"Comments on 'Exchange Rates and Fundamentals' by Charles Engel and Kenneth West"

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It is natural for me to like the basic objectives of this paper which I take to be the testing of some forms of macro theories involving exchange rates, particularly as sound econometric time series methods are used. I do not plan to comment on the macro theories but one might naively wonder why there is no mention of some form of the efficient market theory, possibly after allowing for differences in interest rates between the two countries.

A part of the theory is based on the present value relationship

$$S_t = \sum_{j=0}^{\infty} b^j E_t(f_{t+j} + z_{t+j})$$

where S_t is the (log) exchange rate, f_t a fundamental potential observable explanatory variable, and z_t an unobservable explanatory variable. A consequence of this representation is that

$$S_{t+1} - S_t/b = f_t + z_t + \text{ white noise } .$$

This result uses optimum forecast theory and particularly the updating formula. It was indicated by Samuelson in 1965 and formally shown by myself in 1975.

For the equation to balance, and as S_t seems to be I(1) - that is it has a unit root, it follows both that some of the explanatory variables also need to be I(1), as has been found, and also that there has to be cointegration between S_t, and with at least some of f_t and z_t. The paper discusses tests of pairs of variables including S_t and, in particular, f_t, but these could be expanded to tests involving more explanatory variables. It would be strange if cointegration only occurs between S_t and and the unobserved z_t series.

The main testing tool for relationships is the Granger Causality test, first in pairs and later in Appendix 3, in a more general setting. These tests are using this concept in the way for which it was originally designed, asking if the lags of certain variables belonged in vector autoregression models; or not. We can get over the "causality" hang-up quickly as no deep meaning is being implied by these tests and the tests being presented are not those that I have been recommending for a quarter century to test for "Granger Causality," which are based on the actual predicted performance of models, not on the promised or implied performance.

If one build models of the form

$$Y_t = \text{lag } Y_t + \text{lag } X_t + \text{ noise},$$

and

$$Y_t = \text{lag } Y_t + \text{ noise},$$

and find that the lag X_t terms in the first equation are significant, you have not shown, strictly, that X_t will help forecast Y_t. That did occur in the sample data set, but need not continue in the post-sample period. One requires both stationarity and no change of regime. There are plenty of examples of

apparent in-sample prediction not producing it post-sample.

The results show that, generally

A. Exchange rates cause fundamentals; but
B. Fundamentals do not cause exchange rates.

From an efficient market, simplistic macro viewpoint, I do not find these results very surprising. (B) is rejected with low levels of significance for the nineties. What I do find surprising is the total lack of significant relationships between Canada and the United States, a pair of countries that are very closely linked! Only a couple of significant relationships between relative prices and exchange rates are found (one in A and one in B) and in different periods.

I would like to suggest two ways that the analysis could be expanded. As in finance, we should not be interested only in returns, but also in volatility. It has been found that $|\Delta S_t|$ is long memory using high frequency data, and it may be interesting to see if there is causality from $|\Delta f_t|$ to $|\Delta S_t|$ for example. Forecasting uncertainty in exchange rates may be useful.

It is difficult to find subtle relationships using quarterly data, particularly as we know that exchange rates are available at very high frequencies and that they change rapidly. The results using data recorded more frequently could be rather different. Certainly, using the notation of the paper, S_t, p_t, m_t and i_t could all be gathered monthly and even weekly, using a proxy series for prices based on gasoline, automobiles, and prices in large stores. I can only assume that the Federal Reserve has some weekly measure as a basic form of money. The difficulty is GDP which historically could be approximated by the index of industrial production at the monthly period, but that would have to be improved by including some measures from the service industries. To get a GDP time measure available weekly is a separate research project, but not an impossible one, using available techniques, such as the Kalman Filter, and the many series that are now available at that frequency.

My only final comment is to ask, what would you plan to do with the (causal) models once you get them? Suppose you find a causal relationship between fundamentals and exchange rate volatility? That will not necessarily imply there is a control possibility. There is a strong disagreement amongst those who write about causality about whether "causality" and "controlability" is a deeper concept that we do not yet know how to test for, without observing control experiments.

References

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Samuelson, P.A. (1965): "A Proof That Properly Discounted Present Value of Assets Vibrate Randomly." *Bell Journal of Economics and Management Science* 4, 369-374.