

# **The Forward Premium Puzzle and Intervention Risk**

by

Ayano Sato+                      Hiroya Akiba++  
+Graduate School of Economics  
++School of Political Science & Economics  
Waseda University  
Tokyo, Japan

July, 2003

## **ABSTRACT**

This article focuses on one central question of whether central intervention risk can account for the well-known empirical failure of the forward premium as an unbiased predictor of future exchange rate movements. This failure has been one of the unresolved issues in the forefront of modern international finance, known as the forward premium puzzle (FPP hereafter). To be more specific, it refers to the empirical finding that the forward premium is not only a biased predictor, but also generally predicts the future spot exchange rate in the wrong direction.

The puzzle has been challenged with two main explanations: the time varying risk premium and expectations errors. However, the puzzle still remains unresolved and thus serious, in the sense that none of the subsequent empirical studies, using elaborated estimation techniques and different data sets, can account for the puzzle (Froot and Thaler, 1990; Wu and Zhang; 1996; etc.).

In view of these unsuccessful developments, further research is necessary in four general directions as mentioned by Engel (1996) to explain why the FPP occurs. They are extension of the Peso problem, expectations using survey data, inefficiency in the international financial markets arising from various frictions and the risk premium analysis. This paper takes up the last direction; we focus on the risk premium which is defined slightly differently than in the literature, but similar to the one defined by

Garber and Svensson (1995,ch36). The purpose of this paper is fourfold.

First, we empirically analyze the asymmetry reflected in different speeds of adjustment of risk premium, which is introduced by the expected intervention. While asymmetry is also confirmed by Bansal and Dahlquist (2000) and Wu and Zhang (1996) in their studies of the FPP, the source of the asymmetry remains unsolved. In contrast with this, our analysis clarifies that asymmetry is due to different speeds of adjustment of risk premium.

Second, we also empirically address non-linearity introduced by a S-shaped curve within a target zone. If the exchange rate follows an S-shape in the target zone, the FPP is an inevitable consequence, as remarked by Garber and Svensson (1995,ch36).

Third, since the above two purposes are attained by using a Multiple-Regime Smooth Transition Autoregressive (MRSTAR) model, whose prominent characteristics are asymmetric dynamics, regime-switching and non-linearity, among others, we are in a position to examine exchange rate behavior under a target zone, which reflects both a publicly announced zone and a privately conceived one.

Last, our fourth purpose is, utilizing the results of the above three purposes, to show empirically that a possible cause of the FPP is the risk premium introduced by the expected intervention.

We found that the behavior of risk premium is different among three regimes: the risk premium inside of the target zone follows a random walk process, meaning that the FPP is observed because of no-cointegration. In contrast, the risk premium outside of the zone follows a stable process, indicating that the FPP is not observed.

#### (References)

Bansal, Ravi and Dahlquist, Magnus. "The Forward Premium Puzzle: Different Tales From Developed and Emerging Economies." *Journal of International Economics* 51(1), 2000: 115–144.

Engel, Charles. "The Forward Discount Anomaly and the Risk Premium: A Survey of Recent Evidence." *Journal of Empirical Finance* 3(2), 1996: 123–192.

Froot, Kenneth and Thaler, Richard H. "Anomalies: Foreign Exchange." *Journal of Economic Perspective* 4(3), 1990: 179–192.

Garber, Peter M. and Svensson, Lars E.O. "The Operation and Collapse of Fixed Exchange Rate Regimes." in Gene Grossman and Kenneth Rogoff (eds.), *The Handbook of*

*International Economics*, Amsterdam: North-Holland Publishing Company, 1995.

Obstfeld, Maurice and Rogoff, Kenneth. *Foundations of International Macroeconomics*. Cambridge, Massachusetts: The MIT Press, 1996.

Wu, Yangru and Zhang, Hua. "Asymmetry in Forward Exchange Rate Bias: A Puzzling Result." *Economics Letters* 50, 1996: 407–411.

Address of correspondence of author: Ayano Sato,  
Graduate School of Economics,  
Waseda University, 1-6-1 Nishi-Waseda,  
Shinjuku-ward, Tokyo 169-8050, JAPAN  
Phone & FAX: +81-47-353-8258  
E-mail: ayano\_sato@suou.waseda.jp