could be reconciled by challenging the survey evidence in two ways.¹¹⁸ First, firms may have in mind immediately operable capacity, rather than full potential capacity. “.. in some businesses, especially in manufacturing, it may be possible to shut down some capacity temporarily, reactivating it at relatively low cost once conditions improve.” Second, the notion of capacity in services is slippery: “one might be able to say how many hours the existing partners [in a law firm] could work, but that is not the same as how much they could produce.” The February 2011 Inflation Report notes that productivity might become confused with effort: estate agents may have to work more intensively chasing limited business but would be able to increase output without increasing labour input were demand stronger. These qualifications are important: as Table 7 shows, services’ output shortfall accounts for over two-thirds of the economy-wide shortfall measured against the pre-crisis trend.

There are two further possibilities. First, it is possible for generalised spare capacity to coexist with capacity constraints in certain sectors. Manufacturers specialised in export trades, and their suppliers, may well be in such a position. The volumes of manufactured exports of chemical dyes and paints, pharmaceuticals, non-electrical machinery, such as power-generating equipment, transport equipment, clothing and footwear and scientific instruments, have grown since 2007, and outpaced pre-crisis rates of growth. Expansion of some manufactured exports would have been aided by sterling’s fall and the sharp rebound in emerging economies.

¹¹⁷ Former Monetary Policy Committee member Andrew Sentance and current member Adam Posen represent the opposing interpretations. Sentance (2011b) argues “difficulties in measuring or estimating the margin of spare capacity can be remedied to some extent by looking at direct measures of spare capacity in firms from business surveys ... [which] ...do not support the view that firms currently have a significant margin of spare capacity – particularly in manufacturing industry.” Posen (2010) argues: “But, these surveys are really designed to ask what is the number of businesses who feel capacity utilisation is rising or falling, not to get precise measures of the amount of capacity remaining; accordingly, these surveys will tend to be misleading in times when utilisation has moved quickly far away from normal levels, as in fact has happened here.”

¹¹⁸ Bean (2010).

Chart 7: Survey measures of capacity utilisation - Bank of England assessment



Source and notes: Bank of England Inflation Report, May 2011, Chart 3.3. The notes (a) and (b) describe the measures taken and weighted from surveys by the Bank's Agents, British Chambers of Commerce and the Confederation of British Industry.

Second, the level of spare capacity that businesses report may be influenced by their targets for sales and profits, and the extent to which the targets are achieved. Normal capacity output may be regarded as a level of output that satisfies businesses' aims, for example, to maximise short-run revenues and profits, or to minimise short-run costs, rather than a level of output that is technologically feasible with existing resources. Such a distinction is frequently drawn in economic studies of firms' capacity.¹¹⁹ Surveys may provide a guide to capacity defined in terms of the achievement of businesses' profit or cost objectives whereas the extrapolation of previous established productivity trends provides a guide, albeit a crude one, to the level of output that is achievable with existing technology and resources. In other words, the survey and the extrapolated trend may be measuring different concepts.

If so, it would follow that businesses surveyed in a demand-constrained economy may report normal capacity use if, at the same time, other business objectives, for costs or profits, were being met. The implication is important: the real wage moderation that appears to explain the ability of British firms to perform profitably at below-trend levels of productivity may also help explain the puzzling disjunction between business surveys that indicate close to normal levels of capacity utilisation and the inference, based on trend extrapolation, of a large and persistent productivity shortfall.

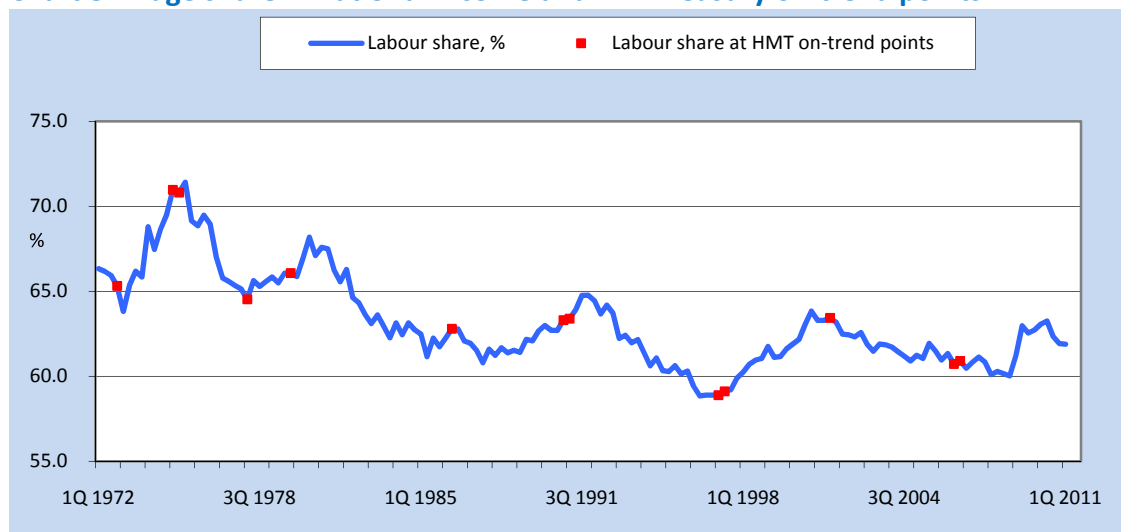
There is suggestive evidence that developments in costs and profits significantly influence businesses' notion of spare capacity. In 2005, the Treasury reported that its measure of the economy-wide output gap was related to the share of labour income in GDP. The Treasury found that "on-trend" points of the economy, when the output gap was zero, corresponded within a few quarters to peaks and troughs in wage share. Chart 8 depicts this relationship.

