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Interest Rate Parity in Excel

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This paper develops interest rate parity in a framework that is easily implemented in Excel. The student can either be given the paper to see how the code is developed using the intuition of the interest rate parity framework or the student can be taught the interest rate parity framework and develop the Excel code as an assignment. Using either teaching method or the other exercises suggested in the paper, the student is able to understand how traders exploit violations of interest parity and become more comfortable with basic concepts, such as, direct quotes and indirect quotes.

INTRODUCTION

Because of developed markets in spot exchange rates and foreign exchange forward contracts, interest rate parity (IRP) violations can almost immediately be arbitraged. The "threshold" for implementing arbitrage trades is directly related to the transaction costs associated with these markets. As transaction costs lower, smaller and smaller parity violations can be exploited leading to more efficient markets (and possibly fewer future opportunities to exploit parity violations). Because transaction costs are relatively low for active foreign exchange markets, IRP is a very good vehicle for allowing students to understand how traders can exploit even small IRP violations.

In more recent years, traders have successfully competed directly with central banks through IRP-based arbitrage (also known as covered interest rate arbitrage). A discussion of such competition appears later in this paper and demonstrates how the market is currently more powerful than many individual central banks. Although covered interest rate arbitrage is the focus of this paper, one should also be aware that these markets are important for hedging risk and that not all trading in these markets is speculative.

To allow the student to grasp how an arbitrage opportunity is exploited in these markets, an IRP-based trading rule is developed in an Excel spreadsheet. This method allows the instructor under different classroom settings (e.g. international finance, discussions on trading, spreadsheet skills, etcetera) to develop the student's intuition and computer skills. A discussion of how the spreadsheet can be applied in the classroom is

provided in section four of the paper.

In the first section, the basic concepts of IRP are developed leading to a trading rule to exploit violations of IRP. The following section implements the trading rule in Excel forcing the student to think through the process of being a trader. The third section discusses the ability of traders and the market in regard to determining currency values even against the will of a particular government. The fourth section provides suggestions for implementing the spreadsheet in the classroom. The final section concludes the paper.

INTEREST RATE PARITY (IRP)

In dealing with foreign exchange, it is very important to understand that a direct quote values one unit of foreign currency in terms of the domestic currency. Whenever possible, working with a direct quote is preferred. An indirect quote values one unit of the domestic currency in terms of the foreign currency. To prevent confusion, one should always be aware as to which currency is the domestic currency and then work with the associated direct quote.

Let "d" symbolize the domestic currency and let "f" symbolize the foreign currency. " 0.5 d : 1 f" is an example of a direct quote. Whereas, "1 d : 2 f", is an example of an indirect quote despite conveying the same information. Following the advice of the previous paragraph, IRP is developed using the direct quote of 0.5 d : 1 f.

Further assume, both countries are politically and economically stable allowing investors in either country to earn a risk-free rate of return. For the foreign country, let the risk-free rate of return be "k_F" and let "k_D" represent the domestic risk-free rate of return. The direct quote for the future expected exchange rate changes relative to k_D and k_F. By allowing both sides of the direct quote to earn the associated risk-free rates, the future exchange rate becomes:

$$0.5\times(1+k_D)\ d : 1\times(1+k_F)\ f \qquad (1)$$

Simplify the expression so that the exchange rate is expressed in terms of one unit of foreign currency by dividing both sides of the quote by $(1+k_F)$. The new future expected exchange rate is expressed as a direct quote:

$$0.5\times(1+k_D)\div(1+k_F) : 1\ f \qquad (2)$$

A forward contract allows the purchaser of the contract to "lock in" a particular exchange rate at some point in the future. In our example, a one-year forward contract may be 0.55 d : 1 f. Notice, the cost of one unit of the foreign currency has increased from 0.50 d to 0.55 d. This is an appreciation of 10% (i.e. {0.55 d – 0.50 d}÷0.50 d).

