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The Output Gap Conundrum

The global economy suffered a severe downturn in 2008 and 2009, and the impact on GDP and macroeconomic policy could be felt for some time. OECD estimates suggest that potential GDP can fall by 1.5% and 2.5% after a recession, and by up to 4.0% after a severe recession.¹ The IMF²² estimates that the permanent loss of output is around 2.5% after currency crises, but as much as 10.0% after banking crises. The recent downturn has probably had a significant impact on global potential output.

The IMF research concludes that while potential output falls after a crisis, potential growth finally returns to its pre-crisis state for most economies. Even this may prove to be too optimistic this time around. In a number of countries (e.g. the USA) it can be argued that total factor productivity growth was boosted by easy credit conditions and a reallocation of resources that gave rise to the build-up of imbalances. If this reallocation of resources is halted as credit conditions tighten, TFP growth rates could fall back to their long-term averages. In the USA, for example, this could take 0.6% off potential growth.

These costs have important implications for the conduct of monetary policy. Conventional measures of the output gap – defined as the difference between actual and potential GDP – point to a very large under-utilisation of capacities in the first quarter of 2009, when economies contracted at record rates worldwide. The US Congressional Budget Office, for instance, estimates the gap for the USA at more than 6% of GDP for 2009 as a whole. These estimates have important implications for the outlook for inflation, the conduct of monetary policy, and investment strategy. If there is a very low degree of capacity utilisation, real GDP could grow at solid rates for many years before inflation risks would return and monetary policy would have to be tightened. At the same time, investors could do without inflation insurance, or even sell such insurance.

However, past experience suggests that estimates of output gaps are very unreliable and that too much faith in these estimates can lead to serious policy (and investment) errors. In a 2002 research paper, Athanasios Orphanides (who now heads the central bank of Cyprus and is a member of the ECB's Governing Council) analysed US

monetary policy during the 1970s, which today is dubbed the period of the Great Inflation.³ He found that "policy decisions were consistent with a 'modern' systematic, activist, forward-looking approach to policy. Policy was consistent with an inflation target of 2%....[and]...responded strongly to forecasts of inflation and the unemployment gap, which could have been reasonably expected to result in a high degree of economic stability." How could things then go so wrong that the result was the Great Inflation instead of economic stability? Orphanides gives the following answer: "...the error in the real-time assessment of the natural rate of unemployment meant that for much of the 1970s policy decisions were based on the incorrect belief that the economy was operating below its full employment potential, while the opposite was true." In other words, policymakers relied on deeply flawed estimates of the output gap.

Could this happen again? In the following we argue that the risk of over-estimating the output gap (and hence under-estimating the risk of inflation) is considerable. We identify three sources of potential errors related to: (1) estimates of historical developments of potential GDP; (2) estimates of the effect of the recent recession on the level of potential GDP; and (3) forecasts of potential growth after the recession. From our analysis we conclude that inflation risks are higher than presently priced by the markets.

What Was Potential GDP Growth in the Past?

Real-time estimates of the output gap are heavily influenced by estimates of the historical path of potential GDP, and estimates of the latter are subject to considerable uncertainty. In a recent paper, Justin Weidner and John Williams of the Federal Reserve Bank of San Francisco therefore used a different method (pioneered by two other economists) to estimate the output gap for the USA. In this approach, estimates of the output gap are inferred from developments of core inflation.⁴ They find that the Congressional Budget Office's method leads to output gaps inconsistent with the behaviour of core inflation. Specifically, given the very large output gap estimated by the CBO for 2009, US core inflation should have been much

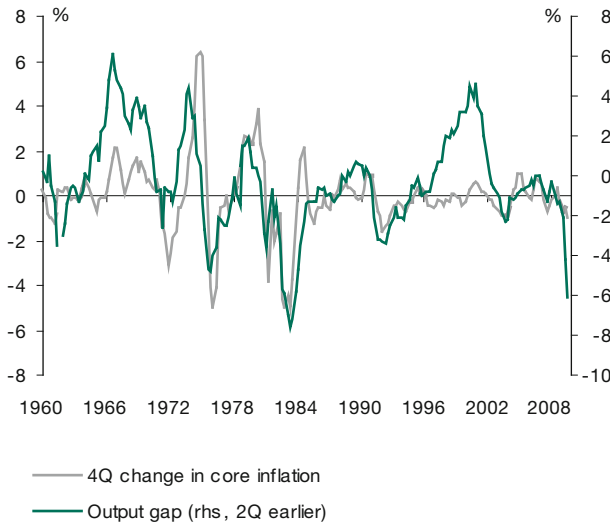
1 OECD Working Paper, No. 699.

