Discussion

of

"Measuring the Natural Output Level by DSGE Models: An Empirical Investigation for Switzerland" by Stefan Leist and Klaus Neusser

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What Output and Which Gap?

The output gap is an elusive concept because it is not directly observable. And yet, it plays a central role in the assessment of the business cycle and in traditional formulations of monetary policy rules.

The output gap is defined as the difference between the natural level of output – or NAIRU output – and the actually achieved level. Theories of business cycles suggest that this gap is self-correcting, and thus actual output fluctuates around the (stochastic) natural output. Estimating the output gap is difficult, because even though actual output can be measured (although with a significant amount of imprecision and a considerable time lag), the natural output level cannot be measured directly, but must be estimated. The usual way to go about this is to use some form of ad hoc smoothing. Any deviation of actual output from some (more or less sophisticated) moving average is called the "output gap." This chartist's approach to measuring the business cycle is very pragmatic, very simple, and most likely very wrong.

Leist and Neusser attack the problem more fundamentally. They estimate the gap by interpreting it through the lens of a New Keynesian macro model. The authors distinguish three concepts of output. First, there is *potential output* ($\ln Z$ in their notation). This is the equilibrium output that would prevail in a frictionless Walrasian equilibrium given available factors and technology. It seems to me that this should be an upper bound for actual output and not a trend around which output fluctuates. The authors assume that potential output is difference stationary. An alternative, which personally I find more compelling, but which the authors do not discuss, is to assume that potential is trend stationary. Secondly, there is *natural output* (y^n). This is "the level of output that would

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prevail under imperfect competition, but with flexible prices and wages" (LEIST and NEUSSER, first paragraph of the introduction). Finally, there is the observed actual output (y).

The difference between actual and potential output is thus split into two parts. On the one hand, the difference between potential and natural output is due to all non Walrasian features (such as imperfect competition), except anything related to inflexible prices. On the other hand, the gap between natural and actual output is due only to imperfectly flexible nominal prices, but not to imperfect competition or other non Walrasian features of the economy. This distinction appears somewhat artificial, because price inflexibility may stem partly from a lack of competition. And yet, the distinction is helpful because only the gap between natural and actual output ($x = y - y^n$) is likely to self-correct and fluctuate around zero. In contrast, there is no clear argument why the difference between natural and potential output ($y^n - \ln Z$) should be zero on average, so this item is unsuitable as a measure of the business cycle. Of course, one should not forget that fluctuations of this natural-vs-potential gap do contribute to fluctuations of actual output. Likewise, fluctuations of the potential output process itself also contribute one-for-one to fluctuations of actual, observed output. Indeed, this used to be the punch line of old real business cycle theory. But fluctuations that are due to such reasons are outside of the scope of policy instruments that operate on the demand side, such as fiscal or monetary policy, so there is not much we can do about them.

Where Has the Gap Gone, and What Does it All Mean?

Leist and Neusser estimate a DSGE model which features some improvements over the basic version of the model. In particular, their model features habits and an open economy block. They calibrate some of the coefficients and estimate the rest. From the estimated model and the observed data, they can then identify the part of the fluctuations of actual output that are due to the gap in the traditional sense (i.e. the difference between actual and natural output). They find that this contribution is very small. In fact, the gap appears to be almost zero throughout their sample.

This is a shocking result, because it goes so strongly against the common prejudice. First of all, it means that the lion's share of output fluctuations must be due to fluctuations of natural output. These fluctuations can be due to changes of the natural-vs-potential gap, or they can be due to fluctuations of potential output per se (due to changes in the availability of factors or productivity innovations).

This is a classic real business cycle story. It implies that policy cannot do much to smooth the fluctuations of output we observe in the data.

Secondly, this result raises the question of how important the role of output stabilizing policy really is in Switzerland. One explanation for the fact that the gap is essentially zero is that nominal price rigidities are not important. That would mean that there is no scope for monetary or fiscal policy to smooth the business cycle. Another, almost orthogonal explanation would be that monetary and maybe also fiscal policy have been so successful in smoothing the business cycle that almost none of it remains in the data. So, the absence of an important output gap can either indicate the irrelevance of business cycle smoothing policies, or the overwhelming success of it.

At this point, it is not clear which interpretation is correct. What does come out of the estimation, however, is that nominal price rigidity is less important than what the authors expected beforehand. One measure of nominal price rigidity is the Calvo parameter, θ. This parameter indicates the probability that a firm is not allowed to change its price between two consecutive periods. $\theta \approx 1$ indicates very rigid nominal prices, $\theta = 0$ indicates completely flexible nominal prices. The authors' expectation prior to performing the estimation was that $0.75 < \theta < 0.8$, based on a study by Sylvia Kaufmann. This assumption, together with the calibration of the discount factor β, implies a coefficient $\kappa \approx 1$; κ is an important parameter which is proportional to the slope of the Phillips curve. This κ, however, is estimated as 0.32, meaning that the Phillips curve is about three times as steep as originally expected by the authors. The Phillips curve parameter κ and the Calvo parameter θ are related to each other in a quadratic fashion, $\kappa\theta = (1 - \theta\beta)(1 - \theta)$, so one can back out the value of the Calvo parameter that is implied from the estimated κ. One finds that $\theta \approx 0.57$. That means that price rigidity is not irrelevant (θ is far from zero), but still considerably less important than what the authors originally believed.