Public Affairs 854
Spring 2009
University of Wisconsin-Madison

Menzie D. Chinn
Social Sciences 7418

Interest Rate Parity

1. Basic concepts

Why do people (actually banks, etc.) trade currencies? Presumably it is because they are trying to get the highest rate of return. What's the rate of return? Well consider yourself an investor. You have several things you can do. You can save $1 in an US treasury bond, and get an interest rate of i^{US}. Or you can can take that one dollar, convert it into Yen at the rate of (1/S) ¥/$, and get an interest rate of i^{JP}. Do you know what you will do? This is what you will have at the end of the year:

Invest in US	Invest in Japan
$(1+i^{US})$ in $	$(1+i^{JP})/S$ in ¥

Presumably, if you are an American, you don't really care how many Yen you have. Rather, you care how many dollars you will have. So your decision depends upon what you think the exchange rate will be at the end of the year (call this is S^e_{+1}).

Invest in US	Invest in Japan
$(1+i^{US})$ in $	$(1+i^{JP})S^e_{+1}/S$ in $

What will you do? This is actually a little hard to look at, so let's compare an approximation:

Invest in US	Invest in Japan
i^{US}	$i^{JP} + (S^e_{+1} - S)/S$
return on US bond	return on Jap. bond *plus* change (depreciation) of $ against ¥

If the LHS is bigger than the RHS, then clearly put your savings in the US. If the reverse is true, then clearly put them in Japan.

If everybody thought the same thing about what the exchange rate would be in a year, eventually all the financial capital would slosh around, moving interest rates and the expected changes in the value of the currency such that the following equality held:

$$i^{US} - i^{JP} = (S^e_{+1} - S)/S$$

interest differential equals expected depreciation

Example .10 - .08 = .02

This condition is called ***uncovered interest parity*** (UIP for short). It's exactly because everybody doesn't think the same way that we have these vast amounts of trades in foreign currencies. Clearly some people think the dollar will lose more value over the year than the .02 (2%), and they will move their money to Japan. Those who think the dollar will lose less than 2% will be moving their money to the US.

2. Does UIP hold?

It is not possible to directly test UIP because *expected* exchange rate changes are not observable. One can test UIP under rational expectations, because in that case, *ex post* changes are equal, on average, to expected changes. The evidence in favor of the joint hypothesis of UIP and rational expectations is weak, as illustrated in Figure 1. At longer horizons, (10 years) the evidence is more supportive (Figure 2).

