

Replies to one minute memos, 9/21/03

Dear Students,

Thank you for asking these great questions. The answer to my question (*what is the difference b/n the covered & uncovered interest rate arbitrage? If you were to choose b/n them, which one is better for a country with very stable exchange rate?*) is: in UIA you do not “cover yourself” against the exposure to forex risk, b/c you do not sell your currency forward to lock in the rate (and profit) as in the case of CIA. If you were to consider CIA vs. UIA (which implies there was potential profit to be made) w/ a country w/ very stable exchange rates, you can go for the UIA if the forward rate is not showing any depreciation of the high interest currency. Most of you identified the uncovered interest arbitrage as the way to go 😊.

Here are the answers to your questions.

In the chart on forward and actual rates in the memo replies from last time, there is a difference b/n the two values and the difference remains for extended periods of time. Isn't there an opportunity to profit here if you assume the risk that thinks won't change in 6 months?

There is a possibility for arbitrage profit. How can you set the arbitrage if you were expecting that the Euro would appreciate by less as compared to the prediction based on the forward rate? Suppose we are at 9/17/2001. The forward rate is EUR 1.09164/ \$. The spot rate six months after (i.e. 3/15/2002) is not known as of 9.17/2001, but as of today we know that it is EUR 1.133. So, here is the strategy:

1. Sell EUR 1,000,000 Euros forward on 9/17/2001 @ 1.09164 to obtain 916,053 US\$.
2. Deposit the US\$ into a six month account to earn US\$ deposit interest.
3. On 3/15/2002 (or six months later) convert the \$ proceeds at the current rate EUR 1.133/ \$ to receive
$$916,053 \text{ US\$} * \text{EUR } 1.133/ \$ = \text{EUR } 1,037,888.$$

Notice that you have to deliver only 1,000,000 EUR. Thus one could have realized a profit of 37,888 EUR plus any interest earned on the US\$-deposit.

But, how can you be sure as of 9/17/2001 what the spot will be in six months??? You can't.

From the point of view of forward rates, if Europe continues to have low interest rates, will euro forward and euro itself have a premium against the US\$ in near future?

Yes, the reason is that if there is to be no arbitrage, an investor holding Euro deposit would require that the value of the Euro would appreciate enough to bring the value of her deposit at par with the value of a similar maturity US\$ deposit.

In class we assume that the exchange rate from dollar to SF and from SF to USD are equal, is it the same in real markets? Is the difference significance?

In real markets the transition from SF to US\$ and vice versa might not be done at the same rate, because oftentimes there will be transactions costs in the market. These transaction costs take the form of a bid-ask spread for say SF. That is, if you want to sell SF to buy US\$ you will have to pay one price, and if you want to buy SF with US\$, you would have to pay another price.

Why is this bid-ask spread? Because the forex dealer oftentimes need to maintain an inventory of currencies in order to be able to meet investor demands. The cost of keeping these supplies can be substantial (insurance, safe-keeping, loss of interest income, etc).

I know that online stock trading accounts were and are quite popular. What about the online currency trading accounts? Why aren't they popular? Risk tolerance in the US is generally pretty high, compared to Europe, why Americans are unwilling to speculate on FOREX market as Europeans are?

Usually American investors are more pre-disposed to invest in US based securities (home bias). Besides, profitable trading in FOREX is very costly – you need timely information, since the FOREX markets are well, and you need substantial capital to undertake it. Further, the risks involved in such trading are larger than the risks involved in trading securities. That's why (I guess ☺) forex trading online accounts might not be popular.

In some countries, the exchange rate is a big deal. In the US it seems more emphasis is placed on the Dow Jones as a gauge of financial markets. But in South Africa for example, I feel more emphasis is placed on the exchange rate of the Rand to the US dollar.

That is my observation too. Foreigners oftentimes view dollars as an asset itself, better than investment in a local company stock.

For problem set 1, why couldn't you find the price of a Honda by solving for the equation $\text{Price}_2 / \$40,000 = 1.60$?