2 WEO, 2009.

3 "Monetary Policy Rules and the Great Inflation", AER Papers and Proceedings 92, May 2002, pp.115-120.

4 "How big is the output gap?", FRBSB Economic Letter, 12 June 2009.

Figure 1
The Output Gap and Inflation in the USA



Sources: Congressional Budget Office (CBO), Haver, Deutsche Bank.

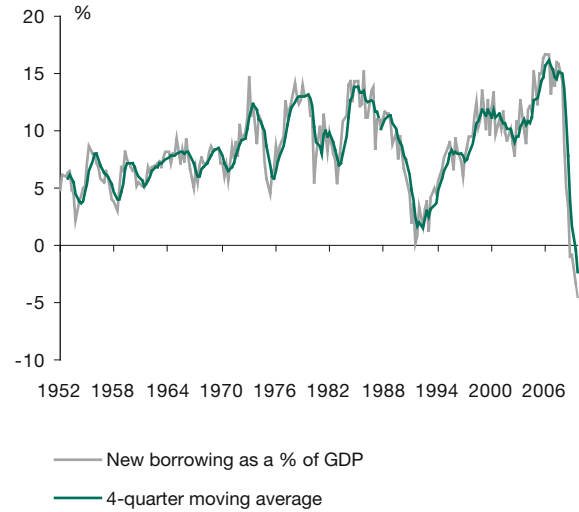
lower. Inferring from core inflation to the output gap gives a gap of only -2.0% for Q1 2009 (compared to the CBO's -6.2%, where a negative sign indicates spare capacity).

This analysis does raise the important point that the output gap may be incorrectly estimated. But in our view this approach places far too much faith in the stable relationship between the output gap and changes in core inflation. The relationship was extremely strong from 1975-1995, but it appears to have broken down over the last 12 years. Inflation increased by less than expected in the late 1990s, and fell by less than expected in Q1 2009. This may have been due to mis-measurement of the output gap in Q1 2009, but it was more likely due to a breakdown in the output gap/inflation relationship in the late 1990s.

In our view one of the weaknesses of both the production function and indirect inflation approach that could cause the output gap to be incorrectly measured is that neither recognises the effects that widening current account deficits and rising debt levels can have on trend growth.

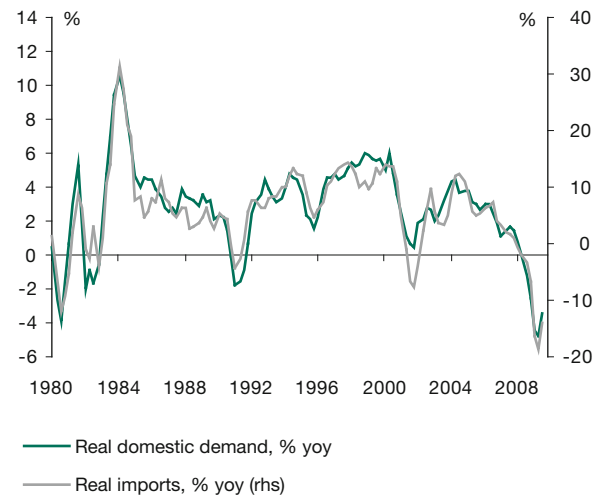
Consider an economy in which the easy availability of domestic and external credit pushes up domestic demand. The increased demand for tradables could be satisfied by increased imports and a widening current account deficit, while the increased demand for non-tradables could be met by a reallocation of domestic resources from the tradable sector to the non-tradable sector. Inflation will stay low and, if productivity growth in the non-tradable sector is higher than in the tradable sector, potential GDP

Figure 2
New Borrowing by the US Non-financial Sector Surged in 1990-2007



Sources: Federal Reserve, Deutsche Bank.

Figure 3
US Domestic Demand Driving Imports

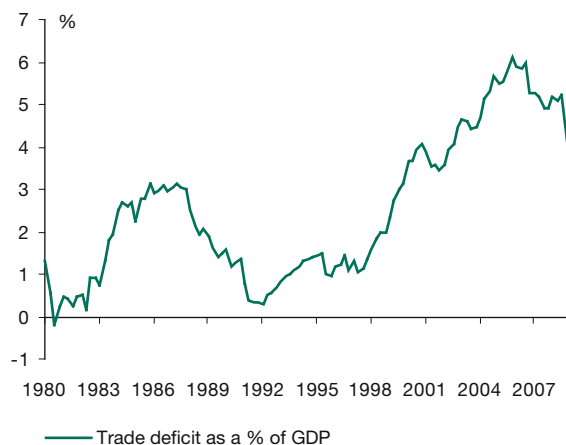


Sources: Bureau of Economic Analysis (BEA), Deutsche Bank.

growth as captured by the production function approach will rise.

