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Using Interest Rate Parity To Trade Forex

by Elvis Picardo (Contact Author | Biography)

Interest rate parity refers to the fundamental equation that governs the relationship between interest rates and currency exchange rates. The basic premise of interest rate parity is that hedged returns from investing in different currencies should be the same regardless of the level of their interest rates. (For more on the role of currencies in investing, read *Risky Portfolio? Currencies Come To The Rescue*.)

There are two versions of interest rate parity:

1. Covered Interest Rate Parity
2. Uncovered Interest Rate Parity

Read on to learn about what determines interest rate parity and how to use it to trade the forex market.

Calculating Forward Rates

Forward exchange rates for currencies refer to exchange rates at a future point in time, as opposed to spot exchange rates, which refer to current rates. An understanding of forward rates is fundamental to interest rate parity, especially as it pertains to arbitrage. (For background reading, see *Forces Behind Exchange Rates*.)

The basic equation for calculating forward rates with the U.S. dollar as the base currency is:

$$\text{Forward Rate} = \text{Spot Rate} \times \frac{(1 + \text{Interest Rate of Overseas country})}{(1 + \text{Interest Rate of Domestic country})}$$

Forward rates are available from banks and currency dealers for periods ranging from less than a week to as far out as five years and beyond. As with spot currency quotations, forwards are quoted with a bid-ask spread. (For more information, read *The Basics Of The Bid-Ask Spread*.)

Consider U.S. and Canadian rates as an illustration. Suppose that the spot rate for the Canadian dollar is presently 1 USD = 1.0650 CAD (ignoring bid-ask spreads for the moment). One-year interest rates (priced off the zero-coupon yield curve) are at 3.15% for the U.S. dollar and 3.64% for the Canadian dollar.

Using the above formula, the one-year forward rate is computed as follows:

$$1 \text{ USD} = 1.0650 \times \frac{(1 + 3.64\%)}{(1 + 3.15\%)} = 1.0700 \text{ CAD}$$

The difference between the forward rate and spot rate is known as swap points. In the above example, the swap points amount to 50. If this difference (forward rate – spot rate) is positive, it is known as a forward premium; a negative difference is termed a forward discount.

A currency with lower interest rates will trade at a forward premium in relation to a currency with a higher interest rate. In the example shown above, the U.S. dollar trades at a forward premium against the Canadian dollar; conversely, the Canadian dollar trades at a forward discount versus the U.S. dollar.

Can forward rates be used to predict future spot rates or interest rates? On both counts, the answer is no. A number of studies have confirmed that forward rates are notoriously poor predictors of future spot rates. Given that forward rates are merely exchange rates adjusted for interest rate differentials, they also have little predictive power in terms of forecasting future interest rates. (For more information, read *Trying To Predict Interest Rates*.)

Covered Interest Rate Parity

According to covered interest rate parity, forward exchange rates should incorporate the difference in interest rates between two countries; otherwise, an arbitrage opportunity would exist. (For more on arbitrage, read *Put-Call Parity And Arbitrage Opportunity*.)

In other words, there is no interest rate advantage if an investor borrows in a low-interest rate currency to invest in a currency offering a higher interest rate. Typically, the investor would take the following steps:

1. Borrow an amount in a currency with a lower interest rate
2. Convert the borrowed amount into a currency with a higher interest rate
3. Invest the proceeds in an interest-bearing instrument in this (higher interest rate) currency
4. Simultaneously hedge exchange risk by buying a forward contract to convert the investment proceeds into the first (lower interest rate) currency

The returns in this case would be the same as those obtained from investing in interest-bearing instruments in the lower interest rate currency. Under the covered interest rate parity condition, the cost of hedging exchange risk negates the higher returns that would accrue from investing in a currency that offers a higher interest rate. (To learn how to use currency moves to your advantage, read *Currency Moves Highlight Equity Opportunities*.)

Covered Interest Rate Arbitrage

Consider the following example to illustrate covered interest rate parity. Assume that the interest rate for borrowing funds for a one-year period in Country A is 3% per annum, and that the one-year

deposit rate in Country B is 5%. Further, assume that the currencies of the two countries are trading at par in the spot market (i.e., Currency A = Currency B). (Read more about the spot market in *Using Options Tools To Trade Foreign-Exchange Spot*.)

An investor:

- Borrows in Currency A at 3%
- Converts the borrowed amount into Currency B at the spot rate
- Invests these proceeds in a deposit denominated in Currency B and paying 5% per annum

The investor can use the one-year forward rate to eliminate the exchange risk implicit in this transaction, which arises because the investor is now holding Currency B, but has to repay the funds borrowed in Currency A. Under covered interest rate parity, the one-year forward rate should be approximately equal to 1.0194 (i.e., Currency A = 1.0194 Currency B), according to the formula discussed above.

What if the one-year forward rate is also at parity (i.e., Currency A = Currency B)? In this case, the investor in the above scenario could reap riskless profits of 2%. Here's how it would work. assume the investor:

- Borrows 100,000 of Currency A at 3% for a one-year period
- Immediately converts the borrowed proceeds to Currency B at the spot rate
- Places the entire amount in a one-year deposit at 5%
- Simultaneously enters into a one-year forward contract for the purchase of 103,000 Currency A

After one year, the investor receives 105,000 of Currency B, of which 103,000 is used to purchase Currency A under the forward contract and repay the borrowed amount, leaving the investor to pocket the balance - 2,000 of Currency B. This transaction is known as covered interest rate arbitrage.

Market forces ensure that forward exchange rates are based on the interest rate differential between two currencies, otherwise arbitrageurs would step in to take advantage of the opportunity for arbitrage profits. In the above example, the one-year forward rate would therefore necessarily be close to 1.0194. (To read about using currency spot and futures together, see *Combining Forex Spot And Futures Transactions*.)