First, let us set up the equation.

As we know from class, the ratio of the actual price at time two, P_2 to the original price, P_1 , shall indicate a percentage change of only 60% of the actual exchange rate percentage change.

Since the actual exchange rate changed by 1.98%, 60% of it is 1.188%. So the right equation if there was no inflation in Japan, is

$$\frac{P_2}{\$40,000} = 1.01188.$$

If you use that equation (and many of you did) you will get $P_2 = \$40,475$. However, this assumes that the price at which Honda will look one year from now is \$40,000, which is not the case, since there is 1% inflation in Japan during that year. So if you account for that one percent inflation by grossing up the \$40,000 with 1%, you will get the following equation

$$\frac{P_2}{\$40,400} = 1.01188,$$

which will give you the answer, $P_2 = \$40,879.95$, which is almost the same as in the answers to the homework. So, the thing to remember is: adjust for inflation prior to the calculation of the new price!

Based on results, is it generally better to supply money in another country such as a Eurodollar account or sell your currency today at a forward rate? Or is highly depends on interest rate?

It depends on the interest rate.

Would you use uncovered interest arbitrage and exchange dollars for a country that is doing poorly economically and predict depreciation of its currency?

No, because when you come back to US\$ you will potentially get less money – if the US\$ appreciates, you will need more foreign currency to get a US\$.

If Germany has lower interest rates than US\$, would you perform uncovered interest arbitrage?

You can, by borrowing in Germany, then investing the proceeds in a US\$ account, and then, at maturity paying back the loan in Germany. Notice that this will make sense only if the exchange rate does not change adversely, i.e. the Euro does not appreciate by more than the interest rate differential between the two countries.

What is the official currency of China? Yuan or the Renminbi?

Renminbi is the official name of the currency of People's Republic of China. Yuan is just the unit of that currency.

A revaluation of the CNY would be disastrous to the Chinese economy due to transparency issues. Economic releases plus statistics currently released by the government are supposed to be sugar coated. Plus, if the yuan gets revalued, pressure to verify the reports would increase. Is this true?

True, corporate governance issues may come into the spotlight. However, this will take time to realize. The more immediate concern is that there will be an outflow of US\$ from China. Why? As in the article, the lack of good investment opportunities in the Chinese stock market will force Chinese investors to look for good returns on their savings elsewhere.

I am still a little unclear on the exchange rate pass-through topic. Can you possibly give a few more examples?

Sure. Suppose that a Toyota cost ¥4,000,000 in Yokohama, Japan. And suppose further that the current exchange rate is ¥110/US\$. That implies that the US\$ price will be $4,000,000 / 110 = 36,363.6$ US\$. Now, if the dollar is to appreciate to ¥120/US\$, and the price changes to 34,000 \$, what is the pass through and the degree of pass-through? If the full change in exchange rates was to be passed-through, then the price in US\$ shall be 33,333.3 US\$. However if the price changed only to 34,000\$, then the change in the price has been only $34,000 / 36,363.6 = 0.935$, or 6.5 % decrease. That is the pass-through. To determine the degree of the pass-through notice that the percentage change in the value of the US\$ is: $(120-110)/110 = 0.0909$, or 9.1%. Thus the degree of the pass-through is $6.5\% / 9.1\% = 0.714$ or 71%.

How can you calculate the inflation rate using the International Fisher effect?

As we know from class, the difference b/n interest rates in a given country shall be equal to the difference between expected inflations, $i^{US\$} - i^{JAPAN} = \pi^{US\$} - \pi^{JAPAN}$, in order that the real rates of return in each of the two countries be the same. So, if you know the interest rates in Japan and US, and the expected inflation in US, you can compute from the above what is the expected inflation in Japan.

How does the currency stabilize according to interest rates for more than one country? If the arbitrage does not exist for one country, would it also not exist for all the other countries?