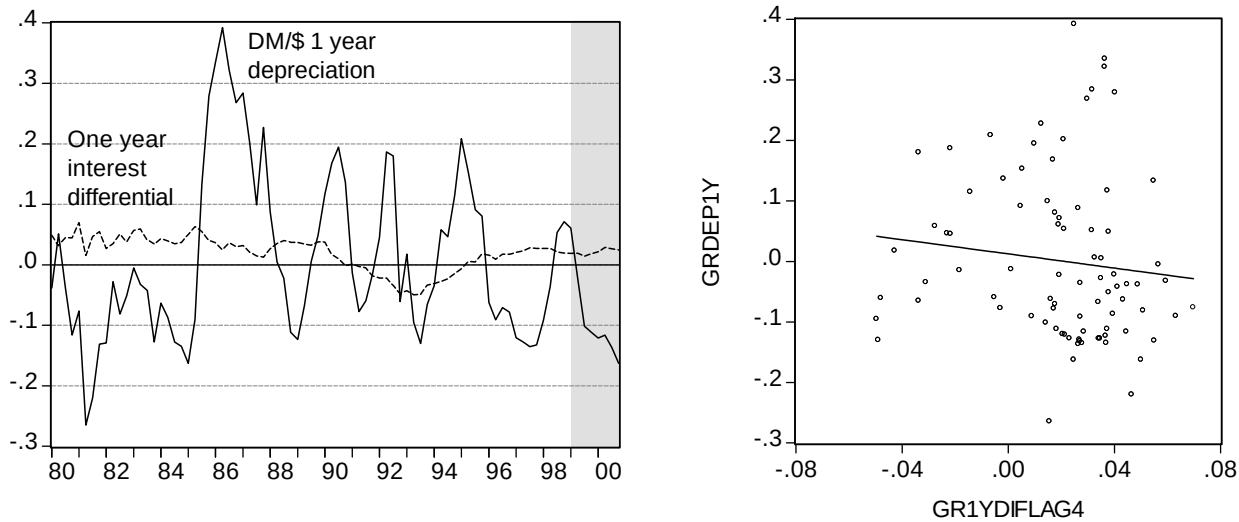

Figure 1: One year DM/US$ depreciation and one year offshore interest differential

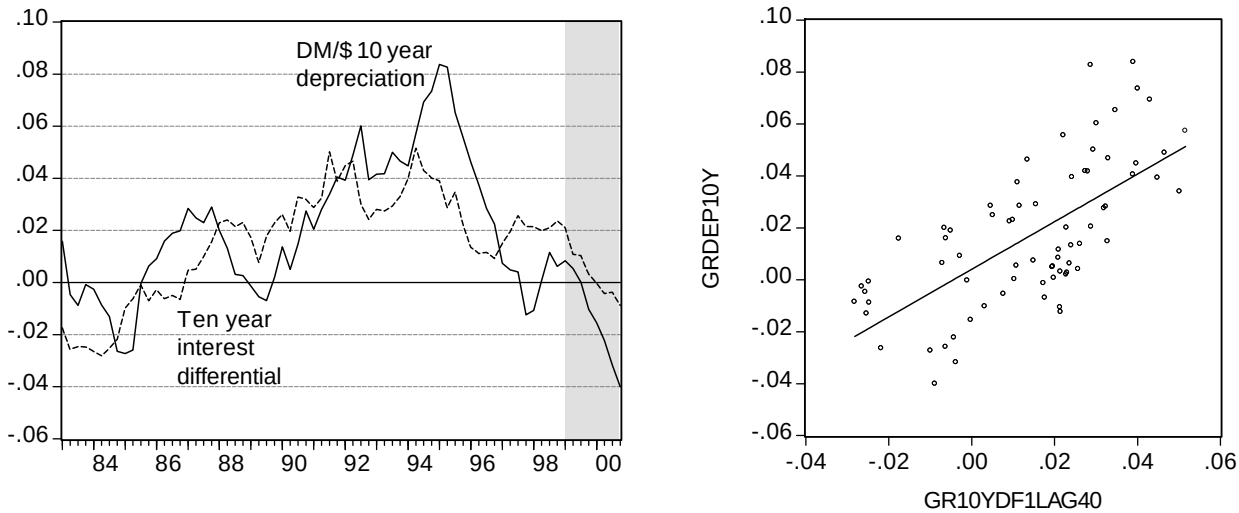

Figure 2: Ten year DM/US$ depreciation and ten year onshore interest differential

The relationship at different horizons between *ex post* exchange rate changes and interest differentials:

$$\Delta s_{t,t+k} = \alpha + \beta\ (i_{t,k} - i^*_{t,k}) + \varepsilon_{t,t+k}\ . \qquad (1)$$

is depicted below (I have approximated the percent change in the exchange rate with the change in the log exchange rate; in continuous time, the two are the same):