¹¹⁹ Some economists, such as Klein (1960), define capacity output as one that secures a minimum level of unit costs suitably defined; Segerson and Squires (1995) emphasise revenue maximisation; Coelli et al. (2002) emphasise the maximisation of short-run profits.

The Treasury's discovery was "all the more striking" because wage share had not been part of the list of indicators used to determine the on-trend points. That list largely comprised survey measures of capacity pressure.

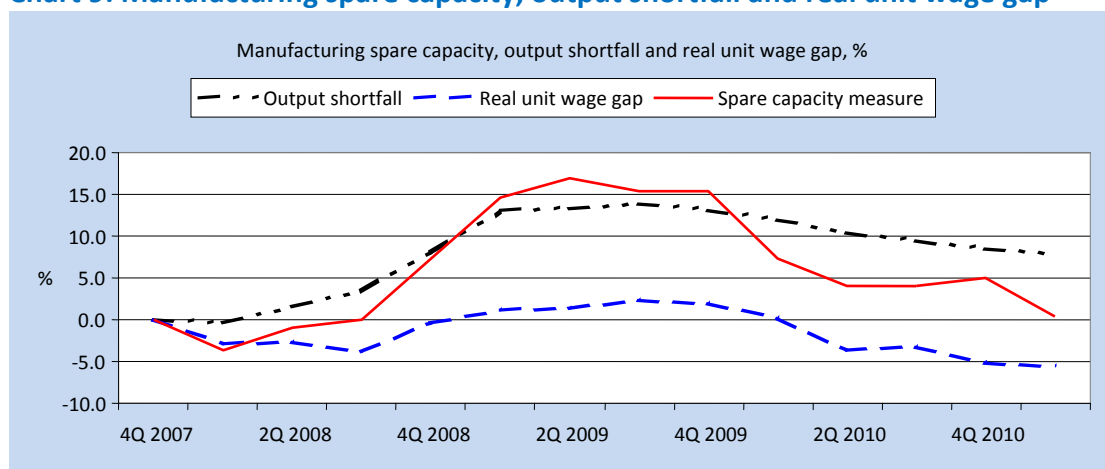
The Treasury finding provides indirect evidence that businesses' conception of capacity utilisation depends, in part, on wage share, or its complement, profit share. The statistical regularity discovered by the Treasury suggests that when wage share ceases to rise, and begins to fall, business surveys may, within a short period of time, indicate that capacity utilisation has returned to normal. This pattern continued after 2007. According to current estimates, the high point for wage share came and passed in 2010, and business surveys now indicate a return to near normal capacity use.

Chart 8: Wage share in national income and HM Treasury on-trend points



Source and notes: ONS, HMT (2005 and 2008), author's calculations. Labour share is defined as in HMT (2005) as the compensation of employees as a per cent of nominal gross value added. On-trend points are the dates at which HM Treasury estimated the economy had a zero output gap (averaged, in some cases, over two quarters). The last HM Treasury assessment was made in the March 2010 Budget.

Chart 9: Manufacturing spare capacity, output shortfall and real unit wage gap



Sources and notes: ONS, Confederation of British Industry, author's calculations. Spare capacity measure is the percentage of manufacturing firms responding to the CBI Industrial Trends Survey indicating below capacity working, difference from average 4Q 2007 level. Output shortfall is the output gap as calculated in Table 7, sign reversed. Real unit wage gap refers to the gap in real product wages divided by productivity, as defined in Table 15.

More evidence is conveyed in Chart 9. It traces a business survey measure of manufacturing capacity under-utilisation, the shortfall in manufacturing output and the gap calculated from actual and trend real product wages relative to output per head, a measure of wage share in manufacturers' sales revenue. The puzzle is revealed by the top two lines in the chart: the survey measure of below capacity working had fallen back by early-2011 to close to 2007 levels and the historic norm, even though output was still around 8% below a level consistent with the pre-crisis trend. The chart suggests that manufacturers' notion of an acceptable level of capacity use may have been affected by the rise and fall in real unit product wages, which by the first quarter of this year were over 5% below trend. Without that moderation, and the cushion it provided for profits, reported capacity under-utilisation might have been substantially higher.

This analysis suggests the following interpretation of the survey evidence. There are, first, instances of capacity shortage, for example in specialised manufacturing export trades. But the surveys may generally understate spare capacity and potential output because some capacity is being mothballed, awaiting a more enduring recovery; because intensity of work effort is confused with productivity and because survey responses are influenced by changes in real unit labour costs. Business output, despite being generally depressed, may have moved closer to a level at which short-run labour cost objectives can be met thanks to the recession-induced decline in real product wages. With the impact on unit labour costs attenuated, the shortfall in productivity may not be regarded by businesses as labour hoarding, even though they remain, like American counterparts, technologically capable of pre-crisis efficiency.