The rate of return that is implied by the forward contract (i.e. the 10% appreciation) is called the forward premium and is symbolized by "k_{Fwd}". Thus, the current quote is altered to be the forward quote by applying the forward premium in the following manner:

$$0.5\times(1+k_{Fwd})\ d : 1\ f \tag{3}$$

Unlike the risk-free rates of the individual countries, the forward premium must be implied from the forward contract. However, IRP states that the future exchange rate is expected to be equal to the exchange rate stipulated in the forward contract. Consequently, equation (2) equals equation (3).

$$0.5\times(1+k_D)\div(1+k_F) : 1\ f = 0.5\times(1+k_{Fwd})\ d : 1\ f \tag{4}$$

Eliminating the current exchange rate from equation (4) generates the parity condition:

$$(1+k_D)\div(1+k_F) = (1+k_{Fwd}) \tag{5}$$

It is from this metric of IRP that a trading rule emerges.

If $(1+k_D)\div(1+k_F) > (1+k_{Fwd})$, then either the domestic rate is too high, the foreign rate is too low, or the forward premium is too low. Arbitrage trading will cause all three rates to adjust to the parity condition almost simultaneously. However, at the moment, a trader can borrow "f" at the low k_F rate, convert the loan into "d", and invest at the high k_D rate. At loan maturity, the trader uses the forward contract to convert some or all of the investment in "d" back into "f" to repay the loan. It is the trader's prerogative in regard to keeping the profit from the investment denominated in "d" or "f".

Alternatively, if $(1+k_D)\div(1+k_F) < (1+k_{Fwd})$, meaning either the domestic rate is too low, the foreign rate is too high, or the forward premium is too high. To take advantage of the arbitrage opportunity, the trader can borrow "d" at the low k_D rate, convert the loan into "f", and invest at the high k_F rate. At loan maturity, the trader uses the forward contract to convert some or all of the investment in "f" back into "d" to repay the loan. Again, it is the trader's prerogative in regard to keeping the profit from the investment in "d" or "f".

In order to take advantage of IRP, it is essential to know if k_D or k_F is too high or too low relative to the forward premium. In other words, k_D can be greater than k_F but still be too low relative to the forward premium. For example, if k_D is 8% and k_F is 6%, k_D is considered to be too low if k_{Fwd} is 3%. In fact, holding k_F and k_{Fwd} constant, k_D needs to be 118 basis points (or 1.18%) higher to maintain parity, which is why the 8% rate is too low despite being greater than k_F. It is this element of IRP that causes confusion among students. Thus, one needs to emphasize the importance of all three rates: k_D, k_F, and k_{Fwd}.

Further, although the forward contract appears to play a minor role in the arbitrage trade, the forward contract is critical in converting the trade into a profitable position.

Transaction costs are ignored in this treatment but one should be aware that transaction costs may eliminate all or some of the trading profit. Further, there is risk in trying to take advantage of IRP disparities because quotes can adjust while placing your trades. Because of the risk, it is somewhat misleading to use the term arbitrage.

Finally, if rates are adjusted to be in continuous time (assuming direct quotes), the future exchange rate for our example becomes:

$$0.5 \times \exp(k_D - k_F)\ d : 1\ f \tag{6}$$

(where "exp(•)" is the exponential function) and the forward premium is:

$$\ln \{0.55\ d \div 0.50\ d\} \tag{7}$$

(where "ln(•)" is the natural logarithm function). Consequently, the IRP condition becomes:

$$k_D - k_F = k_{Fwd} \tag{8}$$

The continuous time IRP condition is sometimes introduced as an approximation of IRP when in reality it is not.

