

UK GDP is the best predictor of UK GDP, literally.

The ONS's preliminary estimate of UK GDP for the third quarter of this year showed a decline in output of 0.4% over the previous quarter. This confounded the average City forecast and that of the Bank of England's Monetary Policy Committee, both of which had expected to see a 0.2% rise. There is nothing unusual about economists getting their forecasts wrong, but the furore that surrounded this particular forecast error, large as it was, was different. Rather than questioning their forecast, most City economists seem to have taken comfort from some analysis by Goldman Sachs which poured scorn on the data, by arguing that the ONS data were "Unbelievable. Literally". This argument is based around the finding that the correlation between the ONS's preliminary estimate of GDP growth and the 'final' figure is 0.1, or 10%. Hence most have concluded that the preliminary GDP estimate is effectively useless as a guide to the final GDP number.

That is unfortunate, because this widely held view appears to be based on some seriously flawed analysis. In reality, the ONS's preliminary GDP estimate does exactly what it says on the tin. Below we explain why. This issue goes far beyond a dull technical dispute about econometrics, it goes to the heart of the most pressing policy issues of the day – is the UK still in recession; and how deep has that recession been?

Spurious econometrics: apples and pears

It is reasonable to ask whether M1 (the preliminary estimate GDP growth) is a good predictor of the final estimate of GDP growth. There are four ways in which it might not be:

- Revisions are large
- Revisions have a non-zero mean
- Revisions are negatively related to M1
- Revisions have a systematic component that is unrelated to M1

On the face of it, the Goldman Sachs analysis appears to have found evidence of all four of these manifestations of error. M1, it is argued, is a poor predictor because it is subject to large revisions; exhibits a non-zero mean in those revisions; a low correlation between final GDP and M1; and the significance of M1 (and indeed all other survey evidence) disappears altogether on the inclusion of the PMI survey in the same equation. We have replicated something like this equation, and attach the results in Appendix A, Table 1.



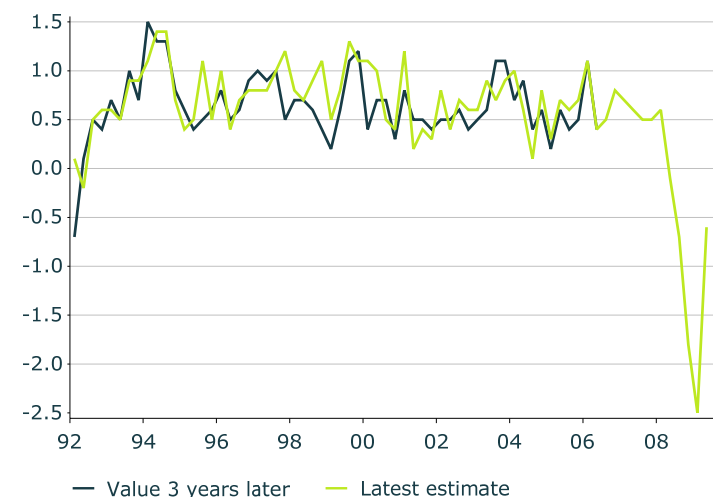
However, that does not mean that we share their conclusions. That is because they appear to have based their analysis on the wrong data. The ONS provides a number of vintages of GDP data starting from the M1 release which is output-based, to the M2 which includes expenditure and income measures and then the M3 which has the national accounts reconciliation. The data may then subsequently be revised for a number of reasons, but they broadly fall into two categories: new information; and methodological changes.

Our assertion is that the Goldman's analysis conflates the two sources of revision and hence in effect ends up comparing apples with pears. Our reasoning is simple. Goldman's analysis compares M1 estimates with the current estimate for a given quarter. But the current estimate includes sometimes significant methodological changes, like the introduction of chain-linking in 2003, or the introduction of the new European System of National Accounts (ESA 95). And the issue has become more acute recently, revisions made in Blue Book 2008 were more substantial than those made in the Blue Book 2007, owing to the reintroduction of balancing, benchmarking and methodological improvements. And revisions extended back to 1961, due to the introduction of a new methodology for estimating FISIM (financial intermediation services indirectly measured). More broadly over the past ten years or so, the service sector turnover data have progressively replaced poor indicators like VAT receipts and employment.