The persistence of inflation

Over the last three years, consumer price inflation has generally persisted at a level above the government's 2% target and above inflation in major competitor countries, a marked contrast to Britain's pre-crisis performance. Only in the second half of 2009 did inflation slip briefly below target. The Bank's forecasts, conditioned by a belief that spare capacity would reduce inflation, have been too optimistic.

A common conclusion is that poor inflation outcomes are symptomatic of limited spare capacity. Former Monetary Policy Committee member Andrew Sentance drew this inference in his critique of the Bank's forecasts and policy: the absence of under-utilised capacity was one of four reasons given to explain the Bank's forecast errors and recently rising pay settlements.¹²⁰ Michael Dicks, contributing to the influential Institute of Fiscal Studies 2011 Green Budget, argued that an output shortfall somewhat smaller than assumed by the OBR, and much smaller than previously assumed by the Treasury, better explained the level of inflation in 2010.¹²¹

This general line of reasoning can be challenged on two grounds. First, the post-crisis increase in inflation has been mainly driven by escalating import prices and, in 2011, by the increase in the rate of Value Added Tax. Domestic sources of inflation, which would be sensitive to the level of spare capacity, have been generally subdued, and below pre-crisis levels. Second, there was substantive evidence well before the crisis of a significant weakening of any link between the output gap and inflation and, in any case, of a limited response of firms' prices

¹²⁰ Sentance (2011a). The May 2011 Inflation Report argues that the 1Q 2011 increase in settlements (to 2.3%) partly reflected the low proportion of reported single-year deals, which tended to be lower.

¹²¹ Dicks (2011).

to the pressure of demand. Today's high inflation may well be evidence of a weak relationship rather than of a zero gap.

Some of the changing sources of inflation are detailed in Table 16. The latest inflation figures are uplifted by the increase in the standard rate of VAT, which mechanically adds about 1½% to the consumer price level.¹²² Measures of inflation excluding the statistical contribution of a variety of indirect taxes stand, at the time of writing, at 2¾% for consumer prices and 3¾% for the former target measure of retail prices excluding mortgage interest payments. These measures of the underlying inflation rate are similar to crisis period averages calculated from a comparison of price levels in the final quarters of 2007 and 2010, a comparison largely unaffected by VAT changes.¹²³ But the crisis period averages are above those pre-crisis, when inflation was typically low, and below target at least as often as it was above target.¹²⁴

Table 16: Inflation and its direct contributors

| Year-on-year rate of change, end-years unless stated, % p.a. and percentage points | 2001 to 2007 | 2008 to 2010 | 2011 Latest |
|--|--------------|--------------|-------------|
| Consumer prices | | | |
| All | 1.7 | 3.1 | 4.2 |
| Excluding indirect taxes* | n.a. | 3.0 | 2.7 |
| Retail prices excluding mortgage interest | | | |
| All | 2.6 | 3.7 | 5.0 |
| Excluding indirect taxes* | 2.6 | 3.7 | 3.7 |
| Expenditure prices excluding net taxes** | 2.4 | 3.5 | 3.1 |
| Of which, contributions, % points (% weight) | | | |
| Import prices (27) *** | 0.2 | 1.7 | 1.6 |
| Domestic incomes per unit of output (73) **** | 2.2 | 1.8 | 1.5 |
| Of which: | | | |
| Employees' compensation (45) | 1.1 | 1.4 | 0.0 |
| Profits and other incomes (28) | 1.0 | 0.3 | 1.5 |
| Memo: | | | |
| Import prices (goods & services) | 0.6 | 6.6 | 6.0 |
| Domestic incomes per unit of output***** | 3.0 | 2.6 | 2.0 |

Sources and notes: ONS, author's calculations. n.a. – not available. 2001 to 2007 and 2008 to 2010 periods refer to end years (Q4). *Official price indices CPIY and RPIY; 2011 figures refer to June. ** Price deflator for total final expenditure (consumption, investment and exports) measured at factor cost (own estimate), excluding all indirect taxes and subsidies. 2011 figures refer to the first quarter. *** Price deflator for all goods and service imports. **** Gross value added at factor cost, plus the national accounts residual error to align with expenditure estimates, divided by the chained volume measure of gross value added at factor cost. Profits and other income is gross value added, as defined, less compensation of employees. ***** Gross value added price deflator at factor cost adjusted for the national accounts residual error. The contributions are approximately equal to the 2010 weights shown and the inflation rates of import prices and domestic incomes per unit of output. The table's figures are calculated from an exact identity, but are subject to rounding error.

Table 16 records as a memorandum item the changing behaviour of import prices. In the pre-crisis period after 2000, import prices rose at a modest ½% a year, a somewhat faster pace than seen in the second half of the previous decade, when import prices fell. In sharp

¹²² The rate increase from 17.5% to 20% added 0.8 percentage points to annual inflation in January 2011 according to ONS estimates. Evidence from the Bank's agents indicates that the VAT increase may eventually be almost fully passed on, rather than absorbed in retailers' margins. The full impact would add 1.4% to the consumer price level, according to the Bank's May 2011 Inflation Report.

¹²³ The standard VAT rate was cut as an emergency budget measure to 15% from December 2008 to December 2009. The previous 17.5% rate was restored from January to December 2010. The Bank suggests that some prices may have been raised in 4Q 2010 in anticipation of the 2011 VAT increase.

¹²⁴ Inflation was frequently below the RPI target measure between 1999 and 2002.

contrast, import prices rose by an average 6½% a year over the three years to end-2010, a cumulative increase slightly in excess of 20%.

