Furthermore, even where the price stickiness interacts with other distortions or market failures, such as those induced by imperfect competition, it need not necessarily establish a role for activist macroeconomic policies.

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Comments

Microeconomic rigidities and aggregate price dynamics
by Ricardo Caballero and Eduardo Engel

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This paper is an important contribution to the literature on the micro-economic foundations of macroeconomics. Caballero and Engel take as given some of the 'facts' of the behavior of the aggregate price level – in particular the high degree of persistence. They then endeavor to explain these facts using a simple model of microeconomic price adjustment. Their explicit examination of how their model fits the data using standard goodness-of-fit criteria, and their focus on explaining dynamic auto-correlations rather than simple contemporaneous correlations is particularly welcome.

Key finding
  The central innovation of the paper, in my view, is that the probability that an individual price (or contract) will adjust depends on both the size and the sign of the deviation of the price from some desired price. This is a significant generalization of the work by Calvo (1983), Chadha (1987) and Levin (1991) who develop staggered contract models in which contract prices are interpreted as having a probability of changing each period, but in which that probability is *exogenous*. The probability distribution is exponential in the case of Calvo (1983) and Chadha (1987) and more general and possibly

time-varying in the case of Levin (1991). Like the earlier staggered contract models only a fraction of prices will be adjusted each period in the Caballero and Engel model. But unlike the earlier models, the distribution of the number of prices that undergo an adjustment is *endogenous*.

This endogeneity has a number of important implications which lead to a big, potentially valuable, research agenda. The following comments are meant to be constructive as the authors begin to pursue this research agenda.

Short-lived micro-rigidities?

An important research question in the microfoundations of aggregate price dynamics is whether the high degree of persistence that we see in aggregate statistics can be explained by relatively short-lived rigidities. For example, I have emphasized that a staggered wage setting model with contracts of only one year could explain persistence of aggregate wages and prices of much longer duration. It seems to me that such a demonstration lends plausibility to sticky prices as an explanation of macroeconomic fluctuations in general. It is hard to quibble about rigidities that are temporary.

Is this same property – that short (average) periods between price changes are consistent with the observed aggregate persistence – true of the Caballero and Engel model? Unfortunately, it is difficult to tell from this paper. The estimated cross-section densities (or the average density in the sample) could perhaps provide information on this important issue, but these are not reported in the paper. To the extent that fig. 1 is representative, my guess is that the average time between price change is quite short, but I would encourage the authors to provide such information directly – perhaps in their future work.

Are the aggregate dynamics sufficiently explained?

It would also be useful to report on how much of the aggregate price dynamics is actually being explained by the model. The authors develop some summary measures of stickiness and asymmetry, but there are other measures of aggregate behavior that can be used to compare theory with the facts. For example, in much of the earlier work on staggered price or wage setting, the unconstrained infinite moving average representation (or the autocorrelation function) of the aggregates was computed with the infinite moving average representations implied by the model. These can easily be computed from vector autoregressions. Recent work by Fuhrer and Moore (1992) use such an approach to see how well the staggered price setting model fits the data.

The Caballero and Engel paper focusses on the aggregate producers price index. According to regressions I have done the percentage change in that index over the 1955–1991 period is described by a second-order autoregression with lag coefficients of 1.13 and -0.26. The detrended log of the index

itself is described by a second-order vector autoregression with coefficients of 1.68 and −0.76. How well does the Caballero and Engel model come to generating a stochastic process for the price level with these properties? The second-order term in these autoregressions is very significant, suggesting that a first-order adjustment process would be insufficient. Is it possible that more complicated microeconomic dynamics would be required to match this second-order property? Or does the interaction of the cross-section distribution and the first-order micro-dynamics provide a second-order aggregate process? Reporting the time series model for the aggregate price level implied by the micro model would answer this question.

Comparison with earlier research on cross-section distributions

It would also be useful to compare the estimated distributions of Caballero and Engel with those that have been estimated with the staggered price setting models with exogenous cross-section distributions. For example, Levin (1991) reports estimates a cross-sectional distribution of wage changes in the United States. Out of a 100 percent total, he finds about 10 percent one quarter wage changes, 25 percent two quarter wage changes and 65 percent four quarter wage changes. Levin uses quarterly data to obtain these estimates and of course they apply to wages, not producer prices. There are also examples of estimated time-varying (though exogenous) cross-section distributions reported in Taylor (1992) to accommodate the Shunto mechanism in Japan. It would be very interesting to compare the Caballero and Engel densities with these previous estimates.

Policy issues

In my view, one of the most important reasons to endogenize the price change or contract termination decision, is to better handle policy issues. The exogeneity of the price change distributions in the staggered contracts models has been one of their most criticized assumptions. Most of the criticisms are from those skeptical of their policy implications – including the finding that monetary policy can be effective.

Caballero and Engel have a model that can potentially answer such criticism. Doing so, of course, will require embedding their price adjustment model into an aggregate demand model which the authors may be reluctant to do at this stage. My guess is that the policy implications will not be too different from the earlier staggered contract models. For example, if the distribution of micro price adjustments does not change much over time, then the existing staggered price or wage setting models will be good approximations for policy. But this remains to be seen. In any case, there are a host of important policy questions – from the question of fixed versus flexible exchange rates to the question of the optimal feed back rule for policy – that the Caballero–Engel framework can help us answer.

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