Chart 1

UK GDP Revisions

Per cent



Source: Reuters EcoWin / Fathom

These changes are obviously not forecastable. But counting these improvements as errors or bias in the preliminary estimates is clearly wrong. It is therefore not remotely surprising nor, in our view, interesting, to discover that estimates of GDP growth in 1975 did not foresee how



those estimates would alter once the data had been chain-linked to 2005 prices, or any of these other methodological changes were introduced - why would anyone expect them to? The current vintage of GDP growth data is chain-linked all the way back through its history, but the M1 data only became chain-linked after 2002. Hence the history of M1 data has a major methodological change in the middle, but the final GDP data series does not. Chain-linking makes a significant difference to both the mean and the variance of GDP growth (see Chart 1).

Similarly, finding that including a survey like the PMI composite in the equation (or indeed the first estimate of German GDP growth as Goldman's also did) 'knocks out' the M1 estimate is tantamount to saying that either the PMI or German GDP can foresee future methodological changes to UK national accounts data. And that in our view would be a totally meaningless and spurious finding. Or in technical terms, baloney.

Comparing apples with apples – M1 beats the PMI, hands down

So, what happens if we compare apples with apples? That is, chain-linked M1 data with chain-linked final GDP data, and non-chain-linked M1 data with non-chain-linked final data?

After three years, only changes to the methodology can cause the recorded GDP growth numbers to change. The underlying survey data do not change. This is an extremely important point. It means that in order to test whether the preliminary estimate of GDP is a good predictor of the 'final' number, we must carry out the test on a level playing field. We have therefore used the three-years-old GDP growth data (Y3) in our analysis, since this allows us to compare apples with apples: to compare the M1 data with corresponding 'final' GDP data compiled using the same methodology.

And, it turns out that not only is M1 a good predictor of the final data over the sample that stops at 2006 Q2, but it in fact dominates the PMI survey. So, rather than a 0.1 or 10% correlation, the true correlation is 0.6 or 60% (see Table 2). As the ONS says, this compares favourably with the findings of an OECD survey of other major statistical bodies¹.

We find that the coefficient on M1 is statistically significant, and that the equation exhibits no significant serial correlation or evidence of missing variables. That is not to say that the M1 data are perfect – far from it. Revisions are large and can be very important for policy, and there is some evidence of mean-reversion in those revisions. The initial estimate of quarterly GDP growth is, on average, 0.17 percentage points below the latest estimate. This is statistically significant and is higher than the figure of 0.15, calculated following last year's Blue Book dataset.

¹ Economic & Labour Market Review | Vol 3 | No 4 | April 2009, ONS.



But there is no evidence that we can find of missing variables, including the PMI (see Table 3). If we include the PMI composite indicator in this regression, it clearly interacts with M1 – which is to be expected, since M1 and the PMI composite are highly positively correlated (contemporaneous correlation of 0.9²). M1 is still significant at the 10% level, but the size of the coefficient is sharply reduced. Note, however, that the PMI composite indicator is not significant at the 20% level: the equation strongly prefers M1. And note that the inclusion of the PMI reduces the explanatory power of the equation, adjusting for degrees of freedom.

So, the bottom line is that when conducted properly, on a like-for-like basis, the econometric results very strongly favour the ONS preliminary estimate over the PMI (or any other survey for that matter). That should hardly come as much of a surprise – they are after all conducted by the same statistical agency, presumably to a consistent methodology. The ONS samples around 35,000 firms per month, and covers close to 100% of the economy. The PMI composite by contrast is a survey of less than 1,500 firms and covers just over 50% of the economy. This does not imply that the PMI data are useless, far from it. But they should be used as guide to predict future or interpret current GDP data, not as a substitute for them.

What, no recession?

