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Alan Greenspan was right, after all.

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- Greenspan has been often accused of overreaction to changes in economic conditions, in particular, of having cut Federal funds rates excessively in 2001, despite the fact that the recession looked relatively mild compared with previous ones, contributing to the build-up of excess liquidity in global markets and over-pumping the real estate bubble in the US.
- The market was also surprised, when Greenspan hiked rates aggressively in 2003-2005, putting the rebound of the US economy in danger and risking a new recession.
- However, according to the new revisions of past GDP data, the 2001 recession was in fact deeper and the rebound of 2003-2005 stronger than previously thought. Greenspan seems to have assessed the state of the US economy correctly, as opposed to the average economic analyst and many of his critics.
- The reason is that the output gap, which is usually used by analysts in Taylor-type rules to estimate the policy neutral level of interest rates, is a bad proxy of the true state of the economy.
- In our view, Ben Bernanke will be almost as unpredictable as Greenspan was. This is because, first, the Fed's assessment of the state of the economy will continue to differ from analysts' predictions as data get constantly revised, and, second, because surprises make sure that monetary policy is effective in affecting the real economy.

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Alan Greenspan was right, after all.

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Greenspan has been often accused of overreaction to economic fundamentals, in particular, of having cut Federal funds rates excessively in 2001, despite the fact that the recession looked relatively mild, compared with previous ones, contributing to the build-up of excess liquidity in global markets and over-pumping the real estate bubble in the US. [1] The market was also surprised, when Greenspan hiked rates aggressively in 2003-2005, putting the rebound of the US economy in danger and risking a new recession. [2]

According to the new revisions of past GDP data by the BEA (Bureau of Economic Analysis) and past potential GDP by the CBO (Congressional Budget Office), the 2001 recession was in fact deeper and the rebound of 2003-2005 stronger than previously thought. Greenspan seems to have assessed the state of the US economy correctly, as opposed to the average economic analyst and many of his critics.

The reason is that the output gap, which is usually employed by analysts in Taylor-type rules of monetary policy, is a bad proxy of the actual state of the economy. GDP data are constantly revised backwards as new information arrives so that the state of the economy in a particular quarter often appears to be quite different a few quarters later from what we have thought in real time. The job of central banks is to interpret real time data correctly and often to guess the actual state of the economy based on diffuse information or (to some extent) information not available to the public. Given the recent revisions of GDP data, Greenspan seems to have acted as a forward-looking central banker, "guessing" correctly the strength of both the recession and the subsequent rebound of the US economy.

Taylor rules of monetary policy

In a path breaking article in 1993, John Taylor suggested a simple feedback rule for monetary policy.[3] According to Taylor's rule, the Fed should hike interest rates when inflation increases above the Bank's target rate and/or the state of the economy improves. The state of the economy is usually measured by output gap, the percent deviation of GDP from potential.

There are two potential problems in assessing the state of the economy using the output gap. First,

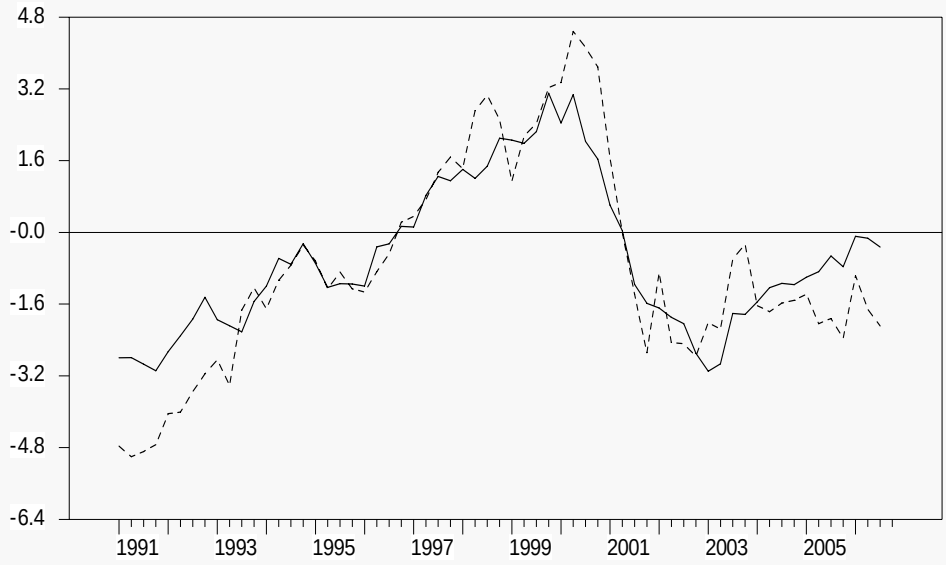
[1] A search in Google of the phrase "Greenspan and excess liquidity" gives 23,100 findings, whereas a search of "Greenspan and bubble" gives the amazing number of 832,000 findings.
[2] A search in Google of the phrase "Greenspan and overreaction" gives 19,100 findings, whereas a search of the phrase "Greenspan and surprise" gives 604,000 findings.