Suppose that there is no arbitrage b/n Japan and US. This does not imply that between Japan & Germany, and Germany & US there will be no arbitrage. In other words, the arbitrage b/n two countries will put pressure on other countries.

Can you go over liquidity trap – by not doing anything w/ the extra \$, how do interest rates stay low?

As we know from the last replies (09/18), liquidity trap is the phenomenon when interest rates go so low (say the Central Bank of Japan wanted to stimulate businesses to borrow and invest more), that effectively investors & businesses stop paying attention to them and simply keep cash (instead of bonds). So, the question is how would that interest rate stay low? Notice that the monetary authority cannot raise the interest rate in these circumstances, since if it does so, it will actually lower incentives for businesses to take loans and invest. So, the only way to raise nominal interest rates is to raise inflation. How can you do that? Print money. That was the prescription which Milton Friedman, an economist at University of Chicago, gave for resolving the Japanese liquidity trap. And that was the expected course of action should the US experience too low interest rates (as a way to stimulate the economy post September 11).

Can you please explain when a forward rate would be considered at premium and when at discount to the spot rate?

Let us look at an example. Suppose we take the EUR/US\$ rate. Currently it stays at 0.88 EUR/ US\$. Suppose that the 6-month forward is 0.85 EUR/ US\$. Then we can tell that the Euro is sold forward at a premium of $[(0.88 - 0.85)/0.85] \times (360/180) \times 100 = 7.06\%$. Why premium? Because, according to the forward rate, you need less EUR to buy a US\$.

How do you tell if the currency will appreciate or depreciate using the forward rate as an unbiased predictor?

Let us look at an example. Suppose we have indirect quotes, say Yen 105/\$ spot rate, and Yen 110/\$ 6-month forward rate. As you can tell, in this case the US\$ is expected to appreciate 6-months from now (it will be worth more yens in six months). Suppose, that instead the 6-month forward was Yen 100/\$. That means that the dollar is expected to depreciate, i.e. is worth less yen in six months.

Is it common for investors to participate in uncovered interest arbitrage? Why would investors do this if they can instead hedge with a covered interest arbitrage?

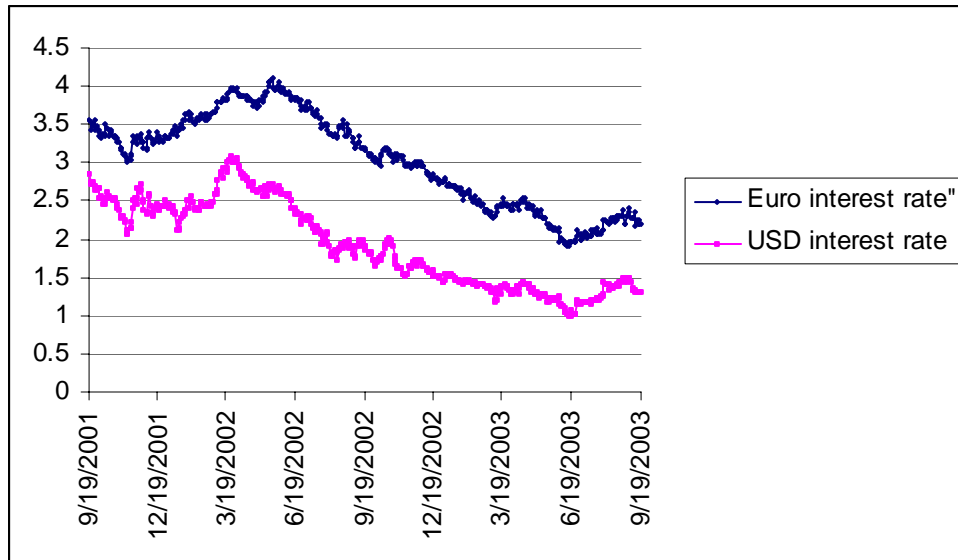
I don't know how common UIA is. Because UIA carries with itself the potential of a high profit, we see it in practice. Of course, it comes at a higher risk (if forward rate changes adversely you might realize a loss).