Most of this rise reflects the decline in the exchange rate. Sterling fell from a peak in the summer of 2007 to a low in spring 2009, thereafter stabilising after a modest recovery. Between the final quarters of 2007 and 2010, the pound's value fell by a little over 20% measured against a basket of currencies, and by a little more against the US dollar. Had world prices remain unchanged, sterling's overall decline would have added mechanically about 25% to the level of sterling import prices.¹²⁵

World commodity prices, often cited as a key influence, contributed much less. In dollar terms, world commodity prices oscillated wildly during the period, reflecting the fortunes of emerging economies as well as changing supply conditions, but cumulatively rose by less than 10%.¹²⁶ Food, agricultural materials and metal prices increased substantially but dollar oil prices were little changed. The sterling prices of imported food, energy and basic materials, less than a fifth of all goods and service imports, rose by nearly 30%, an increase in keeping with the fall in sterling against the US dollar. Had sterling import prices of food, fuels and basic materials risen in line with the prices of imported manufactures, overall import prices would have increased by only 1 percentage point less than they did.

There is no reason to doubt that the escalation in import prices had a large immediate impact on consumer prices. According to the Bank's detailed calculations, rising energy and import prices added between 6% and nearly 10% to the consumer price level over the period between end-2007 and end-2010. The wide range of estimates reflects uncertainties about the indirect consequence of higher energy prices on the prices of other goods and services, such as transport, and the difficulty of gauging the import content of consumers' purchases.¹²⁷ The direct import content of economy-wide total expenditure (which includes investment and exports) can be more easily gauged, however. This wider measure of inflation rose between pre-crisis and crisis periods by an amount similar to that registered by consumer prices. Examination of the sources of escalation of total expenditure prices is therefore instructive.

The accounting exercise shown in Table 16 suggests that imported inflation contributed directly 1¾ percentage points to annual total expenditure inflation over the crisis period, a cumulative impact of about 5%. This estimate therefore lies below the Bank's, but makes no allowance for any indirect consequences of higher import costs. By contrast, the contribution of import price inflation in the pre-crisis period was ¼ percentage point a year. Between the two periods, the increased direct contribution of rising import prices was 1½ percentage points a year – in excess of the observed rise in total expenditure inflation.

The direct contribution of other sources of inflation therefore fell. Between the two periods, the average inflation rate of wage and profit incomes per unit of output declined from 3% a year to 2½% a year. This deceleration contributed directly a negative ½ percentage point a year to the change in total expenditure inflation. The squeeze on profits was the main source of deceleration, a cyclical feature subsequently reversed. Unit profits rose over the year to the first quarter of 2011, but the impact was offset by a moderation in unit wage costs. The

¹²⁵ Roughly inferred from the increase in the reciprocal of the trade-weighted sterling index. For goods and services priced in dollar terms, the impact on sterling import prices would have been nearly 30%.

¹²⁶ Sources: IMF International Financial Statistics; U.S. Energy Information Administration. Dollar commodity prices were about 20% above the 4Q 2010 level by May 2011, 5% below the April peak.

¹²⁷ February 2011, Inflation Report, Chart A, page 34. Estimates taken from 4Q 2007 rather than the 4Q 2006 level depicted in the chart. The VAT impact included in the Bank's estimates was negligible.

inflation rate of domestic incomes per unit of output – a measure of underlying domestic inflation - was 2%.¹²⁸

In summary, the escalation in import prices associated with sterling's fall is the main direct source of Britain's increased inflation rate, above target and above inflation in overseas advanced countries. The inflation shock does not itself corroborate the view that the economy has little under-utilised capacity. Spare capacity "works", if it works at all, by depressing domestic sources of inflation, which have moderated.

The second question is whether the response of inflation, abstracting from the impact of import prices, says anything about the level of capacity under-utilisation. As the Bank itself acknowledged, its inflation forecast errors might have arisen because of an over-estimation of the degree of economic slack.¹²⁹ The analysis, mentioned previously, by Michael Dicks draws precisely this conclusion: the apparently limited deceleration in domestic sources of inflation can be reconciled with the depth of recession if it came with a substantial shortfall in productive capacity.

But this is not the only, or most plausible, way to reconcile the facts. Evidence amassed well before the banking crisis points to a fundamental change in the nature of the inflation process: inflation has become less self-feeding and less sensitive to domestic output gaps.¹³⁰ Summarising an array of academic papers, a study by US Federal Reserve economists published in early-2007 noted, "There is general agreement that in many industrial economies, the responsiveness of inflation to domestic resource utilization has declined."¹³¹ The statistical relationship between inflation and unemployment – popularly known as the "Phillips Curve"¹³² – has therefore changed; in the words of the Federal Reserve study, "the slope of the Phillips Curve has become flatter".

A recent paper by Treasury economists documented the shift in the behaviour of UK consumer price inflation and its goods and services components.¹³³ When the period of investigation included the high inflation rates of the 1980s, the study found a normal Phillips Curve type relationship between inflation and the output gap, variously measured. But when attention was confined to the period of low inflation since 1997, the relationship disappeared, or worse, was the wrong way round.¹³⁴

In America, these behavioural shifts have prompted a search for an improved Phillips Curve. In an influential paper, Stock and Watson report that downward pressure on US inflation is best characterised using the difference between the current unemployment rate and the lowest rate experienced in the previous eleven quarters.¹³⁵ The implication is profound. As Robert Hall noted in his Presidential Address to the American Economic Association "once a

¹²⁸ Note that "domestic" unit incomes are affected by exporters' margins.