[3] See John Taylor: "Discretion versus Policy Rules in practice". Carnegie-Rochester Conference Series on Public Policy, 39, December 1993, pp. 195-214.

potential GDP is not measurable and must be estimated in some way. Alternative methods give different results. Hence, measuring potential GDP is subject to an estimation error. Second, actual GDP is regularly revised backwards, sometimes heavily. As a result, both the level and the growth rate of GDP turn out to be quite different from what we thought in real time. Revisions of GDP data (both actual and potential) are a second important source of uncertainty about the state of the economy.[4]

data available to the public in each quarter (before the revisions).[5] The difference between the two lines is particularly large, of the order of ±2%, when the economy is in a turning point, such as during the 1991 recession, before the 2001 recession and during the rebound of 2003-2006.[6] As a result, the measurement error of the state of the economy is particularly large when the direction of monetary policy changes, i.e. in times when accurate information is needed most. This is in our view the main reason why markets are surprised when central banks change interest rates more than expected.

Figure 1:
State of the US economy (output gap)



The straight line is output gap measured with the latest available data of Q4:2006. The dotted line is output gap as measured in real time, i.e. using data available to the public in each quarter.

Figure 1 shows two measures of output gap in the US. The straight line is output gap measured with the last available data of Q4:2006. The dotted line is output gap as measured in real time, i.e. using

[4] See Athanasios Orphanides: "Monetary Policy Based on Real Time Data", American Economic Review, vol. 91, September 2001, pp. 964-985.

[5] Data are from the Federal Reserve Bank of St. Louis (Real Time Database, http://research.stlouisfed.org/fred2/vintageseries/18). Potential output data are from CBO (Congressional Budget Office), available at the Real Time Database of the Federal Reserve Bank of Philadelphia.

[6] A measurement error of ±2% of GDP is huge, given that the output gap moves between a minimum of -3.1% and a maximum of +3.2%.

Why was Greenspan right, after all?

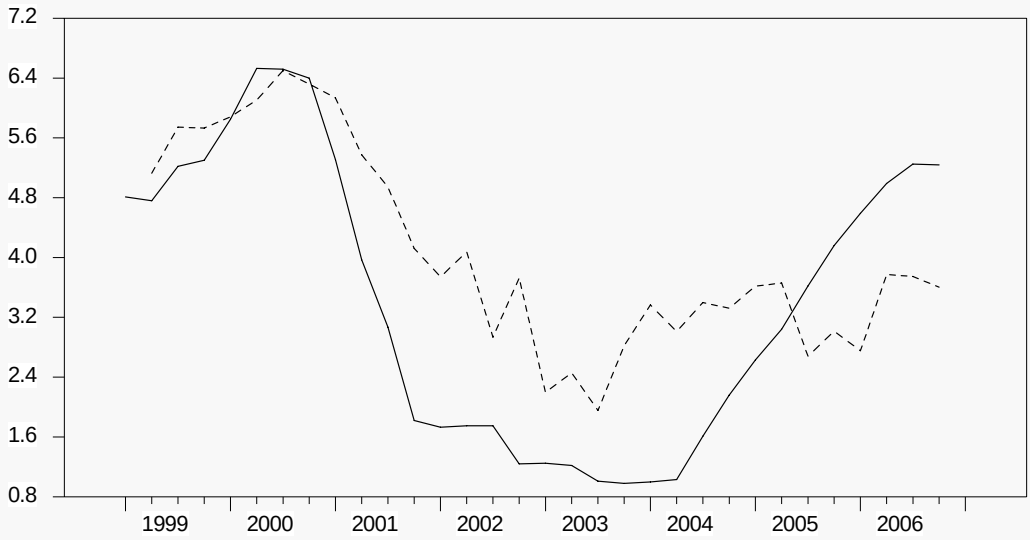
In order to understand why the market has created the wrong image of Greenspan being an over-reactive central banker, we must take into account that most analysts assume a Taylor rule as the Fed's reaction function. As the state of the economy in 2001 did not seem too bad given the available data of GDP and output gap, the market assumed that the Fed will not cut rates aggressively.

