Responses to Referee Report

We are grateful for the very painstaking efforts made by the referees in providing us with these very valuable suggestions and comments. These make us see better how we can make our results and contribution sharper. We believe that we have taken all the suggestions and comments into account in this revised version. To enable the referees to quickly see what we have done, we also summarize how we have responded to the referee as follows.

Major Comments

1. The topic of the paper is interesting, however, the title seems to me a little bit misleading. By reading a title, I would expect something else. First, your definition of what DSGE model mean is not accurate. You should explicitly state what do you want to describe (inflation, dividend process etc.). DSGE should be your tool how to do this. I personally use continuous-time DGSE model to model dividend processes. It is certainly a DSGE model but it is different from yours. This is different from what you are using. Your statement would be correct if you would use some general set of equations generating dynamics, general dynamics, without stating anything about households, interest rates etc. Therefore, you should either reformulate it in economic terms or forget the mentioning of economic variables at the beginning, work with some general equations and at the end of the day, illustrate it on example of interest rates etc.
   Actually, there are different types of DSGE models. In this paper, we offered a stylized New Keynesian macroeconomic model. According to your suggestion, the title is changed to "Interactions in the New Keynesian DSGE Models: The Boltzmann-Gibbs Machine and Social Networks Approach".

2. In section II, you are talking about difference between Gibbs distribution and ant model. You have not introduced that properly and at this point, it is just confusing. Especially if you mix these two terms immediately with inflation. This part should be explanatory and me, as a reader, should be able to understand it and I do not (I have background in nuclear physics so I know what Gibbs distribution means in the nature!).
   There are many agent-based models that can be embodied with network structures. However, one of the purposes in introducing the Boltzmann-Gibbs

distribution to DSGE models is to calibrate the crash and the bubble. In the research on agent-based modeling, both the Boltzmann-Gibbs machine and Kirman's ant model can easily generate herding behavior. For this reason, we build up the network-based ant model. The Details are now given in footnote 3. See page 14.

3. First sentence of section III implies that generation of economists is thinking about YOUR model. Please restate it.
   Done, we had modified it.

4. Statement: The beginning of the story is that some physicists found the collision of particles to be similar to the interaction of people. As Boltzmann showed, particles are similar to many individuals, having most of the states of motion. To be more precise, the collision of constituent particles under specific structures is analogous to the interaction of people under specific social networks. No matter what my personal opinion is, this statement is really too strong and without proper and detailed citations not acceptable. Similarity in this case can be anecdotal, in which case it has value just for motivation, or the similarity was somehow estimated, modeled or measured. In this case, provide citation. If you show the similarities between the world of physics and human agents, you should be also aware of the differences and honestly mention them. It will cause that you will be perceived as an unbiased researcher(s).
   We, of course, are aware that whether or not human agents can be regarded as atoms can be an issue that is much more subtle and controversial then the statement presented above. The reference is offered in footnote 1. See page 11.

5. Page 13: They treat the economy as a complex adaptive system and the emergence of aggregate patterns as a result of individual interactions among participants at the micro-level. I am really afraid that any model, where agents will treat as a complex adaptive systems would mean that only agents in the economy are physicists aware of complex systems, which is far from reality. If you want to describe what agents really are use different wording.
   Done, it had been corrected.

6. If I understand correctly, there is a Markov switching process between two states optimisms and pessimism, thus every agent is in every step changing his mood. I really like that you add the imitation component in this equation.
   Thanks.

7. Then comes the part on the network structures. This part is not smoothly incorporated in the paper. You should rethink how to organize the paper. This should be really an independent chapter. Right now, the methodology section is too mixed up. If you want to sell your paper as economic paper, I would probably devote an appendix for that, where you could describe all the details and keep in the main body of the text just a very brief overview with key results.
   Done, an appendix section which details the social network topologies is added to this revised version.

8. Results and simulation sections, you mention you use simulation with 1000 agents. Is it really enough? Are your results stable with respect to the size of the population.
   To make the model easier to operate with large number of runs, a size of 1,000 agents seems to be a practical choice. In addition, according to our experiments, the simulation results of 100 and 1000 agents are quite similar. The details can be referred in footnote 4. See page 16.

9. Page 36: However, we wonder if S is a good approximation of the distribution of G. I really do not udnerstand this sentence. Support it by the evidence, or comment it but the current formulation is strange.
   Done. The wording had modified.

10. I would also careful with employing Shanon entropy. Your system has certainly a memory, for which this measuse is not the best one. However, it is very illustrative to use an alternative to KS test and make your findings stronger. However, I would suggest to make a robustness check with respect to number of bins N. Currently, you use N=10 and just one choice of the parametrization for a test, which is not understood as deeply as KS statistics is not enough. The purpose of this measure should be making your findings robust, not to make more fancy features into your paper. As it is right now, it suggest the latter case. This is just wording, but it may help you a lot!
    Since the results of the Kolmogorov-Smirnov test will be significantly affected by the number of bins. For this reason, relative entropy to check whether the Boltzmann-Gibbs machine is a good approximation for the herding behavior for any given network structure. The details can be found in page 24.

Minor Comments

The abstract is too long, please make it shorter, now it does not fulfill the role of the abstract.

Done, we have cut it by almost half.