

Reply to Referee Report 1

1. The critique mentioned by the referee refers to Josh Epstein's principle of "Generative Sufficiency" [Epstein (1999)]. In that sense it might be true that we possibly would be able to generate similar (qualitative) results with a less complex model. On the other hand, we want to emphasize that, taking into account the considerable amount of work needed to develop an ACE macro model, our aim was to build a rather general tool that exhibits a proper foundation for further extensions in order to explore a broad set of research questions related to financial stability, monetary policy and the dynamics in the financial markets. Such a tool would require a model approach that is close to the real world system which is why we decided to implement a RTGS payment system serving as such a foundation. Likewise the government agent has its specific tasks like issuing public debt and paying unemployment benefit etc. Of course, there would be a way to avoid the explicit modeling of the government agent and rather let the related economic activities "just happen" but we do not think that this would be in line with the ACE approach of modelling the micro level of the system of interest.
2. Like in reality, the modelled bank lending activity is based on a debt repayment scheme for every single loan. Firms make principal and interest payments which indeed reduce the loan + interest due stock as expected by the referee. Both bank balance sheet positions, business loans as well as interest receivables, are reduced by each payment made by the debtor. Hence, there is no overstating of equity during the lifetime of the loan. The position is just used for internal convenience in processing the data related to bank lending activity. We will clarify this in the text.
3. We adopt the endogenous money approach described in Lavoie (2003) where the starting point of economic activity is that the government issues bonds, i.e. the promise to pay back the face value as they mature plus interest over time, meaning that it encumbers itself with (public) debt. In order to be able to act within the payment system, it is in need of deposits. Thus, it sells the issued bonds to private banks that grant deposits according to the bonds' face value in return. Thus, the transaction creates money since banks do not purchase the bonds with existing funds but by granting deposits to the government.
4. a. We are grateful that the referee raised this point since nobody discovered this issue before. Hence, we are going to adjust formula (25) according to

$$PD_{j,t} = \begin{cases} 1 - \exp\{-\rho_j \xi_{j,t}\} & \text{with prob } \varrho \\ PD_{j,t-1} & \text{with prob } 1 - \varrho \end{cases} \quad (1)$$

Hence, we present the case for $\varrho = 1$ and are going to mention that in the text. The case of $\varrho < 1$ is expected to have (on average) only marginal effects on the qualitative results presented since such a stabilizing element would lead to a common impact across simulated scenarios. This might lead to an overall shift towards more stable results but since we chose a representation in relative terms to the benchmark case, the relative distance and, therefore, the findings are not expected to change significantly. But this issue will definitely be of our concern regarding future research and we are taking this into account.

- b. That is right, we do not consider any collateral yet. We are going to mention that in the text.

- c. Also true, yet we do not have any loan loss provisions implemented. Loan losses (either expected or unexpected) are entirely absorbed by the capital of banks. We are going to mention that in the text.
5. Yes, we see the point raised here. On p.19 we state that "*iff a firm is not able to meet its debt obligations, it exits the market and all financial claims are cleared in such a way that banks have to depreciate the outstanding loans after receiving the proceeds of the liquidation of the firms assets.*". This might be a little bit concise but it means that in a default event of a firm, the creditors receive a pro rata share of liquid assets of the firm based on the creditor's individual share of the firm's debt. We would suggest to add a sentence on that. Here, the trade-off between detailedness of the model description and length of the paper is always present and we try to meet the requirements of all referees as good as possible.
6. We are going to move the information on the programming language in charge to the introduction.
7. Currently, we only provide a link to the annex B in the introduction which might be a little bit scarce. But we do not know what the referee means with content-wise links.
8. We use the phrase as described in [Lavoie \(2003\)](#) where a distinction is made between *asset-based* and *overdraft* economies. While the former is characterized by agents selling their liquid assets to finance new ventures, i.e. firms own the financial resources required to make investment expenditures and banks sell bonds to make new loans, the overdraft economy is characterized by several layers of indebtedness, i.e. firms use credit from private banks to finance their investments, private banks borrow reserves from the central bank and the government issues bonds in order to receive deposits from the private banks. In such systems of endogenous money, central banks provide reserves in a fully flexible manner and, thus, have only indirect control over the money supply by setting the interest for those reserves.
9. This is a fair point. We take this into account and avoid the terminology "intermediary" here.
10. We do appreciate the provided literature and consult the mentioned papers in order to include them in the paper where appropriate.

References

- Epstein, J. M. (1999). Agent-Based Computational Models and Generative Social Science, *Complexity* 4(5): p. 41–60.
- Lavoie, M. (2003). A Primer on Endogenous Credit-Money, in L.-P. Rochon and S. Rossi (eds), *Modern Theories of Money: The Nature and Role of Money in Capitalist Economies*, Edward Elgar Publishing Limited, Northampton, pp. 506–543.