Comments on: "Monetary policy with NAIRU uncertainty and endogenous policy credibility: perspectives on policy rules and the gains from experimentation and transparency"

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The approach adopted in almost all of the papers in this conference volume is to evaluate monetary policy rules in a small macro-model allowing for some form of uncertainty. This paper is in the same vein, but is considerably more ambitious. Like Drew and Hunt (1999) and Smets (1999) it looks at the implications of uncertainty over the NAIRU, but does so simultaneously with two other realistic modifications to standard models: a convex Phillips curve and endogenous policy credibility. The paper also examines the potential gains from allowing the policy rule to depend on private sector inflation expectations, allowing experimental deviations from the policy rule, and considering a move to full transparency.

The paper considers two types of rules: Taylor rules and inflation-forecast based targeting rules (IFB rules), the difference between them being that the latter uses forecast inflation rather than actual inflation. It uses a simple macro-model to evaluate the rules which incorporates both backward and forward inflation expectations, lags in the transmission mechanism, NAIRU uncertainty, a non-linear Phillips curve, and endogenous policy credibility. To evaluate the rules it conducts stochastic simulations to the model whose parameters are estimated from quarterly Australian data. The model is necessarily ad-hoc and results obtained from it need to be replicated in other models before general conclusions can be made.[1] Nevertheless, it is still useful to try to draw out conclusions for the particular model analysed, and to think about why they arise and how general they might be. The paper represents a very useful first step along these lines.

I have identified below five key conclusions from the paper. I will structure my discussion around these five points. With a few reservations aside, I find myself in broad agreement with these conclusions. However, so as not to repeat the material in the paper, I will try to bring out some questions which arise from each of these conclusions and some possible future directions for research, rather than why I think they are reasonable conclusions.

[1] One modification to the model that should be considered is to allow a forward-looking output term in the aggregate demand specification. Developments in macroeconomics over the last two decades suggest the importance of including a term for the model-consistent expected future

The five key conclusions:

1. Models with uncertainty over the NAIRU and non-linearities (reflecting in this case convexity of the Phillips curve and endogenous policy credibility) imply the policymaker should put *relatively* greater weight on inflation compared to unemployment in their policy rule and (in absolute terms) greater weight on inflation and the unemployment gap.

2. In such models, inflation-forecasting based (IFB) rules are significantly more effective than conventional Taylor rules in meeting the central bank's objectives.

3. Allowing an IFB rule to depend on private sector inflation expectations increases its performance somewhat.

4. Allowing experimental deviations from the policy rule, as a strategy to take advantage of times the NAIRU is falling, does not generally improve macroeconomic performance.

5. The monetary authority can enhance macroeconomic performance substantially by being transparent if this increases its policy credibility.

Conclusion 1: Models with uncertainty over the NAIRU and non-linearities (reflecting in this case convexity of the Phillips curve and endogenous policy credibility) imply the policymaker should put *relatively* greater weight on inflation compared to unemployment in their policy rule and (in absolute terms) greater weight on inflation and the unemployment gap.

Like Smets (1999), the authors finds that because of uncertainty over the real side of the economy (in this case the NAIRU), policy rules that put relatively more weight on inflation do better. This conclusion does not seem to rely critically on the non-linearities in the model. The rationale is presumably that when the monetary authority observes a change in unemployment it should discount this change to the extent it may actually reflect a change in the natural rate of unemployment. However, the economic rationale for responding more aggressively (in absolute terms) to inflation and unemployment shocks is not so obvious.

One reason for responding more aggressively to inflation shocks in absolute terms, is that errors in estimating the unemployment gap are positively autocorrelated and these are transmitted through the Phillips curve into changes in the inflation rate. Given that policy credibility can be lost more easily than gained in the model, this requires a strong immediate reaction from the policy maker. Unless the policymaker acts with sufficient force, credibility will be eroded. In fact, Isard and Laxton (1999), confirm that the assumption of endogenous policy credibility is primarily responsible for the benefits of acting more aggressively in this model. Interestingly, both Smets (1999) and Wieland (1998) find that the policymaker should act less aggressively under NAIRU uncertainty in a linear world, while Drew and Hunt (1998) find that the policymaker should act more aggressively under NAIRU uncertainty when there is a convex Phillips curve but exogenous policy credibility. Given the policy importance of the issue (whether to act more or less aggressively under uncertainty), future

output in the aggregate demand relationship. This simple addition can have important implications for the nature of output, interest rates, and inflation under monetary policy rules. Kerr and King (1996) and McCallum (1997) make the case for including such a term.

work should be aimed at disentangling the various effects of NAIRU uncertainty, endogenous credibility, and a convex Phillips curve, with a view to better understanding the economic reasoning behind the results here.

Conclusion 2: In such models, inflation-forecasting based (IFB) rules are significantly more effective than conventional Taylor rules in meeting the central bank's objectives.

