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Measuring the forward foreign exchange risk premium: multi-country evidence from unobserved components models☆

Christian C.P. Wolff *

Limburg Institute of Financial Economics (LIFE), Maastricht University, PO Box 616, 6200MD Maastricht, The Netherlands
Centre for Economic Policy research (CEPR), London, UK

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Abstract

We investigate the nature of the foreign exchange risk premium for a wide range of currencies, using unobserved components models with exactly matched spot and forward exchange rate data. Significant time-variation of the risk premium is documented for most currencies. Our estimates indicate considerable persistence in the risk premium, and suggest that the variability of the risk premium is quite low relative to the variability of the forward forecast error. © 2000 Elsevier Science B.V. All rights reserved.

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1. Introduction

Forward discount bias is a phenomenon that was studied extensively in the literature. In addition to the forward exchange unbiasedness being rejected, it is generally found that the change in the future exchange rate is negatively related to the forward discount. A prominent explanation for the rejection of forward rate unbiasedness is the existence of a time-varying risk premium. Other explanations

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* Corresponding author. Tel.: + 31-43-3883838; fax: + 31-43-3258530.
E-mail address: c.wolff@berfin.unimaas.nl (C.C.P. Wolff)

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involve peso problems, irrationality of expectations, learning behavior, and market inefficiency. Useful surveys of the empirical findings in this area are provided by Hodrick (1987), Lewis (1995), and Engel (1996). In this article we attempt to obtain more information about the nature of the risk premium. One approach to model the risk premium is the unobserved components (or signal extraction) methodology that was introduced in this literature by Wolff (1987) and Nijman et al. (1993). They showed how the risk premium can be interpreted as an unobserved component, and how models of this type can be identified and estimated. The available empirical evidence related to this approach is quite limited as only one relatively small sample, containing three currencies relative to the US Dollar, was studied. In addition to being limited, this sample is by now fairly dated. The primary objective of this article is to further assess the relevance of the unobserved components approach by studying a large, up-to-date dataset, covering 20 years of exchange rate data and 15 different countries. Care is taken, contrary to the earlier studies, to follow the sampling procedure of Bekaert and Hodrick (1993) to match spot and forward data, in order to avoid the introduction of measurement error.

2. The risk premium as an unobserved component

The logarithm of the forward exchange rate can be divided into an expected future spot rate component and a risk premium component:

$$F_t^{t+1} = E_t[S_{t+1}] + P_t \quad (1)$$

where F_t^{t+1} is the natural logarithm of the forward rate at time t for a contract maturing at $t+1$, $E[S_{t+1}]$ is the rational expectation, based on information available at time t, of the log of the spot exchange rate at time $t+1$, and P_t is the risk premium. Subtracting S_{t+1} from both sides of Eq. (1) and defining $v_{t+1} \equiv E[S_{t+1}] - S_{t+1}$, we obtain

$$y_t \equiv F_t^{t+1} - S_{t+1} = P_t + v_{t+1} \quad (2)$$

Eq. (2) states that y_t, the forecast error resulting from the forward rate as a predictor of the subsequent spot rate, consists of a risk premium and a white noise error term: ‘signal’ and ‘noise’. We will attempt to model the signal as an unobserved component in order to extract it from its noisy environment. An important advantage of this methodology is that the expectation of the future spot rate need not be modeled explicitly.

Our modeling strategy focuses on the premium itself. Following Wolff (1987), Nijman et al. (1993) and Huisman et al. (1998), the signal is assumed to be generated by a model from the autoregressive integrated moving average (or ARIMA) class of models. This assumption is consistent with theoretical models that have been studied in the literature, see Nijman et al., 1993. In order to explain our modeling strategy, let us assume that P_t is generated by an ARMA(1,1) model:

$$(1 - \phi L)P_t = (1 - \omega L)a_t \quad (3)$$