

## Comments on: “Learning and the complexity of monetary policy rules”

By Robert J Tetlow, Peter von zur Muehlen and Frederico S Finan

Comments by Scott Roger, International Monetary Fund

This is a thought-provoking and technically impressive paper. The issue being tackled - whether simple monetary policy rules out-perform more complicated rules when private agents have to learn about the rule - is important. The paper demonstrates that trying to answer the question is no simple matter, either conceptually or technically. The complexity of the exercise is reflected in the range of matters that the authors have had to grapple with: specification and estimation of a small model of the US economy; representation of the stochastic environment; modeling the Fed's preferences and how these translate into a policy reaction function; setting out the process by which private agents learn; and making sure that the model solves.

In the model, private agents do not know the central bank's policy rule and, therefore, must infer the rule from the central bank's actions. And, in a stochastic environment, the difficulty of inferring the policy rule increases with its complexity. In such circumstances, a simple policy rule that is fairly easy for agents to decipher might perform about as well as more complex rules that are hard to figure out.

Within this context, the authors examine three issues. The first is whether, in stochastic steady state, a (linear) policy rule involving few arguments performs well compared with one involving more arguments. The second question is whether the costs of learning about a new rule will tend to induce inertia in the policy regime (even if policymakers' preferences change). Lastly, the authors consider how the costs of learning a new rule might affect the choice of policy rule in a transition from a sub-optimal regime towards an optimal regime.

On the first question, the authors find that there are positive but steeply diminishing returns to complexity in the policy rule: the optimal 3-parameter rule (involving policy responses to the output gap, to deviations of inflation from target, and to changes in the short-term nominal interest rate) performs nearly as well as the (unrestricted) 7-parameter optimal rule, but the 3-parameter rule also significantly out-performs the optimal 2-parameter rule involving only inflation and the output gap. In short, the authors obtain the intuitively appealing result that a fairly simple rule performs quite well, but that a simplistic rule - including the Taylor rule - does not.

On the second question, the authors find that it is less costly to switch from a 'conservative' policy regime (emphasising reduction in inflation variance as opposed to output variance) to a 'liberal' policy regime than *vice versa*. In part this stems from the slow adjustment of expectations in the model. As a consequence, an incoming 'liberal' policymaker will benefit from the anti-inflation

reputation of his/her 'conservative' predecessor, while an incoming 'conservative' will be saddled with the less well-anchored inflation expectations of the previous regime. Asymmetry also arises in part (as the authors note) from the fact that, although both the 'liberal' and 'conservative' policymakers will react similarly to excess demand shocks, the 'conservative' will react more forcefully to supply disturbances, inducing significantly greater volatility in output in order to dampen inflation. The 'liberal' benefits more from minimising this tradeoff than the 'conservative' benefits from making it.

On the third question, the authors find that, starting from a sub-optimal (2-parameter) Taylor rule, it pays policymakers to move directly to an optimal 3-parameter rule rather than to stop short at an optimal 2-parameter rule. In other words, the marginal cost in terms of learning a more complex rule is worth incurring.

In my comments on the paper, I will focus on three particular issues raised by the paper: the learning process; the asymmetry of knowledge between the central bank and private agents; and the 'liberal/conservative' characterisation of central bankers.

An important feature of the model is that it takes private agents quite a long time to learn the policy rule. This matters for the preference switching analysis and for the analysis of shifting towards more optimal rules for given preferences. Long learning times add to the cost of switching, which tends to inhibit regime changes except for a switch from a 'conservative' to a 'liberal' rule, since slow learning acts as a bonus in this case. As an empirical matter, however, this learning appears to me to be rather slower than one sees in the real world. From early in the 1980s most industrial country central banks began to put a lot more emphasis on controlling inflation. My impression is that it took agents a few years, but much less than a decade, to take this on board.

One reason why the learning process may seem unrealistically slow is that, in the model, the policy rule has no inherent credibility. Perceptions are based entirely on learning from experience. In reality, agents may have more information or may be more easily convinced. Central banks, especially those that fit the authors' description of 'conservative', tend to devote very substantial resources - including much of the time of their most senior staff - to explaining policy and emphasising their preferences. Presumably they would not do this if they felt that it had no real impact on credibility.

Learning in the real world might also be faster if agents do not use a least squares process. As noted by the authors, a non-linear approach might be more efficient in correcting biased estimation. I might add that an additional difficulty with least squares is that the parameter estimates will be very sensitive to outlier observations. A consequence is that even a single outlier can throw off convergence of estimated parameters to the true parameters for a long time. In other words, least squares learning is not a very robust method. From this perspective, it might be more rational for agents to engage in least absolute errors learning. In this case, the parameter estimates may be less efficient asymptotically than least squares estimates, but might allow for pretty good estimates to be obtained quite quickly.

Of course, if the real world is characterised by faster learning by private agents, then the paper implies that it would be quite improbable that a central bank would stick with a rule as far from the optimal (for most preferences) as the Taylor rule. Even with slow learning, the paper suggests that

a central bank with the necessary autonomy is likely to pursue a close to optimal rule. And yet the Taylor rule is often characterised as a reasonable approximation of what at least some central banks use. What this anomaly might be pointing to is the model assumption that the central bank actually knows the structure of the economy, in contrast with private agents. If the assumption were relaxed, so that the central bank was learning as well, then it would be bound to make policy errors. This would make learning more difficult for the private sector. Moreover, the central bank may prefer to use a relatively simple policy rule if it is likely to be more robust to errors in parameter estimates than a more complex rule. Clearly, implementing dual learning would be technically quite difficult, and I am not suggesting that the authors should have done so. I am suggesting, however, that the use of relatively simple and, sometimes, apparently sub-optimal policy rules in the real world may reflect ignorance on the part of policymakers as much as on the part of private agents.

My last comments concern the 'conservative' and 'liberal' policymakers. The distinction between these two is not whether one prefers lower inflation to the other, or whether one has a wider range of objectives than the other. The only difference is the relative weights placed on the variances of output and inflation. As indicated in the paper, the difference in preferences is not so important in the event of demand shocks, since stabilising output will also work in the direction of stabilising inflation. Where the difference really does matter is in their responses to supply disturbances. In this event, the 'conservative' will react to the prospective change in inflation, accentuating the output movement, while the 'liberal' will tend to follow the opposite course.

In reality, however, even the central banks perceived as single-mindedly pursuing inflation targets actually focus considerable attention on some measure or other of 'core' inflation that seeks to filter out the effect of supply shocks. If such a measure is a good one, it implies that the correlation (allowing for transmission lags) between the variance of 'core' inflation and the output gap will be positive, not negative. As a consequence, the meaningful practical distinction between the 'conservative' and 'liberal' will be significantly reduced. Another way of putting it is that the 'conservative' central banker who focuses on a measure of core inflation in setting policy is actually a closet 'liberal' in terms of this model. So one has to be rather careful about comparisons between the model stereotypes and real world central bankers. An alternative differentiation that might be interesting to consider in this kind of model is Lars Svensson's distinction between the 'strict' and 'flexible' inflation targeting. My intuition is that learning might be faster with relatively 'strict' targeting, since it involves stronger, more immediate, policy reactions than 'flexible' inflation targeting.

My comments on the paper should not be read as suggesting that the authors should have written a different paper. By incorporating learning into the model, the authors have added an important element of reality that is normally swept safely under the rug. The paper shows that allowing for learning helps explain a number of real world phenomena. It also opens up numerous avenues for further research.