Reply to referee report on manuscript: "Paradigm shift"

April 15, 2018

Thank you for this positive review of the manuscript.Your constructive comments will help improve the quality of the article.

First, I agree with your summary of the main point of the article. You also suggest many interesting ways to augment the model. This raises a point that it seems I was not able to make clear enough in the current state of the manuscript, and that will be touched upon several times in the answers below: the described dynamic is robust to a large array of changes to the model I have experimented with. Therefore, my aim was to present a realistic but minimal model that generates the said dynamic, and then point out that the dynamic is robust to an array of changes to the minimal model. My concern is for the article to become a long sundry list of potential interdependent changes to the model that will make the article unclear. Yet I see that need for more details to be added. This is an important take away from your comments that needs to be worked upon.

I will now answer each comment in turn:

1) If a paradigm labelled i is a rejected at a given iteration, the paradigm labelled i at a later iteration will be as likely to be selected as any other paradigm. There are several reasons for this choice. One is to consider that the paradigm that failed to predict are discarded, and a new paradigm is affected to the same label; i.e., if paradigm p numbered i failed to predict at a good enough rank r, it is discarded and a new paradigm p' is labeled i and may be selected by an agent at a later iteration. Another is that agents know that the value of a paradigm highly depends on what is currently the most used paradigm in the market, so that there is little rational to under-select a given paradigm

if it failed at a previous iteration, as the leading paradigm could have changed in between. More to the point, as described below, changing the probability does not, in our experiments, change the overall dynamic of paradigm shifts.

2) That is an interesting point. Yes, we have experimented with this idea: having agents keep a record of the paradigm that failed to perform, and be less likely to select them for a given number of iterations K. The system is affected only in that the stable periods become likelier and longer, but the overall dynamic remains unchanged.

3) Yes, for not too large values of p_2. In my experiment p_2 less that ~ 0.25 did not have a significant effect. As p_2 is essentially the probability that an agent changes paradigm for no market reason, so that 0.25 is rather large, as well as because this is rather counterintuitive, I choose to tone down this point my presentation. I see now that this choice leads to confusion. To my best understanding, there are two way to obtain an intuition of this result. First, as prices are ordered at random, and rank is a robust statistic, there needs to be a lot of randomness added before it actually affects the outcome. Second, since the paradigms are only identified from their labels, they potentially can be though of as different between iterations (see point 1 above), so that having a change of paradigm label does not affect the dynamic itself.

4) Yes. I label it as risky because if the paradigm chosen by the market is bad, then the price will serve little economic value. Another perspective is that the homogeneous state is only waiting for jumping to an inhomogeneous state, which is a type of crash.

5) Yes. This ties back to my overall comment on top.

6) Yes. Thank you for this suggested reference.

7) Thank you for this suggestion. Using q will be my preferred solution.