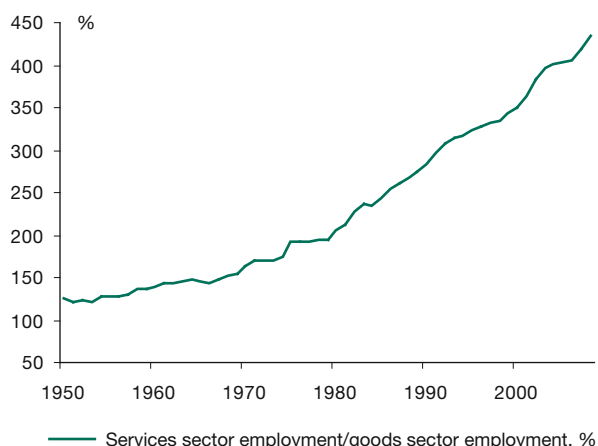
However, this stronger potential GDP growth can only be sustained while credit conditions ease, the current account deficit widens, and debt levels increase. If balance of payments or borrowing constraint started to bind, domestic demand growth would have to fall. This would force a reverse reallocation of resources back to the tradable sector from the non-tradable sector, thereby lowering productivity and potential GDP growth.

Figure 4
Surge in the US Trade Deficit



Sources: Haver, Deutsche Bank.

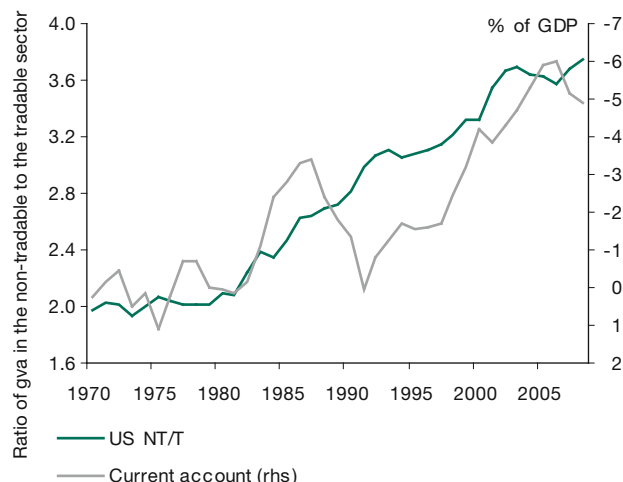
Figure 5
Shift of Resources to the Non-tradable Goods Producing Sector



Sources: BEA, Deutsche Bank.

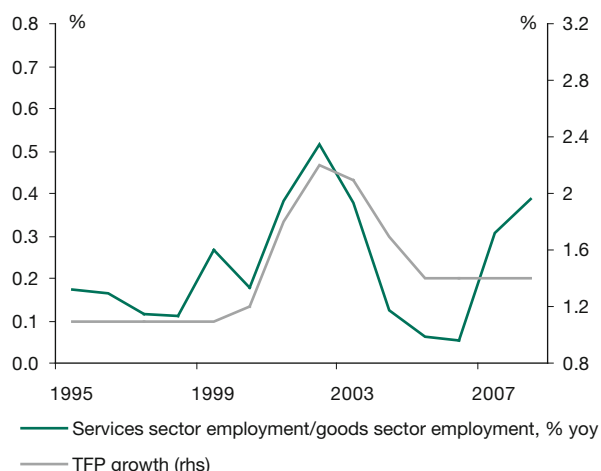
The theoretical case described above can be applied reasonably well to the USA during the 1990s. Easy credit conditions caused new borrowing as a percentage of GDP to increase (Figure 2), which in turn boosted real domestic demand growth. This fed through into imports (Figure 3), causing the trade deficit to widen (Figure 4). The increased demand for non-tradables was met by a reallocation of resources away from the tradable and into the non-tradable sector (Figures 5 and 6), which increased total factor productivity and potential GDP growth (Figure 7).

Figure 6
Shift of Resources to the Non-tradable Goods Producing Sector Correlated with Rising Current Account Deficit



Sources: OECD, Deutsche Bank.