¹²⁹ August 2010 Inflation Report, p49.

¹³⁰ See, for example, analysis by, and extensive references in, Balakrishnan and López-Salido (2002); Cecchetti et al. (2007); Ihrig et al. (2007); Khan (2004); Mishkin (2007); Mourougane and Ibaragi (2004); and O'Reilly and Whelan (2004) who provide contrary evidence for the euro area.

¹³¹ Ihrig et al. (2007).

¹³² After William Phillips, whose seminal paper on UK inflation was published in 1958.

¹³³ Dwyer et al. (2010).

¹³⁴ The coefficients on the level of the output gap were of the "wrong" negative sign in regressions for all consumer prices and the goods component, total and core. In the case of core goods price inflation, the negative coefficient was also statistically significant. Between 1997 and 2009, the output gap attracted a positive and significant coefficient only in the case of consumer service price inflation.

¹³⁵ Stock and Watson (2010).

slump has lasted 11 quarters at, say, the same rate, no matter how high, unemployment loses its deflationary effect.”¹³⁶

The reasons for a flatter Phillips Curve have been much debated. The inflation process may be naturally more damped at low rates than at high rates: the costs of seeking forms of indexation may not outweigh the benefits when inflation is low. Monetary policy may better anchor inflation expectations. Charles Bean and Andrew Sentance stress the importance of globalisation and international specialisation.¹³⁷ Whatever the causes, the flat Phillips Curve phenomenon helps to explain the limited response of domestic inflationary pressure to the recession, but there are other considerations.

Unlike America’s, Britain’s recession comes with a large shortfall in productivity and a comparatively modest rise in unemployment. This difference gives businesses’ pricing strategies a key role in determining the response of UK inflation to the fall in demand. The suspicion is that this relationship is “flat”.

Survey evidence undertaken by the Bank on the eve of the recession confirms that the majority of UK private sector firms mark up their prices over a measure of costs and that they review prices at intervals that are partly scheduled but that also change in response to unexpected developments in costs or demand.¹³⁸ The problem is that firms faced *conflicting* pressures during the crisis: higher import costs and lower productivity acted to inflate unit costs; the moderation in earnings acted to contain costs while the need to maintain sales may have encouraged firms to cut profit margins.¹³⁹ The result may well have been a rather limited initial response of prices to the shortfall in demand, an outcome in keeping with past behaviour. Layard, Nickell and Jackman note in their seminal work on unemployment, “Much of the evidence suggests that prices tend to be rather unresponsive to demand fluctuations.”¹⁴⁰

The escalation in import prices, the flattening of the Phillips Curve, the limited rise in unemployment, and the predictably modest cyclical response of firms’ prices, thanks to contrasting recession impacts on firms’ unit costs and margins, provide a plausible set of explanations consistent with prior evidence for the limited response of inflation to the recession. The popular alternative hypothesis that infers a small output gap from the persistence of above-target inflation gives insufficient weight to the impact of higher import prices and assumes a relationship between spare capacity and inflation more powerful than the accumulated evidence warrants.

This study uses official data available up to 12th July 2011.

¹³⁶ Hall (2011).

¹³⁷ Bean (2006); Sentance (2011a).

¹³⁸ Greenslade and Parker (2010).

¹³⁹ There is mixed evidence on the cyclical nature of firms’ margins: Bils (1987), for example, finds US manufacturers’ mark-up over marginal costs rises during contractions; Smith (2000) finds UK manufacturers’ mark-up rises in response to domestic contractions but falls in response to overseas contractions; at a detailed sectoral level, Coutts and Norman (2007) find “demand pressure effects had relatively little quantitative influence on [UK] domestic manufacturing pricing”; at the aggregate manufacturing level they find “no significant demand effects”.

¹⁴⁰ Layard et al. (1991) p339.

Appendices

(1) Decomposition of national productivity gap

Consider the aggregate level of productivity in a three-sector economy:

$$Z \equiv \frac{O}{J} \equiv \frac{O_a + O_b + O_c}{J_a + J_b + J_c} \quad (1)$$

where Z , O , J denote the levels of productivity, output¹⁴¹ and employed labour (jobs) respectively, and the subscripts denote the three sectors: a , b , c .

The aggregate level of productivity can be re-expressed as the sum of labour-share weighted sectoral productivity levels:

$$Z \equiv \beta_a Z_a + \beta_b Z_b + \beta_c Z_c \quad (2)$$

where, for example, $\beta_a \equiv \frac{J_a}{J}$ and $Z_a \equiv \frac{O_a}{J_a}$.

In terms of trend levels, denoted by a superscript accent, the aggregate productivity level equivalent to identity (1) is defined by:

$$Z' \equiv \frac{O'}{J'} \quad (3)$$

The economy-wide productivity gap, θ , is defined as:

$$\theta \equiv \frac{Z}{Z'} - 1 \quad (4)$$

which can be re-expressed using identities (2) and (3) as:

$$\theta \equiv \frac{Z_a}{Z'_a} \left(\frac{Z'_a}{Z'} \beta_a \right) + \frac{Z_b}{Z'_b} \left(\frac{Z'_b}{Z'} \beta_b \right) + \frac{Z_c}{Z'_c} \left(\frac{Z'_c}{Z'} \beta_c \right) - 1 \quad (5)$$

The elements on the right-hand side of identity (5) comprise for each sector the product of the ratio of actual productivity to its trend level and an implicit weight.

