

Stock Prices and Monetary Policy: Re-examining the Issue in a New Keynesian Model with Endogenous Investment

Referee report #1

In this short reply we concentrate on the main remark of the referee, while we shall consider his/her very useful list of minor remarks for revision of the paper.

The referee points out two important issues in the theoretical literature on monetary policy rules: determinacy and learnability. He/she also suggests two recent papers that have provided significant contributions. Determinacy stands for the existence of a unique RE equilibrium of the system under the given rule. The so-called "Taylor principle" is deemed important because it grants determinacy. Learnability is a further requirement that is deemed important if RE are not assumed as an hypothesis but are obtained as the result of a learning process by agents. Whereas the two issues have first been examined within the basic "labour-only" New Keynesian model, the two suggested papers extend analysis to models with fixed capital and endogenous investment, of which our model is a case. They show that this feature may change the conclusions about determinacy and learnability drawn previously.

Let us first explain why we have not examined determinacy and learnability in our paper. The first reason is that, as recognized by the referee, we have conceived our paper as a contribution to the strand of literature prompted by the "no-inclusion" (of asset prices) result by Bernanke and Gertler (BG). We think that the right way to put under test a result is to replicate the model as close as possible with a clear, controllable (and limited) variation. The BG models do not address determinacy and learnability; they take both for granted (given the Taylor principle). Our variation with respect to BG is the inclusion of a stock-price sensitive investment function, which, as we conjectured, vehiculates our "pro-inclusion" claim.

It is true that, as said above, the presence of endogenous investment has been proved to affect determinacy and learnability with respect to the standard New Keynesian setup. As to determinacy, a well-known negative result (the Taylor principle is insufficient) was proved by Carlstrom and Fuerst (2005) in a model with economy-wide rental capital market and forward-looking inflation targeting like ours. However, we may say that our model also includes output and a stock market indicator in the rule, and that it is essentially applied in nature. This latter feature entails that we have an indirect test of determinacy in that, with plausible calibration, we can track the dynamic trajectories of all the relevant variables and check that they are convergent to respective steady states. This finding excludes

anomalous dynamics, such as strange attractors or multiple equilibria. In principle, major threats to learnability are also excluded.

From this point of view, we may also say that the presumption of determinacy and learnability of our rules may find support in Duffy and Xiao (2011) conclusion that

While confirming the indeterminacy problem, our results suggest that in many cases the severity of that problem can be reduced or eliminated by small changes in a structural parameter or in the specification of a policy rule. Specifically, we find that determinate and learnable REE are more likely with (i) plausible capital adjustment costs, (ii) placing some weight on output in a Taylor-type policy rule, and (iii) pursuing a policy of interest rate smoothing (...) Finally, we believe our findings make a case for greater optimism with regard to the use of Taylor-type monetary policy rules or of the Taylor principle as a rough, though imperfect guide for ensuring determinacy and learnability of equilibrium (p. 961).

The referee also draws our attention to the fact that the array of rules can be extended to different specifications of the time horizon of the policy maker. This is typically relevant to inflation. For instance Duffy and Xiao examine "forward looking rules" (the rule reacts to the expected inflation rate of the policy maker) as well as "contemporaneous rules" and "backward-looking rules" (in practice rules in which there is a time-lag between the inflation signal and the central bank's reaction). Again, we have chosen to stick to the BG model, which is in the line of the largely accepted Svensson principle of forward-looking rules. It should also be considered that, empirically, stock-market booms generally result to lead excess investment and economic activity (e.g. Borio and Lowe (2002)), so that the "forwardness" of the rule ought to be lengthened rather than shortened. We may add that the possibility of improving stabilization in times of stock price bubbles by manipulating the time horizon of the decision maker is a side issue with respect to our main argument that improvement may come from inclusion of the right stock market indicator in an otherwise standard rule.

We wish to conclude, however, that the suggestions put forward by the referee stimulate us to extend our analysis in a further paper concerning the optimization of our preferred rule. In this perspective, determinacy, learnability and the right time horizon of the policy maker should be examined explicitly.

References

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- Carlstrom C.T., Fuerst T. (2005), "Investment and Interest Rate Policy: A Discrete Time Analysis", *Journal of Economic Theory*, vol. 123, pp. 4-20.

Duffy J., Xiao W. (2011), "Investment and Monetary Policy: Learning and Determinacy of Equilibrium", *Journal of Money, Credit, and Banking*, vol. 43, pp. 959-992.