Figure 7
Expansion on Non-tradable Goods Producing Sector Lifting Total Factor Productivity Growth



Sources: CBO, Deutsche Bank.

The above would seem to have been possible as financial innovation and advances in information and communication technology during this period probably boosted productivity growth in the non-tradable goods sector, raising factor returns and attracting resources from exporting and import competing industries. As a result, capital and labour inputs released in the traded goods sector due to substitution of domestic products by imports and reallocated to the non-traded goods sector lifted potential GDP growth. While it may be difficult to measure these

productivity growth differentials ex-post (we would not like to put too much weight on Figure 7), the reallocation of resources away from the tradable to the non-tradable sector suggests that at least ex-ante the returns to factors of production must have been higher in the non-tradables sector.

For the period 1992 to 2006, 3.5% real domestic demand growth gave rise to 8.1% growth in real imports, while growth in exports was more limited at 5.8% and the trade deficit widened throughout the period (Figure 4). If a tightening in domestic and external credit conditions meant that the current account deficit had to stabilise, import growth would have fallen to 5.8% in line with export growth. By our estimates, based on data from 1980 to 2009, a 1.0% decline in import growth would have had to be accommodated by a 0.45% - 0.55% decline in real domestic demand growth. Import growth of 5.8% would have meant domestic demand growth of 2.2% - 2.5%. This would have implied real GDP growth of a similar magnitude (as the contribution from net exports would have been zero), against actual real GDP growth during the period of 3.1%.

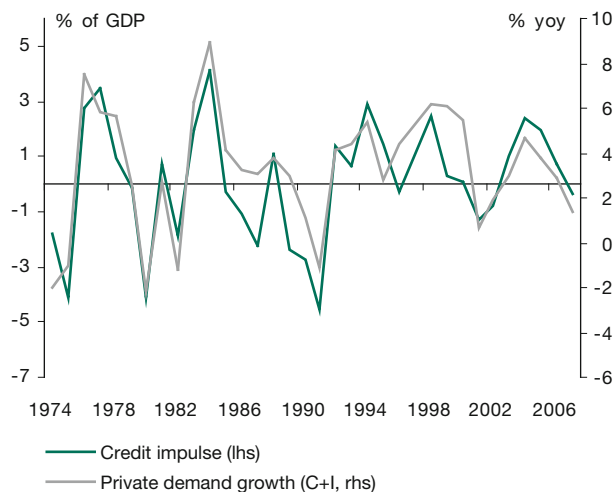
To approach the same problem from a different angle, we have argued before that real domestic demand can be boosted by an increase in net credit flows (which we dub a positive “credit impulse”).⁵ On average we would expect the credit impulse to be mildly positive as developments in the financial sector allow higher borrowing levels, but from 1996 to 2006 it averaged 1.0% of GDP. As Figure 8 shows, this positive credit impulse boosted real private sector domestic demand growth. More importantly in the context of the argument above, the credit impulse boosted real domestic demand growth in excess of real GDP growth, which implied a widening in the external deficit (Figure 9).

If the credit impulse had been only a small positive (as we would expect on average over time) rather than the robust 1.0% of GDP, by our estimates real GDP growth over this period would have been 2.7% rather than 3.1%. This suggests that in the absence of these external stimuli, potential growth from 1992-2006 was probably no more than 2.7%.

The two approaches on balance suggest that if US GDP had followed a more sustainable growth path, potential growth from 1996 to 2006 may have been 2.2% - 2.7%, rather than the 3.1% actually recorded. If capacity was created in these sectors that depended on very strong

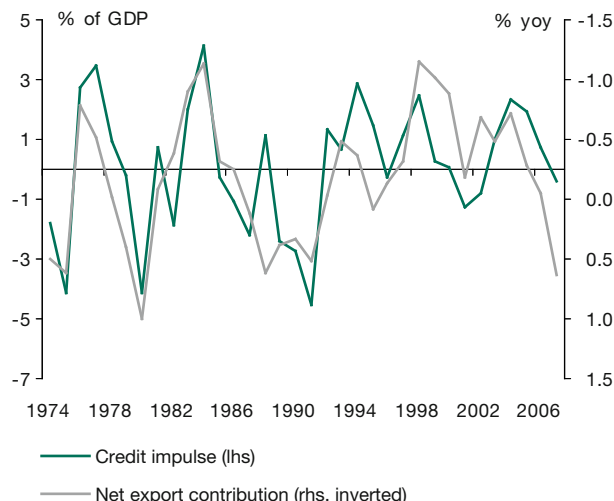
5 Cf. M. Biggs, T. Mayer: The Myth of the credit-less Recovery, Deutsche Bank, Global Macro Issues, 17 December 2009.