For example, in the case of sector a :

$$\frac{Z_a}{Z'_a} \equiv 1 + \theta_a \quad (6)$$

with an implicit weight given by:

¹⁴¹ This expression is applicable only to UK chain-linked GDP estimates from the reference year forward, when the components are additive. The implicit output residual error is assumed to be zero.

$$\frac{Z'_a}{Z'} \beta_a \equiv \frac{\left(\frac{O'_a}{J'_a}\right)}{\left(\frac{O'}{J'}\right)} \beta_a \equiv \frac{\left(\frac{O'_a}{O'}\right)}{\left(\frac{J'_a}{J'}\right)} \beta_a \equiv \frac{\alpha'_a}{\beta'_a} \beta_a \quad (7)$$

where α'_a denotes sector a 's trend output share.

Using $\sum_{i=a}^{i=c} \alpha'_i = 1$, $\frac{\beta_i}{\beta'_i} \equiv 1 + \frac{\beta_i - \beta'_i}{\beta'_i}$ and, as shown in expression (7), $\frac{Z'_a}{Z'} \equiv \frac{\alpha'_a}{\beta'_a}$, identity (5) can be re-written after some manipulation as:

$$\theta \equiv \sum_{i=a}^{i=c} \alpha'_i \theta_i + \sum_{i=a}^{i=c} \left((\beta_i - \beta'_i) \frac{Z'_i}{Z'} \right) + \sum_{i=a}^{i=c} \left(\frac{\beta_i - \beta'_i}{\beta'_i} \alpha'_i \theta_i \right) \quad (8)$$

Each sector's contribution to the national productivity gap comprises three parts: a direct output share component – the product of the sector's productivity gap and its trend output share; an indirect employment share shift component – the product of the sector's relative trend productivity and the difference between the sector's actual and trend share of national employment; and a mixed component, which reflects the sector's productivity gap, its output share and the employment share shift.

For example, sector a 's contribution, Ω , to the national productivity gap is given by:

$$\Omega_a \equiv \alpha'_a \theta_a + (\beta_a - \beta'_a) \frac{Z'_a}{Z'} + \frac{\beta_a - \beta'_a}{\beta'_a} \alpha'_a \theta_a \quad (9)$$

Note that were actual and trend employment shares the same, the aggregate productivity gap would become the sum of trend output-share weighted sectoral productivity gaps:

$$\theta \rightarrow \sum_{i=a}^{i=c} \alpha'_i \theta_i \text{ when } \beta_i \rightarrow \beta'_i, i = a, b, c.$$

It is important to note that the decomposition of the national productivity gap is not unique. An alternative formulation stresses the use of employment weights:¹⁴²

$$\theta \equiv \sum_{i=a}^{i=c} \beta_i \theta_i + \sum_{i=a}^{i=c} \beta_i \left(\frac{Z'_i}{Z'} - 1 \right) + \sum_{i=a}^{i=c} \beta_i \theta_i \left(\frac{Z'_i}{Z'} - 1 \right) \quad (10)$$

This identity expresses the economy-wide productivity gap in terms of the employment weighted sectoral productivity gaps and ratios.

At the sector level, the second term in identity (10) is materially different to the employment share shift second term in identity (8). The second term in identity (10) is negative for all below-average productivity sectors and positive for all above-average productivity sectors, irrespective of whether the sectors are gaining or losing employment share. The second term

¹⁴² I am indebted to Professor Robert Rowthorn for this point and subsequent discussion.

in identity (8) is negative for all employment-losing sectors and positive for all employment-gaining sectors, relative to trend, irrespective of the level of sectoral productivity relative to the national average.

The usefulness of these rival attributions depends on the question posed. Since attention is focussed on the impact of changing employment shares, the main text uses identity (8). Table A1 shows the same decomposition using identity (10).

Table A1: Decomposition of productivity gap in 2010 – identity (10)

| Output per job productivity gap % and percentage points | ----- Identity ----- | | | Total Gap |
|--|----------------------|--------|--------|--------------|
| | Term 1 | Term 2 | Term 3 | |
| Whole economy: | -5.9 | -0.8 | -0.1 | -6.8 |
| of which (sector share of economy): | | | | |
| Agriculture, mining & utilities (4) | -0.6 | 2.1 | -0.0 | 1.5 |
| Manufacturing (12) | -0.9 | 3.2 | -0.3 | 2.0 |
| Construction (6) | -0.2 | -0.5 | 0.0 | -0.7 |
| Distribution, hotels & catering (16) | -1.9 | -7.3 | 0.7 | -8.5 |
| Transport & communications (7) | -0.5 | 1.4 | -0.1 | 0.8 |
| Government & other services (24) | -1.1 | -10.3 | 0.4 | -11.1 |
| Business services & finance (32) | -0.8 | 10.6 | -0.7 | 9.0 |
| of which: | | | | |
| Business services (24) | -0.3 | 5.5 | -0.1 | 5.1 |
| Business services “proper” (17) | -1.1 | -0.4 | 0.1 | -1.5 |
| Financial intermediation (8) | -0.5 | 5.0 | -0.7 | 3.9 |
| of which: | | | | |
| Banking (5) | -0.2 | 3.8 | -0.5 | 3.1 |

Sources and notes: ONS, author’s calculations. The total includes the impact of negligible rounding error.