In Figure 2 we plot the Fed funds rate (straight line) and the estimates of the policy neutral rate of a Taylor rule (dotted line) based on PCE inflation and the real time output gap, i.e. the output gap using real time GDP and potential GDP data available to the Fed when it had to decide about the level of the Fed funds rate. We estimate the level of the policy neutral rate using recursive estimates of the reaction coefficients in order to proxy as better as possible the analysts' real time forecasts of Fed funds rates.

Using real time data, the Fed seems to have overreacted to the 2001 recession and the subsequent rebound of the economy. The Fed seems to have cut interest rates excessively in 2001-2003 and to have hiked rates excessively in 2004-2006.

In both cases, the reason for the systematic error in predicting the level of the Fed funds rate was the error in assessing the true state of the US economy using the available GDP data. Since 2000, GDP has been repeatedly revised backwards, so that the state of the economy during the whole period turned out

Figure 2:
Fed funds rate and estimates of policy neutral rate of a Taylor rule using real time data

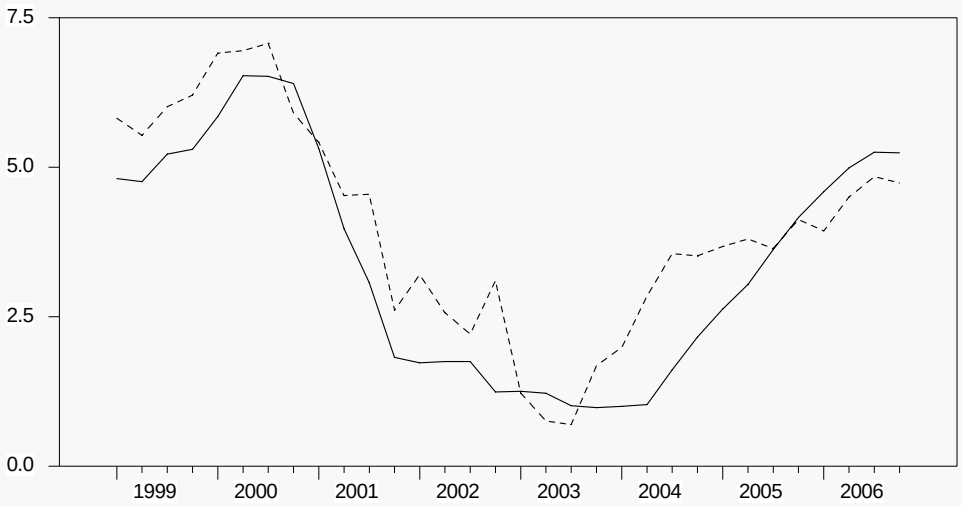


The straight line is the Federal funds rate. The dotted line is the recursive estimate of the neutral level of the Fed funds rate of a Taylor rule using real time data of the output gap. The Taylor rule is:

$$\text{Fed funds} = a + b(\text{Core PCE}) + c(\text{GDP gap}),$$

where Fed funds: Federal funds rate, Core PCE: Core PCE inflation y-o-y, GDP gap: output gap using real time data on GDP (BEA, NIPA tables) and potential GDP (CBO).