With CIA, you are locked in at the forward rate when you borrow the money? For example, if $S=106$ yen/\$ and $F=103.5$ Yen/\$, am I guaranteed to be able to buy back US\$ at that rate at the end of the given time period, regardless of what happens to the exchange rate?

Yes, a party that sold/bought deposits forward is guaranteed the forward rate.

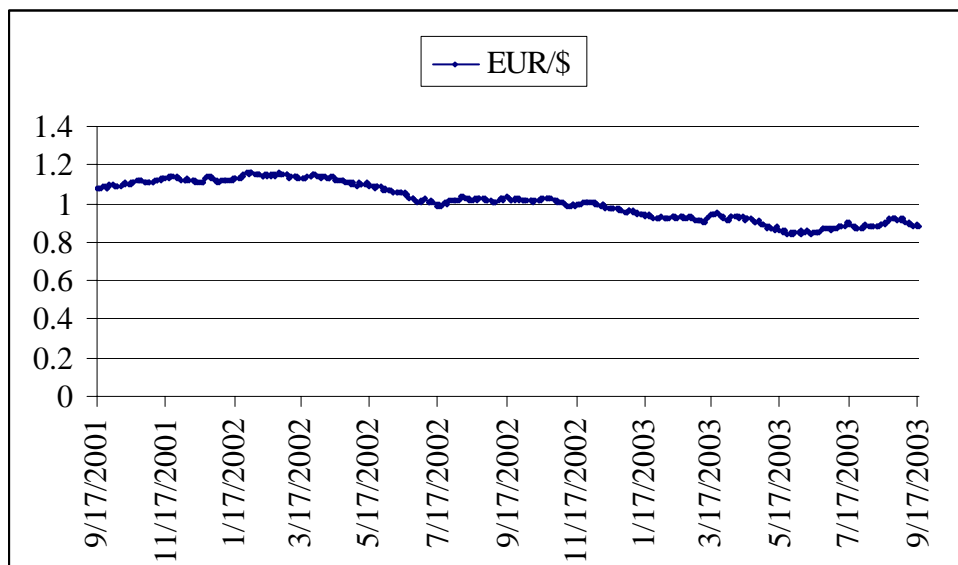
If you compare the interest rates in the US w/ Europe, do you expect the euro to appreciate or to depreciate to the dollar?

In the following graph I have presented the interest rates over the past two years in US and Europe. As you can see, European interest rates were higher than the US ones (naturally so, since in the US the interest rates were lowered several times post September 11 to stimulate the economy, while in Europe the higher interest rates were dictated by the necessity to make the new currency, Euro, attractive for European investors – remember they had to change national currency for the Euro). Based on the interest rate differential one would expect appreciation of the US\$.



Source: Datastream.

And appreciation of the dollar was what investors observed till April 2002.