A comparison with the identity (8) decomposition reveals substantial differences at the sectoral level, largely because of the impact of the contrasting second terms. However, the economy-wide summation of these two terms is the same.¹⁴³ This equivalence, and the minor contribution of the mixed third terms, means that the economy-wide impact of employment shifts between above and below average productivity sectors is largely the same irrespective of the method of decomposition.

A similar decomposition can be applied to growth rates of productivity. Adapting identity (8) by substituting previous period values for trend values, the growth rate (designated by a diacritical dot) of productivity over any past period of length “*n*” from current period “*t*” is given by:

$$\dot{Z} \equiv \sum_{i=a}^{i=c} \alpha_{i,t-n} \dot{Z}_i + \sum_{i=a}^{i=c} \left((\beta_i - \beta_{i,t-n}) \frac{Z_{i,t-n}}{Z_{t-n}} \right) + \sum_{i=a}^{i=c} \beta_i \alpha_{i,t-n} \dot{Z}_i \quad (12)$$

¹⁴³ Note that the second term in identity (8) can be re-written:

$$\sum_{i=a}^{i=c} \left((\beta_i - \beta'_i) \frac{Z'_i}{Z'} \right) \equiv \sum_{i=a}^{i=c} \left(\beta_i \frac{Z'_i}{Z'} - \beta'_i \frac{\alpha'_i}{\beta'_i} \right) \equiv \sum_{i=a}^{i=c} \beta_i \left(\frac{Z'_i}{Z'} - 1 \right)$$

the final expression being the same as the second term in identity (10).

Note that with constant employment shares, the aggregate productivity growth rate becomes the sum of previous-period output-share weighted sectoral productivity growth rates:

$$\dot{Z} \rightarrow \sum_{i=a}^{i=c} \alpha_{i,t-n} \dot{Z}_i \text{ when } \beta_i \rightarrow \beta_{i,t-n}, i = a, b, c.$$

Also note that were sectoral productivity growth rates zero, national productivity growth would depend solely on any shift in sectoral employment shares:

$$\dot{Z} \rightarrow \sum_{i=a}^{i=c} \left((\beta_i - \beta_{i,t-n}) \frac{Z_{i,t-n}}{Z_{t-n}} \right) \text{ when } \dot{Z}_i \rightarrow 0, i = a, b, c.$$

Over a period of recession and recovery, the different contributions are likely to change substantially. Average sectoral productivity growth rates may, for example, tend to zero across periods of declining productivity, in the recession phase, and periods of rising productivity in the expansion phase. The contribution to national productivity growth of shifts in employment shares would be thus temporarily elevated relative to the contribution of sectoral productivity growth rates.

Table A2: Productivity growth accounting

| % and percentage points | 3 qtrs to | ---- 4 quarters to ---- | | 11 qtrs to |
|--------------------------|-----------|-------------------------|---------|------------|
| Output per job | 4Q 2008 | 4Q 2009 | 4Q 2010 | 4Q 2010 |
| Jobs data based on: | | | | |
| mainly business survey | -3.1 | -0.5 | 1.8 | -1.8 |
| mainly household survey | -2.8 | -1.1 | 0.9 | -3.0 |
| of which, contribution: | | | | |
| Direct | -2.6 | -0.8 | 1.4 | -2.0 |
| Indirect | -0.4 | -0.3 | -0.3 | -1.0 |
| Other (mixed & residual) | 0.2 | 0.0 | -0.1 | 0.0 |

Sources and notes: ONS, author's calculations. "qtrs" – quarter periods. The direct, indirect and other components refer respectively to the three terms in identity (12) plus an item reflecting the implicit national accounts output statistical adjustment. Totals are subject to rounding error.

Table A2 illustrates this problem over the eleven quarters between the first quarter of 2008 and the fourth quarter of 2010, the same interval cited by Giles (2011). Giles uses GDP for his measure of output and the workforce data for jobs, based mainly on business surveys, and therefore calculates a fall in productivity smaller than the official figures which are based on gross value added and the LFS jobs data. The first two rows in the table show the difference created by the choice of jobs data, with output measured as gross value added. Over the full period, productivity falls by 1¼% using businesses' records of jobs, but by 3% using the LFS jobs data.

Of the 3% fall, about 2 percentage points are directly attributable to sectors' output weighted productivity growth rates and 1 percentage point to shifts in employment between sectors. The impact of jobs shifting between high and low productivity sectors thus accounts for a third of the national productivity decline over this period, a much larger proportion than conveyed by the productivity gap calculations.

However, as examination of sub-periods in Table A2 reveals, this proportion is highly volatile, and increases when the period includes periods of both productivity decline and productivity

recovery. In contrast, the productivity gap calculations shown in Table A3 are less prone to such transitory movements.