APPLYING THE TRADING RULE IN EXCEL

To apply the trading rule in Excel, it is better to define the rule in terms of a mathematical equation:

$$(1+k_D) \div (1+k_F) - (1+k_{Fwd}) \tag{9}$$

If the equation is positive (i.e. $(1+k_D) \div (1+k_F) > (1+k_{Fwd})$), then one should borrow in the foreign currency and invest in the domestic currency. If the equation is negative (i.e. $(1+k_D) \div (1+k_F) < (1+k_{Fwd})$), then one should borrow in the domestic currency and invest in the foreign currency. If the equation is zero (i.e. $(1+k_D) \div (1+k_F) = (1+k_{Fwd})$), then there is parity and consequently no arbitrage trading opportunities.

However, before applying the trading rule, one needs to determine what they want the Excel spreadsheet to be able to do. In this exercise, the user enters: direct or indirect quotes, risk-free rates in annual terms, the number of days in a year (different currency quotation systems use 360 or 365 days for a year; e.g. the British use a 365 day convention), and the number of days to maturity for the forward contract. The

Figure 1. Excel Template for User Information

	A	B	C	D
1	Quotes:	Domestic		Foreign
2		Currency:	To	Currency:
3	Spot:	*1*	To	*0.5*
4	Forward:	*2.2*	To	*1*
5	Days in Year:*	*360*		
6				
7	Risk-Free Rate:			
8	Domestic:	*10%*	APR	
9	Foreign:	*5%*	APR	
10				
11	Forward Contract:			
12	Maturity:	*180*	Days	

Cell entries in bold-italic are user supplied: cells B3, D3, B4, D4, B5, B8, B9, and B12. APR means Annual Percentage Rate.

*Currency quotes vary on the basis of the number of days per year. Generally, 360 or 365 days are used.

spreadsheet returns the spot and forward quotes as direct quotes, determines the forward premium in annual terms, provides the designated action to be taken based on the trading rule, and returns the future profit from the trading in terms of domestic and foreign currency. To accomplish all of these calculations, it is important to handle each calculation separately so as not to become overwhelmed. In fact, the first operation in Excel is to merely create the template for the user to enter information. Figure 1 illustrates such a template.

Next, extend the template to produce direct quotes for the spot and forward exchange rates. This is accomplished by dividing the domestic currency side of the exchange rate by the value entered in the foreign currency side of the exchange rate. In the current example, the forward quote is already a direct quote. Consequently, the spreadsheet operation just described does not produce a noticeable change. However, the spot exchange rate is an indirect quote and becomes "2 to 1" when changed to a direct quote (see Figure 2).

Using the direct quotes, the forward premium is simply the domestic forward quote divided by the domestic spot quote less one and adjusted for the days to maturity. Further, the equation version of the trading rule can be implemented as well (see Figure 3).

Finally, the Excel template (Figure 4) is completed by providing trading instructions based on the trading rule and by determining the potential profit expressed in both currencies.

Figure 2. Extended Template to Convert User Entered Quotes Into Direct Quotes

	A	B	C	D
1	Quotes:	Domestic		Foreign
2		Currency:	To	Currency:
3	Spot:	*1*	To	*0.5*
4	Forward:	*2.2*	To	*1*
5	Days in Year:*	*360*		
6				
7	Risk-Free Rate:			
8	Domestic:	*10%*	APR	
9	Foreign:	*5%*	APR	
10				
11	Forward Contract:			
12	Maturity:	*180*	Days	
13				
14	Direct Quotes:	Domestic		Foreign
15		Currency:	To	Currency:
16	Spot:	2[a]	To	1
17	Forward:	2.2[b]	To	1

Cell entries in bold-italic are user supplied: cells B3, D3, B4, D4, B5, B8, B9, and B12. APR means Annual Percentage Rate. *Currency quotes vary on the basis of the number of days per year. Generally, 360 or 365 days are used. [a]The cell formula is =B3/D3; [b]The cell formula is =B4/D4.