Apart from a rather dull technical dispute between economists, is there a point to any of this? We would argue that there is. Because the implications of the Goldman Sachs analysis is not simply that the preliminary Q3 data will be revised up, it calls into question the entire recession. Goldman's argue that the preliminary estimate is particularly poor at turning points in the cycle. This is a very curious assertion, even taking our central point which is that the latest data embody all manner of methodological changes since 1975 into account - the 'preliminary' estimate was only introduced in 1993 and has therefore only covered one recovery so far.

Still, that's one full recovery more than the PMI survey has covered – unless you count the ones following the three phantom recessions that the PMI called in 1998, 2001 and 2003. Moreover as Chart 2 shows, you cannot have your PMI cake and eat it. It is noticeable that the GDP forecast produced by the company that runs the PMI survey, Markit, based on its composite measure differs significantly from the raw data. It appears to have been 'fitted' to the GDP data. But whether you use the raw data or the fitted forecast, the PMI either over-predicts the upswing for a decade, or it woefully under-predicts the scale and depth of the

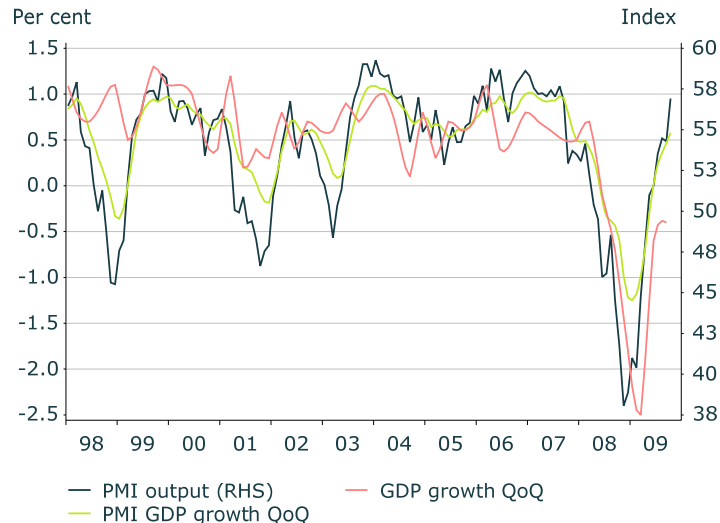
² Note that this very high correlation implies that the finding that the PMI composite can 'add' anything over and above the M1 estimate must be working within a margin of the 10% that is not captured in the direct correlation between the two variables.



current recession. It's one or the other. Hence we find it hard to understand how such strong claims can be made of such a partial survey of the UK economy which has not even covered one whole business cycle.

Chart 2

UK PMI-Based GDP



Source: Reuters EcoWin / Fathom

But for the sake of argument, let's take the Goldman's analysis at face value. Using the PMI composite-based measure of UK GDP we find that the UK has experienced by far the mildest recession of all the major economies³. And indeed the UK is alone in currently enjoying positive annual growth (Chart 3).

That is possible, but not very probable in our view, nor would it seem in the view of the foreign-exchange market. In fact, it is noticeable that even using the official data, the UK suffered a relatively smaller contraction around the turn of the year – the problem is that is that it appears to be taking somewhat longer to recover than the City would like. And in fact the latest data look set to further increase the divergence between the increasingly optimistic PMI survey and the official data. Industrial production data were revised down in the third quarter, implying if anything that the pressure on the ONS is to revise the first estimate down, as it has in six of the past eight quarters. Moreover, initial indications for the fourth quarter look similarly divergent. It is possible, barring a sharp acceleration in November and December's data, that the final quarter of 2009 will register a seventh consecutive fall in output.

