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Cobweb Theorems with production lags and price forecasting

The paper makes a very interesting contribution to the cobweb literature when both production lags and forecasting memory lags are involved. In particular, it provides a better understanding of the impact of the production lags on the stability of the cobweb system, which is new in the literature.

It is well known in the cobweb literature that price forecasting based on past prices can have a very complicated impact on the stability. Given various forecasting rules, such as static or naive expectations, adaptive expectations and extrapolative expectations with either equal or unequal weights and finite or infinite distribution lags, it is not always true that forecasting with longer distribution lags has a stabilizing effect, see Chiarella and He (2004) for a related discussion. Hence, when an additional production lag is introduced, the impact of lags on the stability becomes more complicated. This is clearly illustrated by a number of numerical examples in Section 2. Apart from the general results obtained in Section 3, the paper also considers the existence and stability of limit distribution after introducing random disturbances in the log price process and obtains some interesting results.

In the following, I would like to add two observations. First, when the production lag $\ell = 1$, some of the results in Section 2 are closely related to Chiarella and He (2004) (CH hereafter). For instance, with $\ell = 1$ and $m = 1$, the same stability condition in Theorem 2 is obtained in Proposition 4.2 of CH with the largest stability region $0 < c < 3$ for weights $(\alpha_0, \alpha_1) = (2/3, 1/3)$. With $m = 2$, Proposition 4.3 of CH provides some explicit stability conditions with the largest stability region $0 < c < 7$ for weights $(\alpha_0, \alpha_1, \alpha_2) = (3/7, 3/7, 1/7)$. In the case with equal weights, the same stability condition of Theorem 6 is obtained in Proposition 4.1 of CH. For the geometric weights discussed in section 2.6, CH also provides some stability conditions when $m \leq 8$. When $m \to \infty$, the same result of Theorem 3 (a) is obtained in CH as well.

Secondly, different from Chiarella (1986), the paper considers (log) linear demand and supply curves. This makes no difference when dealing with local stability. By assuming an S-shaped nonlinear supply function, it can have two advantages when conducting numerical analysis. First, when arguing with the stabilizing effect of the production lag, an instability of the linear system may lead to price unboundedness, which makes it difficult to illustrate the stabilizing effect from unstable to stable situation when the lags increase. A nonlinear S-shaped function may lead to complicated, but non-explosive, behaviour, which helps to show the stabilizing effect. Also, this "stabilizing" effect of the nonlinear function may help to examine the limiting distribution when the random system is "stable" (even unstable in some cases) when the shock size is not necessarily small.

Overall, the paper makes a significant contribution to the cobweb literature.

References

Chiarella, C. (1986), 'The cobweb model, its instability and the onset of chaos', *Economic Modelling* **15**, 377–384.

Chiarella, C. and He, X. (2004), *Dynamics of Beliefs and Learning under a_L-Processes – The Homogeneous Case*, Vol. 14 of *ISETE (International Symposium in Economic Theory and Econometrics) Series*, Elsevier, pp. 363–390. in *Economic Complexity: Non-linear Dynamics, Multi-agents Economies, and Learning*, Eds. Barnett, W. and C. Deissenberg and G. Feichtinger.