Figure 3. Extended Template with Forward Premium and Trading Rule

	A	B	C	D
1	Quotes:	Domestic		Foreign
2		Currency:	To	Currency:
3	Spot:	*1*	To	*0.5*
4	Forward:	*2.2*	To	*1*
5	Days in Year:*	*360*		
6				
7	Risk-Free Rate:			
8	Domestic:	*10%*	APR	
9	Foreign:	*5%*	APR	
10				
11	Forward Contract:			
12	Maturity:	*180*	Days	
13				
14	Direct Quotes:	Domestic		Foreign
15		Currency:	To	Currency:
16	Spot:	2[a]	To	1
17	Forward:	2.2[b]	To	1
18				
19	Forward Premium:	20.00%[c]	APR	
20	Trading Rule Equation:	-0.1524[d]		

Cell entries in bold-italic are user supplied: cells B3, D3, B4, D4, B5, B8, B9, and B12. APR means Annual Percentage Rate. *Currency quotes vary on the basis of the number of days per year. Generally, 360 or 365 days are used. [a]The cell formula is =B3/D3; [b]The cell formula is =B4/D4; [c]The cell formula is =(B17/B16-1)*B5/B12. [d]The cell formula is =(1+B8)/(1+B7)-(1+B19).

Figure 4. Final Template

	A	B	C	D
1	Quotes:	Domestic		Foreign
2		Currency:	To	Currency:
3	Spot:	***1***	To	***0.5***
4	Forward:	***2.2***	To	***1***
5	Days in Year:*	***360***		
6				
7	Risk-Free Rate:			
8	Domestic:	***10%***	APR	
9	Foreign:	***5%***	APR	
10				
11	Forward Contract:			
12	Maturity:	***180***	Days	
13				
14	Direct Quotes:	Domestic		Foreign
15		Currency:	To	Currency:
16	Spot:	2[a]	To	1
17	Forward:	2.2[b]	To	1
18				
19	Forward Premium:	20.00%[c]	APR	
20	Trading Rule Equation:	-0.1524[d]		
21	Trading Instructions:	Borrow[e]	Domestic	
22		Invest[f]	Foreign	
23				
24	Profit per Currency Unit:	0.1550[g]	Domestic	
25		0.0705[h]	Foreign	

Cell entries in bold-italic are user supplied: cells B3, D3, B4, D4, B5, B8, B9, and B12. APR means Annual Percentage Rate.

*Currency quotes vary on the basis of the number of days per year. Generally, 360 or 365 days are used.

[a]The cell formula is =B3/D3

[b]The cell formula is =B4/D4

[c]The cell formula is =(B17/B16-1)*B5/B12

[d]The cell formula is =(1+B8)/(1+B7)-(1+B19)

[e]The cell formula is =IF(B20>0, "Invest", IF(B20=0, "Parity", "Borrow"))

[f]The cell formula is =IF(B20>0, "Borrow", IF(B20=0, "Parity", "Invest"))

[g]The cell formula is =IF(B20>0,B16*(1+B8*B12/B5)-B17*(1+B9*B12/B5)
,IF(B20=0,0,B17*(1+B9*B12/B5)-B16*(1+B8*B12/B5)))

[h]The cell formula is =B24/B17 or =IF(B20>0,B16*(1+B8*B12/B5)/B17-(1+B9*B12/B5)
,IF(B20=0,0,(1+B9*B12/B5)-B16*(1+B8*B12/B5)/B17))

The template uses an "iterated IF statement" structure based on the trading rule solution in cell B20. If B20 is negative, the trader should borrow domestically and invest in the foreign market. If B20 is positive, the trader should borrow in the foreign market and invest domestically. If B20 is zero, the trader has no trading opportunities. An IF statement in Excel has the following syntax: =IF(test condition, action if condition is true, action if condition is false) and alone, cannot produce three separate actions.