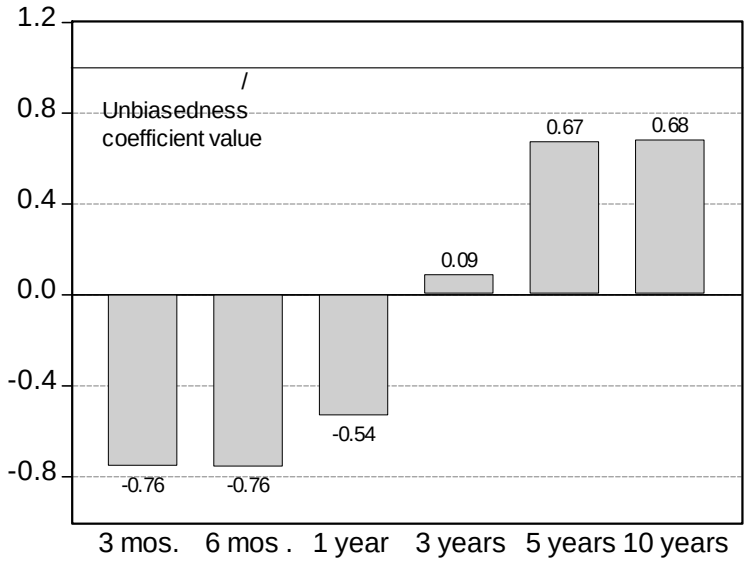

Figure 3: Panel beta coefficients at different horizons.
Notes: Up to 12 months, panel estimates for 6 currencies against US$, eurodeposit rates, 1980q1-00q4; 3 year results are zero coupon yields, 76q1-99q2; 5 and 10 years, constant yields to maturity, 80q1-00q4 and 83q1-00q4. Sources: 3, 6, 12 months, 5 and 10 years from Chinn and Meredith (2004); 3 years, author's calculations using data supplied by Geert Bekaert.

3. Covered Interest Rate Parity

As mentioned above, the problem with figuring out whether the story I just told you is actually true is that we don't ever actually see what people really think the exchange rate is going to be in one year. You can go out and ask people what they think, but they may either lie, or not be the relevant people to ask. Moreover, the story relies upon people caring about how much they expect to make on average. If you're smart, you'll probably be right on average. But you may be very unlucky the first time, and lose all your money. When the stakes are hundreds of millions of dollars, you might not care just about how much you make on average. That's why people sometimes "hedge" their bets, by setting in place the exchange rate the will trade at, let's say in a year's time. In this case, the expression you will have is:

$$i^{US} - i^{JP} = (F - S)/S$$

interest differential equals forward discount

Example .10 - .07 = .03

You may do this particular transaction, instead of the other, because you don't like taking chances. A fancy word for this type of behavior is "risk aversion" -- you try to avoid risks. When you engage in this

behavior, you certainly decrease your risk of bad outcomes, but on the other hand, if the dollar loses its value by 5%, then you get only 10% return instead of the 12% return if you'd gambled uncovered.

Generally, we think that covered interest parity holds, while uncovered is a nice way to think of an idealized world.

4. Capital Mobility and Barriers

However, either of these conditions (UIP or CIP) will only hold if governments do not put any barriers to the movement of your money, or financial capital. In the past, almost all governments put barriers to movements of capital, like restrictions on how much cash you can move out of the country, or into a country. Now, such barriers are very small for developed countries like the US, Germany, UK, and to a lesser degree, Japan. However, for developing countries, like India, China, those in Africa, some Latin American countries, there are likely to be such restriction. Moreover, there is always the threat of the government slapping restrictions on your savings in the country (or even seizing it). In such cases, it would be highly unlikely that you would find the above parity conditions holding.

On a related matter, you'll hear often discussions of the Eurodollar and Eurobond markets. These are offshore markets, not necessarily in Europe (the term arose because the first such markets were in Europe). The reason why these markets arose is because they could trade outside of the control of regulatory institutions in the various countries. For instance a British bank can take deposits in dollars, and pay in dollars. Because the bank is in London, it is not subject to the control of the American authorities. These markets originally arose in response to the aforementioned capital controls. They still exist because they circumvent all sorts of national banking regulations.

References

Chinn, Menzie and Guy Meredith, 2004, “Monetary Policy and Long Horizon Uncovered Interest Parity,” *IMF Staff Papers* 51(3) (November): 409-430.