Review of "**Computational evidence on the distributive properties of monetary policy**"

I think the topic of the paper is very interesting, and the agent-based methodology is surely a promising tool to deal with it. I appreciated the effort of the authors to keep the model simple, in order to be able to interpret results in a more significant way. I also appreciated their innovative methodology for the global sensitivity analysis. I think it is a nice solution that should be probably adopted by many models of this type.

The weakest part of the work, in my opinion, is the "evidence" of the presented results. The authors should make an effort to link the model design with the obtained results. In particular, they should explain how some modelling choices reverberate on their findings. In the following, I propose to the authors some considerations and suggestions that might help enhancing the clarity and the effectiveness of their work. I hope my points will raise a useful discussion.

- In the abstract you state that "*The result emerges that a more restrictive monetary policy increases inequality, even though this effect may differ across groups of households. This may put into question the principle of the independence of central banks*". I think your inference here is too strong, the fact that a monetary contraction can cause inequality can be an useful information for central banks but does not imply central banks should not be independent. So, I suggest to remove this statement, unless you unfold the concept more in-depth. By the way, the verb "emerge" is intransitive and I think the way you use it in the sentence is not correct; you can use "highlights" or a similar verb.

- When you talk in the introduction about the stock-flow consistency approach in agent-based models, I think you should cite the Eurace model, which, as far as I know, has been the first model to adopt convincingly this approach. For instance Cincotti (2010) presents such a model, and Teglio (2010) explains its basic balance sheet consistency properties.

- In page 6 you state "*This consistency implies model closure, in the sense that no external resource is incorrectly added to the system and no internal resource is lost*". I think this is a questionable way to present consistency. If you add incorrectly something, it means your model is just wrong…

- Equation 12 describes the dynamics of outstanding debt. As far as I understand τ includes the payment of the interest and the principal. This can imply a strong bias towards repaying a high fraction of the loans in first time steps. In other words, it does not smooth repayment over time. In turn, this can cause additional instability to the economic system, affecting the bankruptcy rates and other key indicators. Please comment on this topic, and explain why your assumption is acceptable.

- At page 13, the authors state "*Consumers randomly enter the goods market and, because of search costs, visit only a fixed number Z of firms, one of them being the largest (in terms of*

production) firm visited in the previous period. We assume consumers to adopt this sort of "preferential attachment" mechanism in order to minimize the probability to be rationed". This allocation mechanism reinforces large companies and seems to ease a fat tailed distribution of companies' sales. As your paper studies inequality, this assumption could be relevant and should be discussed. I understand that firms have no ownership structure, and therefore there is no clear channel for propagating this asymmetry on sales to households, however you should state in a more convincing way why you need this assumption and what are the main implications for the model.

- Equation 17 presents the consumption rule. If I understand correctly the equation, consumption depends on wealth, not on income; *(D +I)* is the current wealth of the household (by the way, I could not find the value of parameter *c* in table 3). Is there a particular reason for this choice? Moreover, the choice does not seem neutral with respect to the studied topic, as consumption directly depends on the interest rate, i.e., an increase in *i* also increases consumption, especially if the deposits of the household are high enough. This mechanism might be responsible of some of the observed outcomes.

- Concerning the bank and its financial intermediator role, I have some observations. In the model you don't have the concept of savings, as consumption depends directly on wealth. A part of this wealth is consumed, and a part is left as deposits. Banks do not look at deposits when granting loans, but create new (endogenous) money. So, why should banks pay interest on deposits? What is the significance and what are the economic implications of this financial payment? May be some words of discussion should be spent on this topic.

- At pages 14 and 15, the bankruptcy mechanism is described. I need some clarifications about the modelling choices here. 1) Borrower's leverage affects interest rate but not credit rating. Is there a reason why credit rating does not depend on leverage, as a measure or financial stability of the firm? 2) Credit rating, instead, depends on previous defaults of the company. However, defaulted firms are replaced with new firms that should be able to compete in the market, and that are in principle a different entity. It is true that they inherit a part of the old debt, but it looks a bit strange to me that the credit rating depends exclusively on this measure based on previous defaults. As you basically perform a sort of bail-out financed by taxes, it wouldn't be strange to expect even a cancellation of the memory of defaults. Here the authors should explain better the rationale of their choice. Moreover, at page 16 the authors state that "*bankruptcies, in fact, lower firms' credit worthiness and leads to credit rationing by the bank*", highlighting the crucial role of this rule and the need to support it in a more substantial way.

