

Referee Report on 'Optimal Inflation Target: Insights from an Agent-Based Model'

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In this paper a version of the 'Mark-0' agent-based macroeconomic model is employed to study the implications of different choices of the Central Bank's (CB) target inflation rate on output, inflation in the economy and the probability that the CB hits the zero lower bound. The analysis is carried out for two regimes of the model with high/low inflation and high/low output and for both of them it is shown that, by increasing target rate to values substantially higher than the current ECB target of 2%, output is strongly increased and the danger of hitting the zero lower bound is reduced. The paper addresses an interesting and relevant question, since a debate about the optimal target level, which is informed by systematic model-based analyses is certainly desirable. To my knowledge so far there have been no contributions to this debate, which employ agent-based or behavioral macro approaches, so having such a contribution is very welcome. However, I have some concerns with respect to the setup of the model and I also believe that the economic message of the paper should be made more clear and convincing.

Major Points:

- It seems that the main channel through which (expected) real interest rate, and thereby the CB inflation target, influences the real dynamics is equation (10). In this equation an asymmetry is assumed in a sense that production adjustment coefficients are influenced by the debt to payroll ratio only if the (past exponential average of the) interest rate on loans is higher than expected inflation rate, which depends positively on the target rate (if $\tau^* < 0$). The motivation which is given for this formulation is that firms are more concerned about their debt if real interest is high. It is quite unclear why this rationale should stop at a zero real interest rate, i.e. why the max with 0 is taken in (10). In that respect it would also be interesting to see in Figs 3 and 4 the values of $\rho^l - \pi$ or $\rho^{l,ema} - \hat{\pi}$.
- The authors stress that they do not provide a serious calibration of their model and that the numbers should not be taken at face value, but then it is difficult to understand how to interpret a statement like 'low inflation targets are detrimental to a CB-controlled economy'. Low relative to what? In the shown simulations, if we are interested in

maximizing output, it seems that the optimal target rates are always at the upper bound of the considered interval. In these situations there would be an inflation of 6% - 7%, which, if we take these values seriously is rather high. In the framework of the model high inflation seems to be with little real costs, but one has to wonder whether a model which does not seem to capture potential real costs of inflation (e.g. as far as I can see savings have little role in the model) is ideally suited to address the issue of an optimal target rate.

- Related to the previous point. Since the quantitative values should not be taken at face value, the main contribution of the analysis in my opinion should be to highlight (so far not considered?) economic mechanisms through which an increase in the target rate induces real effects in the economy. In that respect much more should be done. In the current version the description of results is very short and essentially simply restates what can be seen Figs. 3 and 4. The reader learns very little through which channels and mechanisms an increase in π^* influences the economic dynamics. Are there any qualitative differences in the relevant mechanisms between scenarios HIHO and LILO?

Minor Points:

- I understand that the authors do not want to give a full description of the Mark-0 model (which is available elsewhere), but it would be good to be slightly more precise at a few places to allow a better understanding of the model, even without reading these other papers. It should be mentioned that $Y_i < 1$ (otherwise (3) does not make sense) and why this inequality holds. Also the last sentence of Section II.A should be made more precise. Is indeed the actual profit of the banking sector (each bank?) zero or is it rather the expected profit?
- p4, II.B: For an agent-based analysis of a model with endogenous CB credibility you might also mention Arifovic et al. (2010).
- p5: In the Introduction the need for micro/behavioral assumptions of the models are stressed. No foundations for the behavioral equation (11) and (12) are given though.
- p8: Why are $\phi_\pi = 0$ and $\phi_\pi = 2.5$ considered in Figs 3 and 4. Any particular reason to consider these values?

- p10: I am not quite sure why, after having carried out the ABM analysis, in Section V the authors then again start discussing differences between ABMs and DSGE models and how their qualitative findings might be obtained also in a DSGE-type framework (by changing the discount factor). I would find it much more convincing if the authors would talk about the economic insights about this particular issue that one can obtain from their study within their model framework.
- p11: I do not understand what the authors mean by ‘..the equilibrium state of the DSGE economy cannot be characterized’. Do they mean that values of economic variables like unemployment, inflation etc. cannot be determined? This would be a somehow surprising claim that should be substantiated.
- p11: ‘..around a God-given state..’. I suggest the authors either add some reference to a DSGE paper with theological arguments or reformulate this.

References:

Arifovic J, Dawid H, Deissenberg C, Kostyshyna O. (2010), "Learning Benevolent Leadership in a Heterogenous Agents Economy", *Journal of Economic Dynamics and Control* 34(9): 1768-1790.