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An equilibrium foundation of the Soros chart[☆]



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ABSTRACT

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The most prominent characteristic of the Japanese yen/U.S. dollar nominal exchange rate in the post-Plaza Accord era is near random-walk behavior sharing a common stochastic trend with the two-country monetary base differential augmented with excess reserves. In this paper, we develop a simple two-country incomplete-market model equipped with domestic reserve markets to structurally investigate this anecdotal evidence known as the Soros chart. In this model, we theoretically verify that a market discount factor close to one generates near random-walk behavior of an equilibrium nominal exchange rate in accordance with a permanent component of the augmented monetary base differential as an economic fundamental. Results of a Bayesian posterior simulation with post-Plaza Accord data of Japan and the United States plausibly support our model as a data generating process of the Japanese yen/U.S. dollar exchange rate. The model identifies the two-country differential in money demand shocks as the main generator of the sharp depreciation of the Japanese yen against the U.S. dollar under the Abenomics. We discuss data evidence that the identified money demand shocks are tightly correlated with

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1. Introduction

Understanding of bumpy unpredictable movements in nominal exchange rates with solid economic reasoning is always a challenging business. Since Meese and Rogoff's (1983) seminal exercise, a random walk has been recognized as a primary property of flexible nominal exchange rates in post-Bretton Woods samples of major advanced economies.¹ The fact that nominal exchange rates are most described by a naïve random walk statistical model has negated past attempts of academic researchers to enjoy equilibrium models of nominal exchange rates and of policy makers to extract macroeconomic policy implications. Nominal exchange rates resemble a beast that resists a casual explanation stubbornly.

A random walk is also a major characteristic of the Japanese yen/U.S. dollar nominal exchange rate, at least, after the Plaza Accord in 1985. In fact, the serial correlation of the currency return of the Japanese yen against the U.S. dollar is estimated to be statistically low and economically negligible. Moreover, the exchange rate seems to be disconnected with any real economic variables such as output and consumption. Neither common trend nor common cycle does it share with both the output and consumption differentials between the two major exchange rate floaters.

Nevertheless, there are two outstanding statistical properties of the Japanese yen/U.S. dollar exchange rate to be noted for profoundly figuring out nominal exchange rate fluctuations. As the first property, the Soros chart is well-known anecdotal evidence that the Japanese yen/U.S. dollar exchange rate is traced by the two countries' relative money supply.² Fig. 1(a) and (b) are two versions of the Soros chart. The former plots the logarithm of the Japanese yen/U.S. dollar rate (the solid black line) and the differential in the logarithm of the monetary base between Japan and the United States (the dashed blue line). This version of the Soros chart appears unsuccessful. In particular, after 2001 when the Bank of Japan (BOJ) initiated the first quantitative easing (QE) policy, the monetary base differential moves far apart from the Japanese yen/U.S. dollar exchange rate. This failure of the first Soros chart stays obvious even after the Lehman shock with subsequent QE policies conducted by the Federal Reserve System (Fed).

The reason behind the failure of the first version of the Soros chart clearly stems from the massive accumulation of the excess reserves at both the BOJ and the Fed through the unconventional monetary policies after 2001. Fig. 1(b) depicts the logarithm of the Japanese yen/U.S. dollar exchange rate (the solid black line) and the two-country differential in the logarithm of the monetary base subtracted the excess reserve (the dashed blue line). Observe that the augmented Soros chart traces the low-frequency slow-moving component of the exchange rate surprisingly well. It, therefore, is empirically plausible that the augmented monetary base differential shares a common stochastic trend with the exchange rate.

The second outstanding property is the historically tight linkage between the two-country interest rate differential and the low-frequency component of the currency return (i.e., the depreciation rate) of the Japanese yen against the U.S. dollar. Fig. 2 displays the differential of the three-month Treasury Bill rates between Japan and the United States (the black line) on the left axis and the currency return

¹ Engel (2014) provides the most recent survey on past studies on nominal exchange rates.

² The Soros chart is named after George Soros who pointed out this anecdotal evidence behind the Japanese yen/U.S. dollar nominal exchange rate. See, for example, an article in the Nikkei Shinbun news paper on April 6, 2013 entitled "Kuroda Kanwa: Enyasu kouka wo tsuyoku ishiki (Monetary easing by Mr.Kuroda: Strong intention to the Japanese yen depreciation)".

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