

THE VOLATILITY OF THE DOLLAR YEN EXCHANGE RATE: CAUSE AND EFFECT

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ABSTRACT

The volatility of exchange rate between currencies has a great deal of impact on foreign trade. This is especially true of the yen/dollar exchange rate because of the trade volume between these two countries. U.S. interest rate, Japanese interest rate, U.S. exports, current account balance, CPI Japan, CPI U.S.A were used in a stepwise regression as independent variable with exchange rate as dependent variable. It was found that U.S. interest, U.S. export, U.S. import, current account balance of U.S. and CPI U.S. has a significant impact on the dollar/yen exchange rate. It is concluded that the above variables determine the exchange rate between the yen and dollar. When there is a drastic change in any of the above variables, it causes volatility in the dollar/yen exchange rate. This has a significant impact on U.S. Japan trade volume.

INTRODUCTION

Basically there are two well established theories that explain and determine exchange rates. First, purchasing power parity (PPP), which quantifies the inflation exchange rates relationship, in other words it attempts to explain that exchange rates adjust based on the respective inflation rates in the two different countries. There are two forms of PPP theory.

The absolute form of PPP states that given that there are no international trade barriers, consumers will tend to shift their purchases for goods and services to the country where the price is lower as measured by common currency. For example, exchange rates will eventually adjust where a basket of goods will cost the same both in the U.S. and Japan using a common currency. If the price in Japan is higher for the same basket, it will increase the price in the U.S. and decrease the price in Japan. This means the price in both countries should be the same when measured in common currency.

The second theory of exchange rate determination is the interest rate parity theory. This theory states that one cannot make a greater profit by taking advantage of an interest rate differential in two different countries. Because the currency of the higher interest rate will depreciate either in the forward market or appreciate in the spot market.

Suppose for example the interest rate in the U.S. is eight percent and the interest rate in Japan is four percent. A Japanese investor will be tempted to invest in the U.S. for the higher

return. The increased demand for the dollar will tend to appreciate the spot rate of the dollar. On the other hand, at the end of the investment horizon when the Japanese investor demands to convert the dollars to yen, this increased demand in the forward market will increase the value of the yen in the forward market. Because of these two reasons, the gain made by the Japanese investor from higher interest rate will be wiped out, because of the adjustment in exchange rates. The interest rate parity must hold based on the following equation

$$1 + d_i = 1 + F_i \left(\frac{\text{forward rate}}{\text{spot rate}} \right)$$

where d_i = domestic rate and F_i = foreign rate.

The exchange rate must be a direct quote, that is, it must be yen per dollar. It must be foreign currency per unit of domestic currency. Here the U.S. is considered domestic and Japan is considered foreign.

PURPOSE AND METHODOLOGY

The purpose of this study is to determine the cause and effect of the volatility of the dollar/yen exchange rate because of the volume of trade between the two nations. The exchange rate of the dollar/yen has a great deal of impact on trade between the two nations.

Several variables were considered as independent variables and exchange rate was used as the dependent variable. The independent variables are U.S. interest rates, Japanese interest rates, U.S. export, U.S. import, current account balance, CPI in Japan and the CPI in the U.S. These variables have been chosen because historically they have been found to be the ones that impact the exchange rate. Stepwise regression was used to include those variables that have the greatest impact on the exchange rates. Data on these variables were used from 1996 to 2007. The CPI for 2000=100.

LITERATURE REVIEW

There are many models that attempt to prove the interest rate parity theory of exchange rates. The article by Atkeson and Kehoe attempts to demonstrate how several of the economic models which attempt to predict changes to the conditional means of two variables (marginal utility growth and inflation). It does not take into consideration the changes in the conditional variances of how movements in the interest rates are mostly reflected in excess bond returns. The presented data show how the models fail to account for the excess returns from interest rate differentials (Atkeson & Kehoe, 2007) because based on interest rate parity covered interest arbitrage is not possible. The article coming from the Federal Reserve Bank of Minneapolis is

crucial in establishing that the very entity partially responsible for fluctuations in rates which lead to the parity in foreign exchange seem to clarify that their own approach to understanding their actions is flawed. This article does not engage in much discussion of the interest rate parity, but does raise several questions about the outlook towards root causes. This indicates that if exchange rates are random walks then everything we say about monetary policy is wrong (Atkeson, & Kehoe, 2007). In October of 2008 the dollar fell against the yen but the dollar gained against other key currencies immediately the following day. However, two major currencies recovered followed by panic selling of risky assets. Funds were repatriated into dollars and unwinding of carry-trade.

