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Do purchasing power parity and uncovered interest rate parity hold in the long run? An example of likelihood inference in a multivariate time-series model

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Abstract

The long-run foreign transmission effects are analyzed in a multivariate time-series model of Danish and German prices, exchange rates, and interest rates. The analysis of the likelihood function reveals that the vector process is I(2), but that a linear transformation of the prices and the nomical exchange rate removes the I(2) trend from the data. A structural representation of the full cointegration space is found to facilitate the understanding of the interaction between the goods and the capital market and hence the mechanisms behind the inflationary effects transmitted from abroad.

Key words: VAR model; Cointegration; Purchasing power parity; Uncovered interest rate parity
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1. Introduction

The debate about the usefulness of Bayesian versus classical inference in econometric time-series models has a long history. Leamer (1991) expresses this as: 'From a Bayesian perspective the quantification of precise judgments is the conceptually straightforward activity of forming a posterior distribution given

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a precisely defined prior distribution and a precisely defined sampling distribution.' Here we will concentrate on the last issue with the purpose of illustrating the extent to which the macro-data themselves provide the basis for precise judgments, as contrasted to the 'data' added to the analysis in the form of prior probabilities.

This point will be illustrated with an empirical analysis of the determination of exchange rates between Denmark and West Germany in the period 1972 to 1991. The analysis builds on previous results discussed in Juselius (1991), but the sample period was extended. The exchange rate problem has been empirically investigated in a large number of papers, for instance in Baillie and Selover (1987), Edison and Klovland (1987), Schotman (1989), Mark (1990), Koedijk and Schotman (1990), and Glen (1992). A common feature of most empirical results is the empirical rejection of standard economic hypotheses such as the prevalence of the purchasing power parity (PPP) as a backward adjustment mechanism in the goods market and the uncovered interest rate parity (UIP) as a forward-looking market clearing mechanism in the capital market. Because many economists – in spite of the empirical rejection – rate of the opinion that the parities have to work one way or another, this seems to be an example of a situation where additional data, such as strong prior probabilities, are needed.

Here we will advocate that the lack of empirical support for purchasing power parity as well as uncovered interest rate parity might partly be due to the lack of a precise specification of the sampling distribution of the data. Three different points will be discussed: (i) the general neglect to account for the time-series properties of the data which is likely to invalidate the statistical analysis, (ii) the importance of analyzing the PPP and the UIP jointly in a full system approach in which possible interactions between the goods and the capital markets are allowed for, and (iii) the importance of allowing for different short-run and long-run effects in the model so that the error correction terms of the PPP and the UIP ensure that in a steady state, i.e., an economy with no changes or shocks, the model is consistent with the two parities. In the short run it is assumed only that the parities describe a tendency in the markets to react toward them, implying that the parities might actually never be satisfied, but also that neither the prices nor the interest rates can diverge substantially without evoking adjustment forces that tend to restore equilibrium.

These three points will be discussed in connection with the empirical analysis. Similar analyses have been performed on other data sets, for instance on UK data in Johansen and Juselius (1992), on Australian data in Johansen (1992b), on Norwegian data in Jore et al. (1992), on Swedish data in Sjöö (1995), and on Spanish data in Camarero and Tamarit (1993).

The organization of the paper is as follows. In Section 2 the economic background is discussed briefly and related to the choice of econometric method. In Section 3 the statistical model is formulated and the fundamental hypotheses about the order of integration are defined. In Section 4 the