- At page 22, you state "*Unlike mainstream micro-founded models, in fact, in multi-agent frameworks there is in general no one-to-one relationship between micro and macro variables. Consequently, the lack of clear causal links between emergent macro-phenomena and individual behavioral equations makes the interpretation of the results quite an arduous, if not totally futile, task*". I do not agree with your statement. The task might be arduous but it is by no means futile. On the contrary this is the most important task of agent-based macroeconomics, because we need to understand which are the aggregation properties in economics. If we consider this

task as futile, then I'm afraid we are undermining the agent-based approach at its very core. I suggest to remove or modify this statement, and I ask the authors to make their vision more explicit, because I might have misunderstood something.

Section 4.1

- In this section, the authors describe the results of the policy experiment. However, they should state in a very clear way how monetary policy channels into the economic system. This information is crucial to understand what's going on, and I think it is not remarked with sufficient strength.

- As far as I see, monetary policy does not propagate through the money supply in the system (as deposits are not affected) but directly through the change of the interest rate by the central bank. In other words, you have an endogenous money supply mechanism that generates new deposits for firms as soon as a new loan is granted, and a monetary policy that does not operate through money creation. It would be interesting to check the how the money supply and interest rate dynamics are related.

- The interest rate affects financial returns (deposits rate) and the loan rate. If I did not miss anything, these should be the two transmission mechanisms in the model. Of course they are not exhaustive, even with respect to the list of propagation mechanisms cited in the paper, but I understand that simplifications are needed to keep the model simple. However, in order to understand the results, you should try to connect them in a more systematic way to these propagation mechanisms.

- The authors state at page 23 that the bottom 50% of households is mostly made by unemployed workers but this would imply a quite high unemployment rate that does not seem consistent with the Phillips curve in figure 3a. Please explain. In any case, your statements on the composition of the three groups that you define (e.g., bottom 50%, middle 40% and top 10%), in terms of income type (labor and capital) should be supported by some evidence.

- The authors motivate the effects of the policy experiment by citing an increase in the unemployment rate and a decrease in (real?) wages. I think they should report these economic indicators to help reader's understanding. Moreover, the explanation that the authors give is not quite clear to me. Why does a higher interest rate increase unemployment rate in the model? In principle, aggregate demand, according to equation 17, should increase. So, is the problem a higher cost of loans and a higher default rate? But in this case, if the problem is a supply side problem, then the way in which firms' defaults are designed in the model could have a crucial role (see my previous comments) and should be discussed in the results part.

- Another issue that could be clarified by the authors is how are labor income and capital income related, as their interpretation of results is based on the interaction of these two elements.

- Also the explanations about the behavior of the 40% middle households is not very clear. Why decreasing (homogeneously?) wages should offset the inequality due to higher capital income? In figure 7 it happens the opposite as inequality increases, but not for the top 10%...

- I think the authors should provide more material to support their interpretation of results.

Concerning section 4.3, I find it very interesting. May be the authors should indicate clearly the level of significance of the regression coefficients, for example showing the classic stars, in order to facilitate the reader.

Minor points (just a few examples, please check carefully the paper)

Page 2, par. 3, line 6: "whereas" suggests a contradiction and not that "they find the same evidence". Use and alternative conjunction.

Page 5, line 2: you do not "simulate" a model in a section. I suggest revising.

You use the same letter D for Demand, Firm's deposits, Household's deposits, and total bank's deposits. This can generate some confusion. I suggest, for instance, to use D_h and D_f, as you do in table 1.

References

Silvano Cincotti, Marco Raberto, and Andrea Teglio (2010). "Credit Money and Macroeconomic Instability in the Agent-based Model and Simulator Eurace." Economics: The Open-Access, Open-Assessment E-Journal, Vol. 4, 2010-26. doi:10.5018/economics-ejournal.ja.2010-26, http://dx.doi.org/10.5018/economics-ejournal.ja.2010-26

A. Teglio, M. Raberto and S. Cincotti, "Balance sheet approach to agent based computational economics: the Eurace project", in "Combining soft computing and statistical methods in data analysis", Advances in intelligent and soft computing, vol 77, pp 603-610 Springer Verlag Berlin Heidelberg 2010