Figure 8
US Private Demand Growth and the Credit Impulse



Sources: BEA, Federal Reserve, Deutsche Bank.

Figure 9
The US Credit Impulse and Net Exports



Sources: BEA, Federal Reserve, Deutsche Bank.

credit-driven real domestic demand, then the removal of this credit could cause this capacity to be rendered obsolete.

What is the Effect of the Recession on the Level of Potential GDP?

A commonly held view is that potential GDP is unaffected by a downturn of actual GDP. During recessions, the latter dips temporarily below the former, catches up again during the upswing and finally exceeds potential during the phase of overheating, before entering the next recession.

sion. However, recent analysis by the OECD of a number of historical episodes suggests that recessions also depress the level of potential GDP by between 1.5% and 2.5% on average (and up to 4% for severe crises).⁶ The reason for the drop in potential GDP is that economic downturns make part of the capital stock obsolete and increase the unemployment rate consistent with stable inflation as the size of some industries is permanently reduced. Since it takes time to relocate resources potential GDP can be lower than before for some time, especially when the downturn is as long and severe as the recent one. In its Economic Outlook from mid-2009 the OECD estimates that shrinkage in the capital stock during the present recession could shave 2% off the level of US potential GDP.

In our view, this argument is reinforced by the above analysis. In the USA, excessively strong credit growth drove strong demand and robust GDP growth, but this growth path depended critically on rising debt levels and a widening current account deficit. In this process significant capacity was built up in residential construction and various financial services, but this capacity could only be utilised as debt and current account balances moved to unsustainable levels. Above we suggested that sustainable potential growth might have been significantly below the estimated levels. If we assume for a moment that past potential growth estimates were correct, then we could conclude that the current crisis is destroying big chunks of capacity in these sectors, inducing a massive plunge in the level of potential GDP.

In the previous section we argued that potential growth from 1996 to 2006 may have been overestimated on average by at least 0.4% per year. This would have left potential GDP overestimated by at least 4.0% in 2006, which is broadly the amount of capacity the OECD argues could be destroyed in a severe recession. Thus, the true output gap may have been 5% in 2006 instead of the 1% estimated by the OECD on the basis of the production function approach.

What is the Effect of the Recession on Potential GDP Growth?

The empirical evidence of the effect of recessions on the subsequent growth of potential GDP is mixed. According to an analysis of eleven countries by the EU Commission (published in their Quarterly Report II/2009), potential growth fell after recessions in about half the cases con-

sidered and increased in the other half. However, given the severity of the present downturn and the unfavourable demographic outlook, we see a high risk that potential growth will be lower in the future.

In the context of a production function, the drivers of potential GDP will be the labour force, the capital to labour ratio and total factor productivity. Firstly, both the CBO and OECD see labour force growth in the USA falling from 1.1% to 0.6% by 2011 and 0.5% by 2015. This decline, while not an impact of the recent recession, would take 0.6% off potential GDP growth.

Secondly, total factor productivity growth over the last decade has averaged 1.5%, and this contributed significantly to strong growth rates. As we argued earlier, the stronger TFP growth was probably due at least in part to a shift in resources from the tradable to the non-tradable sectors of the US economy, which was matched by a widening in the current account deficit. If this reallocation were to end, TFP growth would probably slow. TFP growth averaged 1.0% in the three decades prior to this one, and 0.8% from 1975 to 2005. A moderation in TFP growth towards these levels seems likely in the future.

If we assume that returns to capital must remain stable over time, then, within the context of a Cobb-Douglas production function framework, potential growth is:

Potential GDP growth = $1/(1-a)$ *TFP growth + labour force growth

where “a” is the capital share in the economy. If we assume that potential labour force growth is going to be equal to the 0.5% the CBO estimates, then potential growth will be a function of the capital share in the economy and TFP growth. Possible outcomes are shown in Table 1.

Table 1
US Future Potential Growth Estimates

Capital share	Total factor productivity growth			
	0.6	0.8	1.0	1.2
0.3	1.4	1.6	1.9	2.2
0.4	1.5	1.8	2.2	2.5
0.5	1.7	2.1	2.5	2.9

Source: Deutsche Bank.

⁶ See D. Furceri, A. Mourougane: The Effect of Financial Crises on Potential Output: New Empirical Evidence from OECD Countries, OECD Economic Department Working Paper, No.699, 2009.