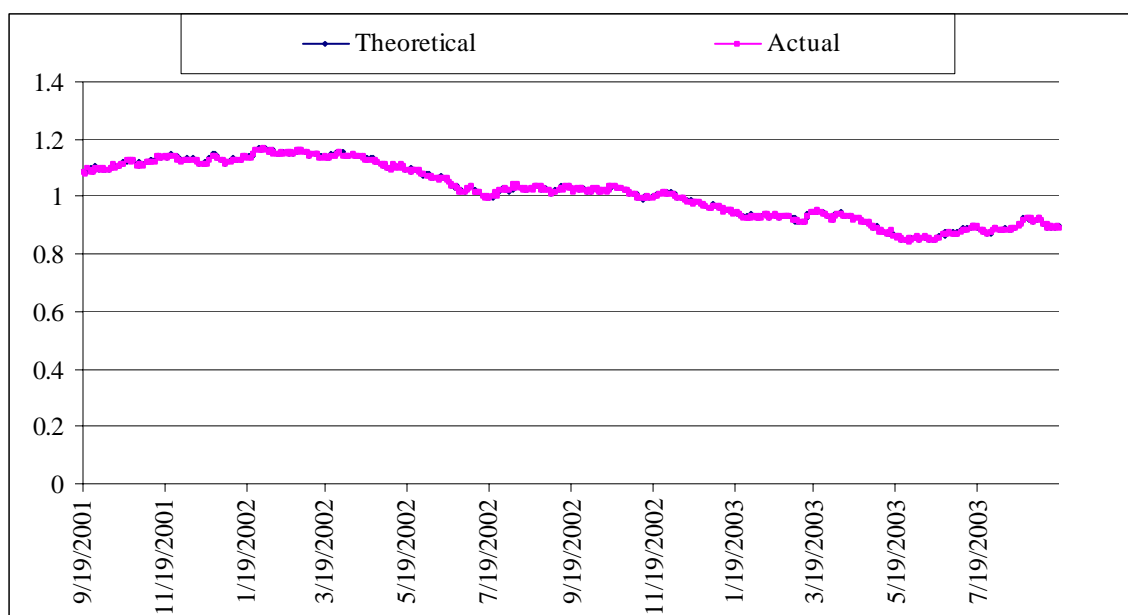


Source: Datastream.

Since then the dollar started depreciating against the EUR.

Is the formula for the forward exchange rate only theoretical, or do you see the real forward exchange rate as quoted in the newspapers when you work out the formula?

It is applied in practice too. Look at the following graph – it presents the theoretically computed six month forward rate, and the actual forward rate for the past two years on the EUR/USD rate. As you can see, there are almost identical – quite precise linkage b/n theory and practice.



Source: Datastream.

Why does covered interest arbitrage exist? Won't fixed forward exchange rate adjust correspondingly to the difference between the interest rates in the two countries?

Even though in a longer maturity perspective the covered interest arbitrage does not exist, in a shorter perspective it does, since markets are not always in equilibrium. Small deviations from the equilibrium rates generate small arbitrage profits – and usually the size of the covered interest arbitrage is not so big.

For techniques of arbitrage, such as interest rate parity, covered interest arbitrage, and uncovered interest arbitrage, what must be the real gain in order to undertake it? What are the costs associated with these instruments and do they drive the change for profiting down?

The real gain has to be greater than zero. Notice that in computing the real gain you have to net out the transaction costs, such as bid-ask spreads, brokerage fees, legal fees, etc.

If interest rates in the domestic country are higher than that in the foreign country, then there will be a discount in the domestic currency. However, I keep thinking that with higher interest rates, there is a greater return, and that it should be sold at a premium.

Okey, suppose that US offers 5% interest on one year deposits, while Japan offers only 1% on a similar maturity, similar risk deposit. Clearly all informed investors will start selling today Yen for US\$. This will immediately lead to an appreciation of the dollar, since so many investors decided to invest in US\$. However, one year from now, when all

these investors will come back to the Yen, suddenly all these people will decided to convert into yen. And since the would convert the principle plus the interest (that is more money than one year ago), it is feasible to expect that the Yen will appreciate by more one year from now, as compared to its depreciation today.

Now, investors expect that happening. So, in an efficient financial market, they price this today, rather than waiting till one year from now.

That is why, even though interest rates in US are higher, you still see a discount in the value of the US\$, our domestic currency.

Is there a way to create an arbitrage using both covered and uncovered interest rate arbitrages?

These are more complicated strategies, for example you can enter a covered interest arbitrage in one currency, say EUR/USD, & at the same time have uncovered interest arbitrage in another currency, say YEN/USD.

What is the rationale for a forward rate premium with a lower interest rate? Can you explain it in words rather than with the equation? Why a higher interest rate would imply that the currency is traded forward at a discount?

Suppose Japan has 0.5 % annual interest rate, while US has 4% interest rate. Suppose that the current spot rate is ¥120/\$. What is a fair forward rate, i.e. a rate that will make an investor indifferent between investing the US bill offering 4% per annum versus investing in the Japanese bill, offering 0.5% per annum?

