Reply to The Referee Report

I am truly grateful to the anonymous referee for her/his comments and suggestions on the discussion paper version of my work.

A SFC model is based on an accounting framework, in which every transaction in the artificial economy should be recorded using the double-entry bookkeeping method, which ensures that the basic accounting equation holds at all times, i.e. total assets equal total liabilities (external liabilities+ equity) in every single balance sheet at every time step. For that reason, a SFC model must explicitly define how every possible type of transaction affects the balance sheet components of all types of agents in the model. In the presented work is not possible to determine if the basic accounting equation holds at every time step and if all the transactions follow the double-entry bookkeeping system.

REPLY: Fundamentally, the stock-flow consistency guarantees the following facts:

1, Every transaction by one sector implies an equivalent transaction by another sector.

2, Every flow causes an equal change in the item on the corresponding balance sheet, the stock variable.

3, Every financial stock is recorded as a liability for someone and an asset for someone (Godley & Lavoie 2007, p.xxxiv; Caiani et al. 2016).

For the first two points, the flow of any transaction between two paired agents must be subtracted from an item on one's balance sheet and adds to the item on the balance sheet of the other agent by the same amount, i.e., any flow comes from somewhere and goes somewhere. Thus, my model meets the first two features. As for the third point, any financial stock either given by the initial endowment or created by agents' behavior must occur on the two separate agents' balance sheets that have been involved, recorded as an asset and a liability respectively. So the model also satisfies the third requirement. Based on these properties, this model proves to be a coherent financial stock-flow approach.

Besides, in this model, several processes are not completely in line with the double-entry bookkeeping method, for example, the credit creation and repayment is governed by the quadruple-entry process.

E.g. in the initial setup it is not mentioned how the equity of every agent is determined, neither is the cash and fixed property of FIs set, without this information is impossible to determine if total assets equal total liabilities in the balance sheets. Another example regarding the transactions is that the accounting of the transactions generated by the consumption of the households is not explained in the dynamics of the model: is the HH after consuming decreasing its cash and its equity? The FI is increasing its cash after consumption, but what about the liability side?

REPLY: About checking the stock-flow consistency, please refer to my above reply. In addition, at the initial setup, we give the information on the variables affecting the following dynamic evolution or generating observable effects. Nevertheless, the agent's equity is the type of variable on which no agent's behavior will depend in our model, therefore not mentioned in the initialization stage. As for the consumption, the consumer spends cash and receives the same value of goods, which occurs on the asset side of the balance sheet of the consumer and does not affect the equity. On the other side, the firm receives the cash paid by the consumer and supplies the goods

ordered by the consumer, which does not involve any item on the liability side.

In fact, although more than 60% of the firms default in the simulation, because they cannot pay back their loans, no bank defaults and there is no mention of any losses in the banking system.

REPLY: Yes, several banks fail in the simulations. I will incorporate this information in the revised version of this manuscript later. Indeed, the failure of banks is triggered by the illiquidity, the liquidity shortage to the extent that the bank cannot maintain the reserve requirement. The bank's liquidity position is determined by multiple factors, including not only the repayments of loans but also the level of reserves held by the bank, withdrawals and savings by the households. Therefore, the loan defaults cannot solely determine the bank's failure.

Another two examples for some of the fundamental flaws found in the model are: 1) income and net profit are incorrectly defined. The FIs' income includes the investment done at time t-1, investment is not an income, the capital gain, dividends or interest payments

obtained from the investment are income.

REPLY: Both the income and profit defined in our article are flow variables. The investment by the firm at period t-1 will turn out to be one firm's income, which is consistent with the motto of the stock-flow consistency—everything must come from somewhere and go somewhere (Godley & Lavoie 2007, p.xxxiv; Caiani et al. 2016). In fact, if we consider the firm sector as a whole, the investment comes from the firm sector, and in turn becomes the income of the firm sector itself. Therefore, the investment must be one part of the firm's income.

From the FIs' net profit is subtracted an expression that the author named periodic repayment flow, which is neither a cost nor an expense of the firm.