Table A3: Productivity gap accounting

| % and percentage points Output per job (LFS data) | ----- Productivity gap ----- | | | |
|--|------------------------------|------|------|---------|
| | 2008 | 2009 | 2010 | 1Q 2011 |
| Total | -1.9 | -6.5 | -6.8 | -7.9 |
| Of which, contribution: | | | | |
| Direct | -1.9 | -6.3 | -6.1 | -7.3 |
| Indirect | -0.1 | -0.4 | -0.8 | -0.6 |
| Other (mixed & residual) | 0.1 | 0.2 | 0.0 | -0.0 |

Sources and notes: ONS, author's calculations. The direct, indirect and other components refer respectively to the three terms in identity (8) plus an item reflecting the implicit national accounts output statistical adjustment. Totals are subject to rounding error.

(2) Full capacity, normal capacity and real wages

In the main text, it is argued that a demand-constrained economy with a sufficiently low level of real wages may sustain a level of productivity indistinguishable from the performance of a structurally weaker economy that does not face a demand constraint.

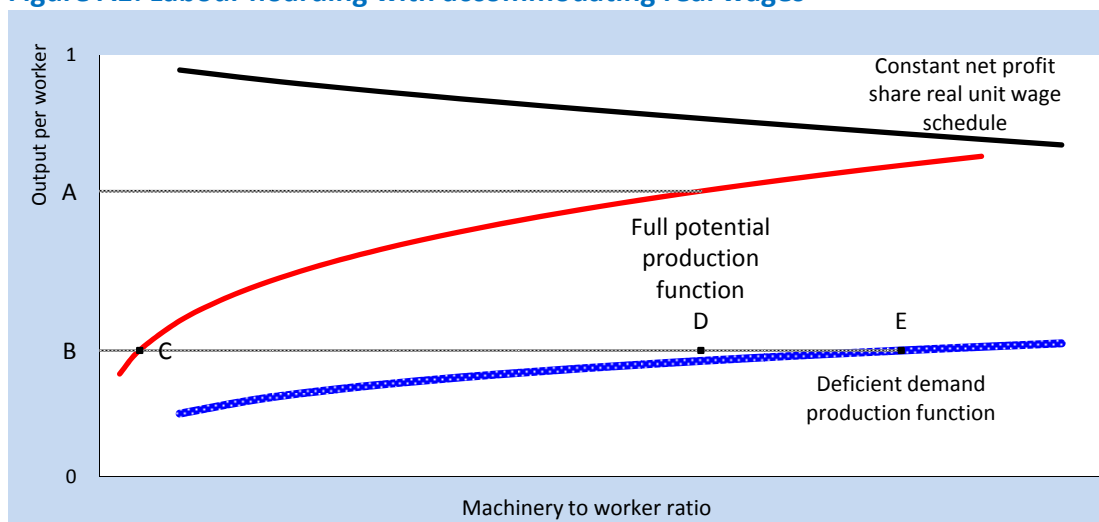
Figure A1 summarises the argument in a stylised form.¹⁴⁴ Two upward sloping lines represent the rising level of labour productivity that industry can achieve as more machinery is deployed relative to the number of workers employed. "Machinery" stands for any resource that cannot be flexibly adjusted to prevailing levels of demand; "worker" stands for resources that are fully flexible within a defined period. The higher of the two lines depicts a production function when resources are fully utilised; the vertical distance OA measures the associated level of output per worker. It is an indication of industry's productivity potential given the current state of technology and the full-utilisation of labour, capital and other resources.

Suppose the economy suffers a recession due to a fall in demand but, initially, with no change in the real wage received by workers. Industry's profits are therefore squeezed: profits net of depreciation fall in relation to value added (profits plus wages) because labour costs and depreciation take up a larger slice of sales revenue. In response, industry lays off workers (and other variable resources) but is unable to adjust its stock of machinery (and other fixed resources); machinery is therefore under-utilised even though, by assumption, the remaining workers are fully utilised.

It can be imagined that the level of *utilised* machinery falls in relation to the number of remaining workers so that industry slides down its full-potential production function to a position such as C, well below the original machinery to worker ratio at point D. Position C is unsustainable, however, granted unchanged real wages. Despite industry's efforts to shed labour, profits are too low. This is so because production, which relies on machinery as well as labour, falls by more than employment; so the level of labour productivity declines. The ratio of the vertical distances OB to OA indicates the labour productivity shortfall. The fall in productivity is not, however, matched by a fall in real wages, so profits are squeezed.

¹⁴⁴ The figure draws on Hulten (1986).

Figure A1: Labour hoarding with accommodating real wages



Although this is the true position, the economy may appear to be at a point such as E, with a *higher* ratio of observed machinery to workers. This happens because workers have been laid off and the (fixed) stock of machinery has not changed, only its rate of utilisation has fallen. It may thus appear that the economy's productive potential has fallen: that is, the economy's level of productivity is taken to be consistent with the "deficient demand production function" which everywhere lies below the full potential production function. The main indications that this is not the true position are the fall in output *and* the shortfall in profits.

However, the squeeze on profits may be relieved by a fall in real wages, induced by the recession. The top line in the figure, sloping down from left to right, depicts a level of real unit wages in the recession scenario in comparison to the level of real unit wages in the full-utilisation scenario that would leave profit share unchanged. Real wages would need to fall in relation to the level of productivity in order to offset the impact on profit share of the decline in the utilisation of machinery. Granted such real wage moderation, profit share at each point is the same whether measured along the full potential production function or the deficient demand production function. With profit share restored, industry may be content with the lower level of labour productivity and the demand-constrained level of capacity working.

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