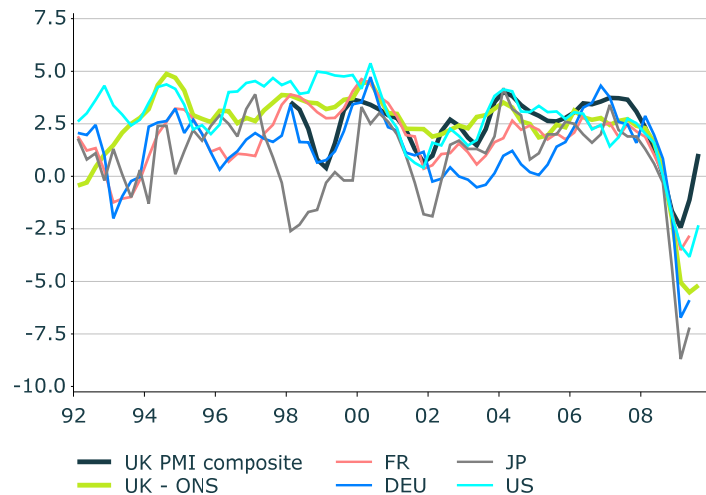
³ We assume that Goldman's do not have issues with all the other countries' GDP data as well. And we note in passing that in contrast to its views on UK GDP, Goldman Sachs is one of the most vociferous advocates of China's official GDP data, which are compiled in 15 days and are rarely if ever revised. Lack of revision should not be confused with accuracy.



Chart 3

International GDP Comparisons

Annual percentage change



Source: Reuters EcoWin / Fathom

Over the cycle

But the fundamental problem in running our horse race between the M1 and the PMI is that neither stretch back even one recession. As a result, our sample period has no cycle in it. The variance of GDP growth is very low during this period, and it is therefore difficult to capture the true explanatory power of either M1 or PMI data: the estimates are dominated by the noise in the revisions to GDP data, which is probably much larger in comparison to the signal than it would be if the sample period included a full cycle.

So, in our final regression, we extend the sample period to run right up to the second quarter of 2009. That is, we relax the constraint that the GDP data have to be three years old (after which no new data are collected). The third GDP release that occurs in the third month after the relevant quarter (M3) can still be marginally revised as the underlying data set is completed (i.e. for non-methodological reasons). But those data revisions tend to be small: subsequent changes to the methodology can make and have made a large difference⁴ but, by the third month, nearly all of the underlying data are in.

But using M3 allows us to include the recent cycle. On this basis, M1 is an excellent predictor of near-final GDP data – though of course it may still be a poor predictor of any future methodological changes. There is no significant bias in the revisions between M1 and M3 (the constant is not significantly different from zero), and the equation exhibits neither serial correlation nor evidence of missing variables. M1 explains 94% of the

⁴ The largest mean revision takes place at Blue Book 2 (BB2), and are generally methodological.



variance in M3, with a coefficient that is not significantly different from 1 (Table 4). In other words, it pretty much does what it says on the tin.

The composite PMI interacts with M1 in this equation too – but the coefficient on M1 remains strongly significant and unity cannot be rejected. The PMI is insignificant at the 5% level but significant at the 10% level (Table 5). Our inference is that we should certainly pay close attention to the PMI data, since it is possible they contain some information about forthcoming revisions to GDP growth. But it would be crazy to suggest that the PMI data should supplant M1: at best (and the evidence here is inconclusive) they provide supplementary information.

In conclusion, the preliminary ONS estimate ‘should’ have a unit coefficient in the final estimate of GDP, and the constant in that regression ‘should’ be zero – implying no bias. If there were clear evidence that either or both of those ‘shoulds’ were not the case, that would imply there was something systematically wrong with the way the ONS puts together its first estimate of GDP growth. There is no such evidence that we can discover in the data. The ‘evidence’ cited by most commentators is based on analysis that takes no account of methodological changes. It therefore compares apples with pears, and is unbelievable, literally.