REPLY: I agree with the claim that repayment flow is neither a cost nor an expense of the firm. However, the repayment as a flow variable must come from somewhere. In our mode, the firm does not hold cash or deposits (this is not the case in the model of the papers such as Lengnick et al. (2013); Krug et al. (2015), **where the borrowers repay the loans by the liquid funds of their own);**

hence, the only sources of funds which can be used to repay debt is current income. In addition, the repayment behavior simultaneously causes the decreases in both the liabilities and assets on the firm's balance sheet by the amount of the repayment, thus not changing the equity or net worth of a firm. Nevertheless, the relationship between the income and repayment can prove to be the criterion of financial stability (Gatti et al. 2011, p.68).

And 2) the argument that supports the choice of interbank repayment algorithm used is inappropriate; that the repayment algorithm minimizes the banks defaults should not be a reason for implementing it in the model. For the purpose of a meaningful model, an appropriate interbank repayment algorithm should mimic as well as possible the possible repayment patterns of the real banking system.

REPLY: The aim of this paper is to present the macroeconomic impacts of the LCR. I do not think it is necessary to mimic the possible real repayment patterns as well as possible. The current repayment algorithm reduces complexity of the interbank network and its uncertain impacts on the macroeconomic results to the

most extent. This is the reason why this paper adopts this repayment algorithm.

Although having two scenarios is a good idea to structure the analysis of the results, none of the scenarios seems to represent appropriately what would happen in a real economy. In the LCR framework scenario the LCR is suddenly increased “in response to liquidity shortages or stressful economic conditions”, but no stressful economic conditions have occurred in the artificial economic model in the presented work at time t=100. Additionally, increasing abruptly the level of the LCR to provoke stress in the banking system is not pertinent to the aim of the presented work, if any stress provoked by the LCR were to occur in the model, it should be an endogenous result, but not an exogenous shock. On the other hand, the setup of the benchmark scenario that produces a decrease in the liquidity buffer right after the exogenous shock on LCR and subsequently develops in a constant liquidity buffer is not supported by empirical evidence

REPLY: I appreciate this comments proposed by the anonymous referee. I will rewrite this part, which brings about some misunderstandings, in the revised version. According to our objective, irrespective of the liquidity

shortages or stressful economic conditions, I just intend to feature the endogenous feedback loop introduced by the LCR, which shows the macro mechanism hidden behind the regulation. The shock refers to the scenario where the LCR becomes excessively strict set by the supervisors, thereby strengthening the feedback effect.

I agree with the referee that any stress triggered by the LCR should be endogenous rather than exogenous, which is consistent with what I have presented in this paper. In my model, except the rise of the LCR at period t=100, all the time series result from endogenous evolution. The periods before time t=100 experience a rapid debt growth and accumulation until the system achieves equilibrium, where the repayment flow meets the lending flow. Thus, the firm has to obtain sufficient income to repay those outstanding loans. Due to this fact, the shock raises the LCR along with causing more loan defaults, which will make the results more significant. This is why this shock is introduced in this model. Despite this consideration, the shock can be even removed from the model, which turns out to be a full endogenous dynamics without any

exogenous shock. Then, the results have the similar patterns to the part of the present results after period t=100.

The setup of the benchmark scenario results in the bank holding an average buffer of the actual buffers of the 30 periods from the time point of increasing the LCR. Thus, there is indeed an increase in the liquidity buffer rather than a decrease. This setting cannot reproduce the stylized facts in empirical evidence. Instead the benchmark scenario muting the feedback loop serves as a benchmark to stress the feedback effect.

Finally, the incorrect use of some terminology and the frequent grammatical errors are a considerable obstacle to fully understanding the model, results and conclusions presented in the submitted paper.

REPLY: I am very grateful for these detailed and useful comments. In the revised version, I will carefully address all errors.

Additional comment:

The following segment of the presented paper needs to be quoted as it is an identical copy of an extract from the (BCBS 2013).

REPLY: Thank the anonymous referee for pointing out my neglect on the citation. The citation will be added in the revised version of this manuscript.

References

BCBS, 2013. Basel III: The Liquidity Coverage Ratio and liquidity risk monitoring tools. *Bank for International Settlements*.

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