If the one year forward in also ¥120/\$, then clearly I can make a covered interest arbitrage as follows:

1. Borrow yen 1,000,000 @ 0.5% per annum, for a total one year from now, of ¥1,005,000.
2. Sell them @ ¥120/\$ to receive a total of \$ 8,333.33
3. Invest the \$ 8,333.33 @ 4% per annum.
4. Sell the proceeds from the above, \$ 8,333.33 x (1+0.04) =8,666.66 @ the forward rate of ¥120/\$ to obtain 1,039,999.99

Clearly you can make risk-less profit here. So, many investors will start selling forward the dollars. But what happens when so many investors sell forward the dollar? The forward price of the dollar goes down: say from ¥120/\$, to ¥110/\$, Now this implies that yen will be traded forward at a premium:

$$\frac{Yen120 - Yen110}{Yen110} \times \frac{360}{360} \times 100 = 9.09\%$$

In a nutshell, the reason why the low interest rate currency appreciates is to compensate investors for investing in the low interest rate currency deposit.

When identifying interest arbitrage, either the interest rates or forward rates can be what creates it?

When identifying interest rate arbitrage, the following could influence the decision whether to undertake covered or uncovered interest arbitrage:

1. Interest rate you borrow in.
2. Interest rate you deposit at.
3. Spot exchange rate at which you will change currency.
4. Forward exchange rate at which you will have to convert the currency back.

How can you have a negative balance in assets (on the homework)?

Actually these are assets in the portfolio investment sub-account of the financial account of the BOP. Now, remember that BOP presents a flow statement, not a balance sheet. Thus negative assets implies that there is an outflow if portfolio investments.

If you were a trader in the market, how would you actually perform the arbitrage? Who would you borrow from and how would you do it, is it via T-bills? How do you do that, do you just call your broker or do it electronically?

This is a great question. The way you perform the arbitrage depends on the market you are in and the institution you do it for. In the US you just need to call your counter-party (usually a forex broker) and briefly discuss the details (the exchange rate, and the amount) over the phone. The rest you leave to the back office to process (paperwork, permissions, etc). If you are to borrow, you may need to call your contact at the bank your institution works with. In all these, the rule is: “my word is my bond”.

Does the way forward rate predicts interest rates depend on the way one views the market for interest rates? There are three market hypotheses on determining interest rate: expectations theory, market segmentation, liquidity premium theory.

Notice that the forward rate is a predictor of future exchange rate, not interest rates in a given country. Since you mention three theories for determining term structure of interest rates, I quickly review them for your convenience:

1. The expectations theory that suggests that the interest rate on a long-term bond will be equal to an average of the short-term interest rates that investors expect to occur over the life-cycle of the long-term bond.
2. The segmented market theory suggests that the markets for different maturity bonds are completely segmented and separate.
3. The liquidity premium theory suggests that the interest rate on a long term bond will equal an average of short-term interest rates expected to occur over the life cycle of the long-term bond plus a liquidity premium.

Many of the Chinese investors do not see the “crash” as you described in class. That’s why more and more are putting their money to play around in the stock market. So, how do you explain the increase in real estate investment? The way I see it is that people use the profit from the stock market investment to purchase real estate assets.

I think that it is natural to see the real estate prices increasing over the long run in China, as investors become wealthier than before. However, the rate at which prices are growing currently suggest that there may be a market bubble in the real estate market in China. Why would there be a real estate bubble? Because there might be an increased liquidity in the financial markets in China (due to high forex proceeds entering China in the past two decades), which will look for the highest possible returns offered in the Chinese financial market. So, if there are not sufficient investment opportunities in China, it is conceivable that the money will flow into the real estate market.

Are pass through exchange rates the only thing in transfer pricing?

No, we will discuss in detail techniques for capital budgeting, such as leading & lagging of costs, offsetting positions in foreign currencies, etc.