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Appendix A – Regression tables

Table 1

Dependent Variable: GDPNOW
 Method: Least Squares
 Date: 11/03/09 Time: 08:29
 Sample (adjusted): 1998Q1 2006Q4
 Included observations: 36 after adjustments

	Coefficient	Std. Error	t-Statistic	Prob.
C	0.591403	0.120892	4.892007	0.0000
M1	-0.046523	0.295532	-0.157421	0.8759
PMI_COMP	0.233174	0.210126	1.109688	0.2752
R-squared	0.059330	Mean dependent var		0.708333
Adjusted R-squared	0.002319	S.D. dependent var		0.295079
S.E. of regression	0.294736	Akaike info criterion		0.474184
Sum squared resid	2.866693	Schwarz criterion		0.606144
Log likelihood	-5.535312	Hannan-Quinn criter.		0.520242
F-statistic	1.040680	Durbin-Watson stat		1.871010
Prob(F-statistic)	0.364518			

Table 2

Dependent Variable: Y3
 Method: Least Squares
 Date: 11/03/09 Time: 17:16
 Sample (adjusted): 1993Q1 2006Q2
 Included observations: 54 after adjustments

	Coefficient	Std. Error	t-Statistic	Prob.
C	0.299639	0.085807	3.492025	0.0010
M1	0.673770	0.138223	4.874501	0.0000
R-squared	0.313629	Mean dependent var		0.685185
Adjusted R-squared	0.300429	S.D. dependent var		0.292296
S.E. of regression	0.244477	Akaike info criterion		0.056943
Sum squared resid	3.107990	Schwarz criterion		0.130609
Log likelihood	0.462528	Hannan-Quinn criter.		0.085354
F-statistic	23.76076	Durbin-Watson stat		1.610077
Prob(F-statistic)	0.000011			



Table 3

Dependent Variable: Y3
 Method: Least Squares
 Date: 11/03/09 Time: 17:17
 Sample (adjusted): 1998Q1 2006Q2
 Included observations: 34 after adjustments

	Coefficient	Std. Error	t-Statistic	Prob.
C	0.291484	0.091361	3.190470	0.0032
M1	0.393071	0.223223	1.760893	0.0881
PML_COMP	0.200528	0.157997	1.269193	0.2138
R-squared	0.335800	Mean dependent var		0.614706
Adjusted R-squared	0.292949	S.D. dependent var		0.263004
S.E. of regression	0.221150	Akaike info criterion		-0.095849
Sum squared resid	1.516134	Schwarz criterion		0.038830
Log likelihood	4.629438	Hannan-Quinn criter.		-0.049920
F-statistic	7.836350	Durbin-Watson stat		1.879993
Prob(F-statistic)	0.001760			

Table 4

Dependent Variable: M3
 Method: Least Squares
 Date: 11/03/09 Time: 18:00
 Sample (adjusted): 1993Q1 2009Q2
 Included observations: 66 after adjustments

	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.028729	0.022194	-1.294497	0.2001
M1	1.054364	0.032373	32.56963	0.0000
R-squared	0.943100	Mean dependent var		0.469697
Adjusted R-squared	0.942211	S.D. dependent var		0.543201
S.E. of regression	0.130582	Akaike info criterion		-1.203796
Sum squared resid	1.091307	Schwarz criterion		-1.137443
Log likelihood	41.72526	Hannan-Quinn criter.		-1.177576
F-statistic	1060.781	Durbin-Watson stat		2.075372
Prob(F-statistic)	0.000000			



Table 5

Dependent Variable: M3

Method: Least Squares

Date: 11/03/09 Time: 18:09

Sample (adjusted): 1998Q1 2009Q2

Included observations: 46 after adjustments

	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.070331	0.029270	-2.402802	0.0207
M1	0.933340	0.078601	11.87438	0.0000
PML_COMP	0.170087	0.087759	1.938114	0.0592
R-squared	0.955415	Mean dependent var		0.380435
Adjusted R-squared	0.953341	S.D. dependent var		0.618823
S.E. of regression	0.133669	Akaike info criterion		-1.123901
Sum squared resid	0.768303	Schwarz criterion		-1.004641
Log likelihood	28.84971	Hannan-Quinn criter.		-1.079225
F-statistic	460.7269	Durbin-Watson stat		2.200612
Prob(F-statistic)	0.000000			