However, by first testing if B20 is greater than zero, meaning B20 is less than or equal to zero for the condition to be false, a second IF statement can be inserted as the action taken when the false condition exists. This second IF statement within the first IF statement tests: when B20 is not greater than zero, is B20 equal to zero with associated true and false condition actions. The IF statement within the IF statement allows for three separate courses of action. The syntax is: =IF (initial condition, action if initial condition is true, IF (second condition, action if second condition is true and initial condition is false, action if both conditions are false). The "iterated IF statement" can be extended to produce more than three courses of action. In the appendix, a further discussion of the "iterated IF statement" is provided.

HOW TRADERS COMPETE WITH CENTRAL BANKS

What is not apparent with the trading rule from the previous sections is the adjustment by the market when IRP is violated. Certainly the domestic risk-free rate or the foreign risk-free rate can change to create IRP, but more than likely, the forward premium changes by having the spot quote adjust. Recall, the forward premium is determined by the dividing the forward direct quote by the spot direct quote. Thus, changing the spot quote (or the forward quote) alters the forward premium. Consequently, a change in the spot quote, which may not seem to be a part of IRP, is actually directly related to IRP through the forward premium. As a result, much of the discussion in regard to markets and central banks revolves around adjustments to the spot exchange rate and indirectly to IRP.

The most pivotal moment in favor of market forces is the collapse of the Bretton Woods system in 1973. Under the system, central banks attempt to support currencies to maintain fixed exchange rates despite market forces to the contrary. After Bretton Woods and the subsequent introduction of flexible exchange rates that change based on market forces, central bank intervention generally follows one of two goals: 1) stabilize the value of the domestic currency and 2) adjust the currency value to encourage foreign investment in the domestic economy. However, research evidence regarding central bank intervention tends to indicate that such intervention has a temporary influence on relative currency values. Further, Baillie and Osterberg [1997] provide evidence that central bank intervention tends to increase volatility rather than calm chaotic markets.

Despite a regime of flexible exchange rates, in the 1990s, there are instances when central banks and traders combat each other in regard to currency valuation. Generally, the issue revolves around a currency whose value is "pegged" to another currency or a basket of currencies. In essence the currency that is "pegged" is not actually fully flexible and consequently may not adjust appropriately to the conditions pervasive within the domestic economy.

For example, in 1992, the trading activities of the Quantum Fund forced the British pound sterling to be devalued. The pound had been pegged to a basket of European currencies dominated by the German deutsch mark. Upon the reunification of Germany, the basket of European currencies reflected more of what was happening in the German economy rather than the British economy. This inconsistency in the value of the pound relative to the British economy led to significant speculative trading (the Quantum Fund being one of the largest speculators) within the foreign exchange market as the Bank of England attempted to maintain the exchange rate. Ultimately, the Bank of England had to yield to the market forces and devalue the pound.[1] Similar instances are apparent in 1997, relative to Asian currencies, such as the Thai bath.[2]

As evidenced above, the power of the market to maintain IRP appears to be stronger than the activities of individual central banks. Governments may not desire having a currency value altered or being forced to adjust domestic rates in response to market forces. Yet, a policy to support a currency value against the wishes of the market has been and will continue to be very costly to any given government.[3] Consequently, countries and traders need to respect the powerful currency trading market that now exists.

CLASSROOM APPLICATIONS

The spreadsheet and trading rule methods can be applied in the classroom in a number of ways. The simplest application is to supply the student with the paper as a means of introducing IRP and then have test questions based on the trading rule and what actions a trader should take when parity does not exist. This application forfeits the benefits of the spreadsheet, but is still introduces trading into the topic of IRP.

To use the paper as a take-home or in-class assignment, we suggest providing an in-class presentation of IRP and the trading rule with the associated trading rule equation. Next, provide the student with Figure 5 and the appendix for the "iterated IF statement" as a guide for designing the spreadsheet as an assignment.

Be certain to have the student provide the spreadsheet code or to have the student produce the appropriate answers to a number of examples. To determine if the student actually understands the trading rule, again, we suggest test questions based on the trading rule and what actions a trader should take when parity does not exist.