Uncovered Interest Rate Parity

Uncovered interest rate parity (UIP) states that the difference in interest rates between two countries equals the expected change in exchange rates between those two countries. Theoretically, if the interest rate differential between two countries is 3%, then the currency of the nation with the higher interest rate would be expected to depreciate 3% against the other currency.

In reality, however, it is a different story. Since the introduction of floating exchange rates in the

early 1970s, currencies of countries with high interest rates have tended to appreciate, rather than depreciate, as the UIP equation states. This well-known conundrum, also termed the "forward premium puzzle", has been the subject of several academic research papers. (Read more about floating exchange rates in *Floating And Fixed Exchange Rates*.)

The anomaly may be partly explained by the "carry trade", whereby speculators borrow in low-interest currencies such as the Japanese yen, sell the borrowed amount and invest the proceeds in higher-yielding currencies and instruments. The Japanese yen was a favorite target for this activity until mid-2007, with an estimated $1 trillion tied up in the yen carry trade by that year. (To learn more, read *Currency Carry Trades Deliver*.)

Relentless selling of the borrowed currency has the effect of weakening it in the foreign exchange markets. From the beginning of 2005 to mid-2007, the Japanese yen depreciated almost 21% against the U.S. dollar. The Bank of Japan's target rate over that period ranged from zero to 0.50%; if the UIP theory had held, the yen should have appreciated against the U.S. dollar on the basis of Japan's lower interest rates alone. (For more about the advantages of the carry trade, read *Profiting From Carry Trade Candidates*.)

The Interest Rate Parity Relationship Between the U.S. and Canada

Let us examine the historical relationship between interest rates and exchange rates for the U.S. and Canada, the world's largest trading partners. The Canadian dollar has been exceptionally volatile since the year 2000. After reaching a record low of US61.79 cents in January 2002, it rebounded close to 80% in the following years, reaching a modern-day high of more than US$1.10 in November 2007.

Looking at long-term cycles, the Canadian dollar depreciated against the U.S. dollar from 1980 to 1985. It appreciated against the U.S. dollar from 1986 to 1991 and commenced a lengthy slide in 1992, culminating in its January 2002 record low. From that low, it then appreciated steadily against the U.S. dollar for the next 5 and a half years.

For the sake of simplicity, we use prime rates (the rates charged by commercial banks to their best customers) to test the UIP condition between the U.S. dollar and Canadian dollar from 1988 to 2008.

Based on prime rates, UIP held during some points of this period, but did not hold at others, as shown in the following examples:

- The Canadian prime rate was higher than the U.S. prime rate from September 1988 to March 1993. During most of this period, the Canadian dollar appreciated against its U.S. counterpart, which is contrary to the UIP relationship.
- The Canadian prime rate was lower than the U.S. prime rate for most of the time from mid-1995 to the beginning of 2002; as a result, the Canadian dollar traded at a forward premium to the U.S. dollar for much of this period. However, the Canadian dollar depreciated 15% against the U.S. dollar, implying that UIP did not hold during this period as well.

- The UIP condition held for most of the period from 2002, when the Canadian dollar commenced its commodity-fueled rally, until late 2007, when it reached its peak. The Canadian prime rate was generally below the U.S. prime rate for much of this period, except for an 18-month span from October 2002 to March 2004.

(For further information, read *Commodity Prices And Currency Movements*.)

Hedging Exchange Risk

Forward rates can be very useful as a tool for hedging exchange risk. The caveat is that a forward contract is highly inflexible, because it is a binding contract that the buyer and seller are obligated to execute at the agreed-upon rate.

Understanding exchange risk is an increasingly worthwhile exercise in a world where the best investment opportunities may lie overseas. Consider a U.S. investor who had the foresight to invest in the Canadian equity market at the beginning of 2002. Total returns from Canada's benchmark S&P/TSX equity index from 2002 to August 2008 were 106%, or about 11.5% annually. Compare that performance with that of the S&P 500, which has provided returns of only 26% over that period, or 3.5% annually. (To learn more about the TSX, read *History Of The Toronto Stock Exchange*.)

Here's the kicker. Because currency moves can magnify investment returns, a U.S. investor invested in the S&P/TSX at the start of 2002 would have had total returns (in terms of USD) of 208% by August 2008, or 18.4% annually. The Canadian dollar's appreciation against the U.S. dollar over that time frame turned healthy returns into spectacular ones.

Of course, at the beginning of 2002, with the Canadian dollar heading for a record low against the U.S. dollar, some U.S. investors may have felt the need to hedge their exchange risk. In that case, were they fully hedged over the period mentioned above, they would have foregone the additional 102% gains arising from the Canadian dollar's appreciation. With the benefit of hindsight, the prudent move in this case would have been to not hedge the exchange risk. (For more information, see *A Beginner's Guide To Hedging*.)

However, it is an altogether different story for Canadian investors invested in the U.S. equity market. In this case, the 26% returns provided by the S&P 500 from 2002 to August 2008 would have turned to *negative* 16%, due to the U.S. dollar's depreciation against the Canadian dollar. Hedging exchange risk (again, with the benefit of hindsight) in this case would have mitigated at least part of that dismal performance. (For more on hedging in the forex market, read *Getting Started In Foreign Exchange Futures*.)

Conclusion

Interest rate parity is fundamental knowledge for traders of foreign currencies. In order to fully understand the two kinds of interest rate parity, however, the trader must first grasp the basics of forward exchange rates and hedging strategies. Armed with this knowledge, the forex trader will then be able to use interest rate differentials to his or her advantage. The case

of U.S. dollar/Canadian dollar appreciation and depreciation illustrates how profitable these trades can be given the right circumstances, strategy and knowledge.

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