In our view a capital share of around 0.3% - 0.4% would appear appropriate, and the most likely outcome for future TFP growth would be in the 0.8% - 1.0% range. If these ranges are correct, we would expect future potential real GDP growth to be in the range of 1.6% - 2.2% (grey cells in Table 1).

So far we have assumed no change in returns to capital. However, the present recession marks the end of a longer expansion based on credit-driven demand growth in a number of (mostly Anglo-Saxon) countries. As credit is unlikely to be as cheap and readily available again for any country in the future, capital stock growth is likely to be lower. The “capital shallowing” could lower real potential growth further, probably to 1.5% in the USA. All in all, the above considerations suggest reasonable ranges for potential growth in the USA of 1.5% - 2.0%. Following similar reasoning, we expect growth of 1.0% - 1.5% for the euro area.

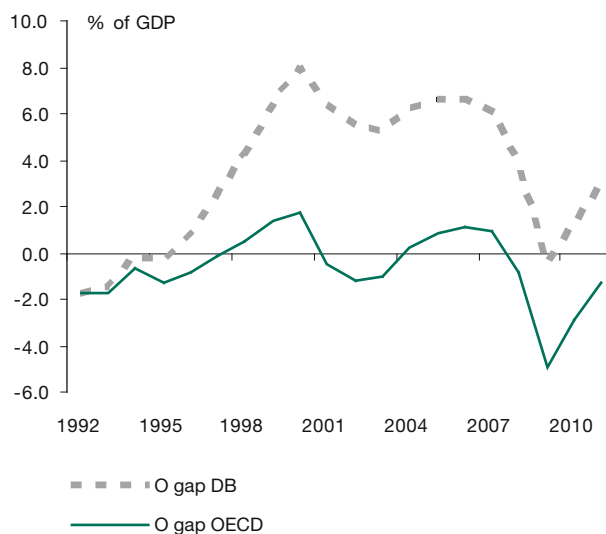
Our estimates point to a loss in potential growth in the USA between 1 and 1.5 percentage points from the pre-crisis rate. This is roughly in line with IMF estimates of the effects of banking crises on potential GDP. Analysing 88 banking crises, the IMF found that seven years following the crises potential GDP was on average 10% below the level it would have attained if growth had continued at the pre-crisis rate, which implies a drop in the annual trend rate of growth by about 1.5 percentage points.⁷

Alternative Output Gaps

Based on the discussion above we compare in this section conventional estimates and forecasts of output gaps with an alternative path based on different past estimates of potential GDP and taking into account possible effects of the present downturn on the level and growth rate of potential GDP. To represent the conventional output gap we use the OECD series for real potential GDP from the latest Economic Outlook (suggesting annual average potential growth of 3.1% in 1992-2006). Our alternative measure for the USA is based on the assumption that potential GDP growth averaged only 2.7% between 1992 and 2006 when credit-financed net imports artificially lifted average growth rates, and that it will average 1.75% as of 2008. We use Deutsche Bank’s latest US GDP forecasts for 2009-2011 (-2.5%, 3.6%, 3.3%) to calculate the predicted output gaps.

⁷ See IMF: World Economic Outlook, October 2009.

Figure 10
Alternative Estimates of the US Output Gap



Sources: OECD, Deutsche Bank.

Figure 10 shows two paths for the output gap in the USA (with negative numbers indicating under-utilisation of capacities). The conventional OECD measure puts the output gap at -2.9% in 2010, safely below any level that could raise inflation worries. Our alternative estimate based on the assumptions that potential growth during the 1990s was only 2.7% and potential growth drops to 1.75% as of 2008 shows an output gap of +1.3% for 2010. The positive output gap in 1996-2008 indicates that GDP growth during this period, which was characterised by asset price inflation and numerous financial bubbles, was way above the rate sustainable in the long term.

Conclusion: Inflation Risks Higher than Generally Expected

Past experience has shown that estimates of the output gap are highly uncertain and that reliance on such estimates for the conduct of economic policy (or for investment decisions) can lead to serious errors. The present extraordinary downturn in the wake of the burst of a global credit bubble would seem to make output gap estimates even more uncertain. Our simulations have demonstrated that output gaps could be very narrow and somewhat stronger-than-expected economic recovery could raise inflation pressures. If central banks were then prevented from exiting extremely easy policies quickly by worries about financial stability or fiscal solvency, inflation expectations could become unanchored.