The dollar/yen declined significantly and force liquidation were factors in international equity and commodity markets. Hedge funds and others have for many years borrowed in the low yield yen (and dollar) and have bought assets and commodities in higher yielding currencies and benefited both from borrowing and buying assets. According to uncovered interest rate parity, the difference in interest is equal to the expected depreciation of the higher yielding currency. For many years speculators and investors borrowed in yen, bought assets in high yielding currencies and therefore benefited both from low yen borrowing rates and the depreciating yen, which is contrary to uncovered interest parity.

A study conducting empirical investigation based on CPI-based real interest rates is used to conclude that real interest rate parity is not supported in a paper by Lin Wu and Lin Chen (Wu & Chen, 2007).

The validity of real interest rate parity is a very important issue to all policy makers. Equality of real rates across countries implies that the influence of the domestic monetary authority of real interest rates is limited by the extent to which monetary policy can influence the world real interest rate. Feldstein in 1991 pointed out that unless real rates can differ across countries, policies which are directed with the intention of increasing domestic savings cannot increase the rate of capital formation thereby increasing productivity.

There is no doubt about the importance and significance of real interest parity, however there is a lack of empirical support for this theory.

Currency depreciation and appreciation tend to change the relative competitiveness of producers in different countries which are not desirable from a global perspective, because it usually leads to relative prices that usually do not reflect the true relative cost of production. From the perspective “external balance” does not indicate that trade balance could be zero, but instead it forces global resources to be allocated efficiently. This implies that we should explore monetary policy in determining exchange rates (Engel, 2009). This article challenges some of the arguments put forth in favor of full floating exchange rates. The study also explores the role of sterilized intervention and international reserves.

When exporters set prices in their native currency and there is nominal price stickiness, in that case exchange rate movements will change a country's terms of trade (Engel, 2009).

There is a general theme followed by modern Keynesian macroeconomics which state that monetary policy should be directed at adjusting for economic inefficiencies (Engel, 2009).

During the nineteenth century London was the financial capital of the world. Its downfall was due to large amounts spent on World War I which ultimately resulted in overvalued currency and the loss of credible gold convertibility. This put Britain in great amount of debt. Is the U.S. in the same path due to its involvement in Iraq and Afghanistan? But even if the U.S. struggles, the world still relies on the dollar base system (Harold, 2008).

Interest rate parity has very important implications in foreign trading markets. It is a link to short term interest rates, spot and forward exchange rates of two or more different currencies. If the theory is violated, arbitrage opportunity is created. Interest rate parity is a non-arbitrage condition (Kim, 2006).

A test for interest rate parity among seven countries were conducted over a period of eighteen years from 1975-1993. The countries included the U.S., Germany, Japan, Canada, Great Brittan, Switzerland, and France. The study found that the difference between the U.S. dollar and the British pound was as big as six percent positive or negative due to pricing errors prior to 1982. This variance led to significant gain and losses between currencies exchange rates and interest rate changes after the parity variances in the mean values were closed to zero. However, since April 1983 global markets were transformed with interest rate parity which eventually denied traders to destabilize markets through speculation in exchange rates based on interest rates (Guin & Maxwell, 1996).

The real interest rate is a key variable in theoretical models of consumption and investment and of financial asset valuation. According to fisher effect, nominal interest rates move along with expected inflation on a one for one in the long run based on rational expectations. This implies that the real export interest rate should follow mean-reversion. However, empirical tests have shown no consensus to that theory (Kanas, 2006).

RESULTS

The results of the regression included the following variables, U.S. interest rate, U.S. export, U.S. import, CPI Japan and CPI U.S. The R-square for the regression was 0.608, which indicates that about 61 percent of the variation is explained by the regression model

$$-877.543735054779 + 4.950775619(\text{U.S. interest}) + 0.002837509(\text{U.S. export}) \\ + 5.449884674(\text{CPI Japan}) + 2.880979132(\text{CPI U.S.})$$

Based on the above equation, it is believed that if the above variables are stable, then the dollar/yen exchange rate would be stable.

CONCLUSIONS

The reason for the volatility in the dollar/yen exchange rate is the fluctuation in the volume of U.S. exports, fluctuation of the U.S. interest rates, fluctuation in the Japanese CPI and fluctuation in the U.S. CPI. Because of fluctuations in the above variables the dollar/yen exchange rate seem to fluctuate a great deal which causes problems in trade between the two countries and also causes problems in the global foreign exchange market and global economy.

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