Figure 3:
Fed funds rate and estimates of policy neutral rate of a Taylor rule using Q4: 2006 data

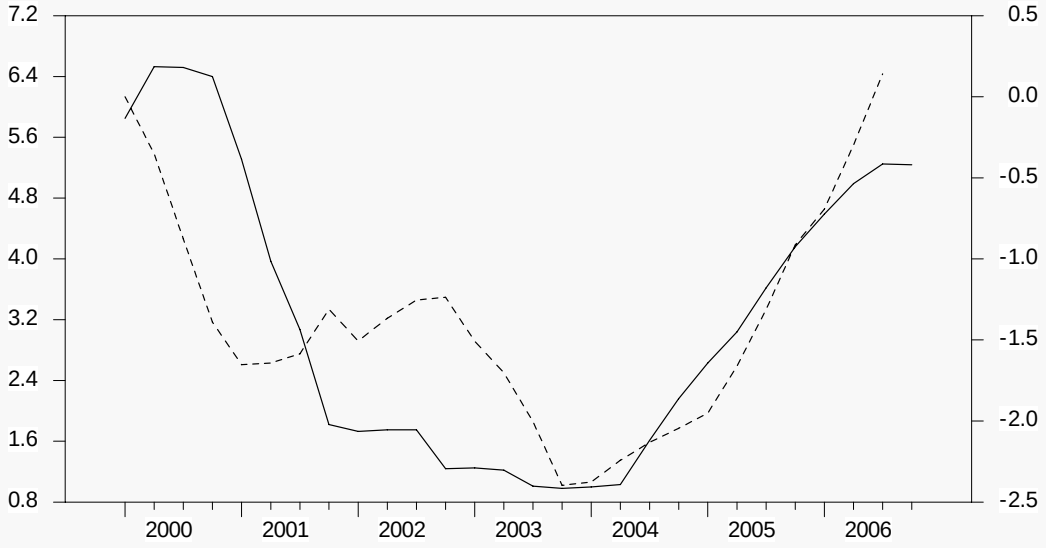


The straight line is the Federal funds rate. The dotted line is the estimate of the neutral level of the Fed funds rate of a Taylor rule using data of the output gap, available in Q4:2006. The Taylor rule is:

Fed funds = a + b(Core PCE) + c(GDP gap),

where Fed funds: Federal funds rate, Core PCE: Core PCE inflation y-o-y, GDP gap: output gap using data available in Q4:2006.

Figure 4:
Greenspan was forward looking.
Fed funds rates and cumulated revisions of output gap



to be quite different from what economists thought at that time. In particular, GDP has been revised upwards during the period 1991-1999 and downwards during the period 2000-2005. The revisions were particularly strong in 2000-2001. Similarly, potential GDP has been revised upwards during 1993-2000 and downwards after the 2001 recession. After observing the GDP revisions, the economy appears to have been in a worse state in 2000-2003 and in a better state in 2004-2006 than we have thought back then.

Figure 3 plots the Fed funds rate (straight line) and the estimates of a Taylor rule using the latest available data on GDP and potential GDP as of Q4:2006. The figure suggests that the Fed did not cut rates excessively in 2001, as the recession turned out to be deeper than we thought back then. Similarly, the Fed did not hike rates excessively in 2004-2006, as the economy appears to have been in a better state than we have thought back then.

We conclude that the Fed acted in a forward looking manner, setting interest rates in line with the actual state of the US economy. This gets clear in Figure 4, which plots the Fed funds rate on the left axis (straight line) and the cumulated revisions of the output gap since 2000 on the right axis (dotted line). The strong correlation between the two lines suggests that the Fed has correctly guessed both the direction and the rough magnitude of future revisions of GDP and set interest rates appropriately.

Conclusion

Our main conclusion is that monetary policy is too complicated to be captured in a feedback rule such as the standard Taylor rule. Using such a rule to forecast interest rates often leads to market surprises as the central bank often seems to overreact to changes in the state of the economy. The reason for this is in our view the fact that the output gap, used by most analysts in assessing the state of the economy, is a bad proxy. GDP data are constantly revised backwards, so that the true state of the economy often appears to have been quite different from what we have thought at the time when we had to forecast interest rates. Central banks make their own assessment of the state of the economy using more information than contained in simple output gap measures. Contrary to expectations of Fed observers that Bernanke will likely follow a Taylor type rule more closely than Greenspan, monetary policy will in our view continue to surprise markets. This is because, first, the Fed's assessment of the state of the economy will continue to differ from analysts' predictions as data get constantly revised, and, second, because surprises make sure that monetary policy is effective in affecting the real economy.

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