Conclusion 1 clouds the comparison between IFB rules and traditional Taylor rules, since the two different rules use different weights. The IFB rule has relatively more weight on inflation, and greater absolute weights on inflation and the unemployment gap than the Taylor rule. We know from above, that both these features of the IFB rule make it work better than the Taylor rule in an environment with NAIRU uncertainty and non-linearities. The authors acknowledge this fact and refer readers to a companion paper, Isard et al. (1998), where they compare policy rules with the same weights. The results from Isard et al. do confirm, that even with the same weights, the IFB based rules still perform better when there are non-linarities; primarily because of non-linearities arising from the non-convex Phillips curve, although also from non-linearities arising from endogenous policy credibility.

What drives the superior performance of the IFB rules then? Even in a linear world with no NAIRU uncertainty (where first order moments are not affected by changes in policy rules), the IFB rule typically outperforms the Taylor rule, achieving lower variance in both unemployment and inflation. The simple reasoning is that when there are lags in the transmission mechanism, it pays to be forward looking in policy. Lower variances of unemployment and inflation translate into lower mean levels of unemployment and inflation in a non-linear world. The idea here is that, in a non-linear world, it is preferable to respond quickly to incipient inflation pressures, as deep recessions are needed to offset periods of mild excess demand. Similarly, if the monetary authority waits until it observes changes in inflation (as it does under the Taylor rule), then credibility will be affected, which means inflation expectations are affected, and these in turn feed through into the inflation rate. The natural policy response is to react to inflation before it develops, thus not allowing credibility to vary unnecessarily.

In order that IFB rules are successful along these lines, the monetary authority must be able to appropriately pick the forecast horizon and forecast future inflation using the model in hand. One problem arising from this is that the same model is then used to evaluate the policy rules. This is rather like using a data set to estimate a forecasting model and comparing the forecasting model with a naive forecasting rule (eg using last periods observation for the variable being forecasted) within the same data set. As we know, such forecasting models work considerably better in-sample than if we used the more relevant criteria, out-of-sample forecasting performance. This analogy suggests since we do not know the true model, the acid test for policy rules is how they work in other models.[2] It implies we should really compare the Taylor rule with the IFB rule, where the later uses inflation forecasts taken from other models (subject to the same set of shocks).

These arguments suggest that the apparent superior performance of IFB rules over Taylor rules may be overstated. Perhaps a better rule is to use a weighted average of the current inflation rate and the forecasted inflation rate, where the weights reflect the degree of uncertainty over the model

for the inflation forecast.[3] If uncertainty magnifies as the forecast horizon lengthens, an equivalent and simpler approach may be to use the standard IFB rule but to use a forecast horizon that is shorter than that which is optimal according to the model.

A similar approach applies to output (or unemployment). If the output gap is also in the monetary authority's objective function and reacts with a lag to interest rate changes, then the forecasted output gap as well as the current output gap should be in the policy rule. The weights could again reflect the uncertainty over the model for the output gap forecast, where the forecast horizon reflects the transmission lags from interest rates to output in the model (this horizon is likely to be shorter than the horizon for the inflation forecasts). Again, because uncertainty magnifies as the forecast horizon increases, a shorter forecast horizon might be equivalent to a lower weight on the output gap forecast. The general point is that a rule, such as the Taylor rule, which relies on the actual variables the Bank cares about (inflation and the output gap), rather than a forecasting model for these variables, has advantages when there is model uncertainty that have not been adequately captured in the literature yet. Moreover, if one thinks about why policy rules are useful devices, the simpler Taylor rule has other advantages in terms of transparency, credibility, and political considerations.[4] These advantages need to be weighed up against the many merits of an IFB approach, which are explained in Svensson (1997).

Conclusion 3: Allowing an inflation-forecasting based rule to depend on private sector inflation expectations increases its performance somewhat.

If policy credibility is endogenous, as is likely the case, a rule that reacts to the bias in the public's inflation expectations allows it to respond more strongly when there is a loss in policy credibility. Given it is easier to lose credibility than to gain it, this novel policy rule leads to an improvement in performance over the standard IFB rule. This is similar to the idea that in the early stages of disinflation, where initially inflation expectations are high, the policymakers should act swiftly to lower the inflationary bias in expectations and so lower the cost of the dis-inflation process. However, one concern arises if the policy is to be implemented as part of a mechanical policy rule. This relates to a point made in Woodford (1994). He shows that rules that depend mechanically on private sector expectations can lead to instability, non-uniqueness or non-existence of equilibria (nominal indeterminacy). One way the issues raised by Woodford can be addressed in practice, is by noting that the rule is not designed to be followed mechanically. However, if the rule is used mechanically in the model, as it is in this paper, Woodford's point should be addressed explicitly.

Conclusion 4: Allowing experimental deviations from the policy rule, as a strategy to take advantage of times the NAIRU is falling, does not generally improve macroeconomic performance.

