Available online at www.sciencedirect.com
ScienceDirect
Int. Fin. Markets, Inst. and Money 17 (2007) 180–197
Journal of INTERNATIONAL FINANCIAL MARKETS, INSTITUTIONS & MONEY
www.elsevier.com/locate/intfin

Currency futures-spot basis and risk premium

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Received 30 April 2005; accepted 24 October 2005
Available online 28 November 2005

Abstract

This paper explores the usefulness of currency futures-spot basis in predicting spot rate changes and currency futures returns. We conjecture that the currency risk premium may be an important component of the basis for long-maturity futures contracts, but may not be so for short-maturities. Thus, the basis of long-maturity contracts cannot predict the spot rate changes between now and maturity, rejecting uncovered interest rate parity (UIP), but can predict currency futures returns, which are solely determined by the risk premium. Conversely, the basis of the short-maturity contracts can predict the spot rate changes between now and maturity, validating the UIP, but cannot predict currency futures returns. Empirical tests support these conjectures for the Japanese, British, Swiss, and German currencies over the last two decades. The results are also consistent with Longstaff [Longstaff, F., 2000. The term structure of very short-term rates: new evidence for the Expectation Hypothesis. Journal of Financial Economics 58, 397–415], who shows that the Expectations Hypothesis holds at the very short end of the term structure of interest rates.

JEL classification: G13; F31; G14

Keywords: Currency futures; Exchange rates; Risk premium

1. Introduction

The relationship between currency futures and spot exchange rates has been the subject of numerous studies. The difference between the futures exchange rate and current spot exchange rate is defined as the basis of the futures contract. The most commonly tested theory on the link between the basis and spot rate changes is the Expectations Hypothesis, or the uncovered interest parity (UIP hereafter). According to this theory, the futures exchange rate should be an unbiased

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doi:10.1016/j.intfin.2005.10.003

estimate of the spot exchange rate at maturity. Thus, a regression of percentage change in the spot rates between now and the maturity date on the current futures-spot basis divided by the current spot rate should produce a slope coefficient of one. However, overwhelming evidence from different currencies, sample periods, lags, and estimation techniques has shown that this slope coefficient is statistically different from one. As a matter of fact, it is often negative.[1] Fama (1984) has termed the anomaly as *forward premium puzzle* and has attributed the failure of the UIP to the existence of a time-varying currency risk premium.

An implicit view from many studies is that the futures-spot basis does not help explain spot rate changes. However, such a view may be too pessimistic. It is very likely that the basis does contain useful information about future spot rate changes and currency returns in general. Theoretically, the basis is the sum of expected spot rate change and currency risk premium. Since the failure of the UIP is due to the variable risk premium, a direct implication is that when the risk premium does not play an important role, the basis, which will largely be the expected spot rate change component, should help explain future spot rate changes. Since the risk premium is unobserved, the question becomes how to identify when the risk premium is important and when it is not.

In this study, it is suggested that the risk premium becomes an increasingly more important component of the futures-spot basis as the maturity of the currency futures contract gets longer. Therefore, the UIP is unlikely to hold for long-maturity contracts, but is likely to hold for short-maturity ones. Consistent with our ideas, Longstaff (2000) has shown that the Expectations Hypothesis holds at the very short end of the term structure of interest rates, while most of other studies that focus on longer horizons have rejected the Expectations Hypothesis on interest rates.

To empirically test our idea, we separate the data on futures contracts into short-, middle-, and long-maturity groups. Tests of the UIP are conducted separately for each of these maturity-based groups on the British Pound, Japanese Yen, Swiss Franc, and German Mark against the US dollar. For the long-maturity group, the UIP is flatly rejected and the slope coefficients are all negative. These results for the long-maturity group are consistent with those reported in the literature. However, for the short-maturity group, the UIP holds in most cases with the slope coefficients being positive and statistically indifferent from one.

The basis may contain information that is useful for predicting currency futures returns as well as for testing the UIP hypothesis. Theoretically, as shown in Section 2, currency futures returns are solely determined by the unobservable risk premium associated with futures prices. Since the risk premium is an important and perhaps dominating component of the futures-spot basis for the long-maturity futures contracts, the basis can help explain and predict returns of these currency futures. For the short-maturity group of currency futures contracts, the basis cannot be a good proxy for the risk premium and cannot help explain futures returns of these contracts, because the risk premium is only an unimportant component of the basis. To test this idea, we run regressions of 2-, 5-, 10-day-ahead currency futures returns on the futures-spot basis divided by the spot rate for the three different maturity groups. For the long-maturity group, the slope coefficients are statistically different from zero for all the currencies and forecasting horizons. These are encouraging results, as it is extremely difficult to predict futures returns in the highly efficient currency futures market.[2] Not surprisingly, none of the slope coefficients for the short-maturity group are statistically significant for any of the currencies.

[1] See Frankel (1979), Bessembinder (1992), Backus et al. (1995, 2001) and Inci and Lu (2004).

[2] Taylor (1992) provides profitable trading strategies using currency futures price levels, but Doukas and Rahman (1987), and Barkoulas et al. (1999) document non-stationarity of price data and question the predictive power of the techniques using price levels. Most forecasting models cannot beat the random walk (Sequeira et al., 2001).