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[2] McCallum (1988) and Leven et al. (1998) explore the robustness of monetary policy rules.

[3] If the monetary authority were completely uncertain about the correct forecasting model, then they would presumably be better off to put no weight on forecast inflation and total weight on actual inflation in their policy rule; otherwise they are just adding noise to their rule.

[4] For instance, the Taylor rule does not suffer the politically difficult job of justifying a rise in interest rates even when the inflation rate and output gap remain unchanged.

The results of this paper suggest that, given the noise the economy is subject to, modest random experimentation is unlikely to enable the policy maker to learn anything much about the uncertain level of the NAIRU. Wieland (1998) finds that some amount of experimentation is welfare improving when there is NAIRU uncertainty in a linear model, because it enables the policymaker to gain information about the NAIRU (and in his model the slope of the linear Phillips curve). However, as Isard and Laxton point out, because his model is linear, any error through experimentation can be offset without any first order impact. This is not the case in the non-linear model this paper considers. Another difference between Wieland's analysis and that of this paper is in the learning process; Wieland considers an optimal dynamic learning framework. This suggests future work should investigate adapting Wieland's optimal dynamic learning framework to the case the Phillips curve is non-linear.

Conclusion 5: The monetary authority can enhance macroeconomic performance substantially by being transparent if this increases its policy credibility.

In most recent discussions of monetary policy design, transparency is put forward as a desirable objective. Yet the definition of transparency is typically left vague (Faust and Svensson (1998) is an exception). Isard and Laxton's paper assumes that transparency reduces the bias in the public's inflation expectations. The way I believe this works is that by making policy transparent, the central bank makes it harder for politicians to influence the behaviour of monetary policy without the public seeing this intervention. By taking away the ability of the central bank to *surprise* inflate, transparency reduces the time-inconsistency problem and improves the credibility of low inflation policies. Given that increased transparency reduces the inflation bias, it is easy to see how it can enhance macroeconomic performance.

However, I would disagree that even full transparency (even in an inflation targeting framework) will eliminate the inflation bias. This relates to a point in the paper that "Such bias would presumably disappear if the public was able to perfectly infer the monetary authorities' intentions." Provided a loosening in monetary policy can raise output, even when it is fully announced, there will be political reasons why in any democracy an inflation bias will still exist. This bias will partially reflect the public's appetite for inflation. In a country like Germany, where there is a long history of strong public resistance to inflation, the inflation bias is likely to be quite small. The bias is likely to be greater in a country such as New Zealand, which despite having considerably more transparent policy, has traditionally had a sizeable section of the population that is receptive to always slightly looser monetary conditions.[5]

In this case, a more powerful solution to the time inconsistency problem may be, not only to improve the transparency of a low-inflation policy, but also to minimise the political costs of implementing it. It seems to me that the Reserve Bank's pre-March 1999 method of monetary policy implementation went some way to addressing these issues, within the context of an inflation-

[5] Arguably, the transparency of policy is itself determined by the public's attitude towards monetary policy. In the United States and Germany, where there has been less public and political acceptance of inflationary policies (compared to the United Kingdom and New Zealand), there is also currently less transparency in policy.

targeting approach. This approach had the following features.[6]

- The financial markets continually adjusted the 90-day interest rate to a level that they think the Reserve Bank will be comfortable with.
- The Reserve Bank does not try to influence the level of interest rates, provided the level is roughly consistent with that which comes out of its policy rule.
- If the Bank is not comfortable with market delivered interest rates, an announcement was made. If this is not successful in moving rates, then the Bank ultimately changed policy settings (this is the threat which ties down interest rates).
- If it did not carry out its threat, then open market operations and policy settings were all determined by a mechanical rule that takes no account of desired monetary conditions.
- Because of this mechanical rule, the monetary base automatically adjusts to maintain money market equilibrium at these interest rates; this is done primarily by linking the discount rate and the interest rate on settlement cash automatically to market rates and targeting a constant level of settlement cash held by the banking system.

The benefit of a system such as that, was that monetary policy is essentially market-implemented, is that it avoids politically sensitive rate changes, thus making policy less political and so hopefully reducing the inflation bias that arises from the public's traditional desire for the Government to have soft policies. At the same time, it also leaves no room for surprise inflation or discretionary policies, and requires the Bank to be totally transparent if the approach is to work properly (otherwise announcements will continually be needed). Future work should examine the merits (and potential costs) of such an approach.

Concluding comments

Isard and Laxton's work is on the forefront of a literature analysing monetary policy rules in increasingly realistic macro-models. Among other things, the paper illustrates the importance of uncertainty and non-linearities in such models. Many policy conclusions are affected by allowing for these realistic extensions, and while much further work is needed to interpret these results, I have no doubt that their paper represents a very valuable contribution to this developing literature.

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