Another application is to have students use actual quotes within the spreadsheet to

Figure 5. Student Template

	A	B	C	D
1	Quotes:	Domestic		Foreign
2		Currency*:	To	Currency**:
3	Spot:	***1***	To	***0.5***
4	Forward:	***2.2***	To	***1***
5	Days in Year:***	***360***		
6				
7	Risk-Free Rate:			
8	Domestic:	***10%***	APR	
9	Foreign:	***5%***	APR	
10				
11	Forward Contract:			
12	Maturity:	***180***	Days	
13				
14	Direct Quotes:	Domestic		Foreign
15		Currency:	To	Currency:
16	Spot:	2[a]	To	1
17	Forward:	2.2[a]	To	1
18				
19	Forward Premium:	20.00%[b]	APR	
20	Trading Rule	-0.1524[c]		
21	Trading Instructions:	Borrow[d]	Domestic	
22		Invest[d]	Foreign	
23				
24	Profit per Currency	0.1550[e]	Domestic	
25		0.0705[e]	Foreign	

Cell entries in bold-italic are user supplied: cells B3, D3, B4, D4, B5, B8, B9, and B12. APR means Annual Percentage Rate.

*The unit for domestic currency in the text is "d"

**The unit for foreign currency in the text is "f"

***Currency quotes vary on the basis of the number of days per year. Generally, 360 or 365 days are used.

[a]The cell formula converts an indirect quote into a direct quote by dividing the number of units of domestic currency by the number of units of the foreign currency. If the quote is already a direct quote, it will not change even when the cell formula is applied.

[b]The cell formula converts the forward premium into an annual rate.

[c]The cell formula calculates the trading rule equation: $(1+k_D)\div(1+k_F) - (1+k_{Fwd})$.

[d]The cell formula uses an "iterate IF statement" to provide the instructions: "Borrow", "Parity", or "Invest" based on the trading rule equation. Note: different instructions are applied when trading rule equation is positive, zero, or negative.

[e]The cell formula uses an "iterated IF statement" to determine the profit (zero when there is parity) in the associated currency. Note: different instructions are applied when the trading rule equation is positive, zero, or negative.

test IRP using the Financial Times or the following websites:

- www.international.nasdaq.com
- www.oecd.org
- www.ft.com/markets - preferred by authors

The student should be made aware that quotes may be "stale" (i.e. not reported simultaneously) and that small parity violations may not be exploitable due to transaction costs.

For example, direct quotes in U.S. dollars for British pounds reported in the Financial Times for May 22, 2003 have a spot exchange rate of $1.635: 1 British pound and a 90 day forward exchange rate of $1.6232 : 1 British pound. The 90 day Treasury rates are 1.08% APR for the U.S. (i.e. k_D is 1.08%) and 3.63% APR for the U.K. (i.e. k_F is 3.63%). Notice, that the British convention is to assume a 365-day year and must be implemented in the spreadsheet in the "Days in Year" cell. The resulting forward premium is –2.63% APR and the suggested action is to invest in the U.S. market and to borrow from the British market to generate a per pound profit of $0.0016 or 0.001 pounds. Assuming the quotes are not stale, there is still a question regarding whether this small violation of parity is enough to offset transaction costs. Notice, if the transaction costs are in excess of two-tenths of a penny per pound traded, it will be unprofitable to exploit this parity violation.

A fourth application is to have the student convert the spreadsheet into continuous time by having the student restructure the spreadsheet commands based on the discussion of the final paragraph in section one. The result, using the initial example from this paper, is displayed in Figure 6.

Finally, the paper can be distributed to the student as background material for cases or historical events that concern IRP. Because the paper is self-contained, it does not necessarily need to be taught in the classroom. Other issues, such as, inflation in relation to the adjustment of interest rates can be examined using the Excel template as well. One can change interest rates and then use the "Goal Seek" function to change the forward exchange rate until the trading rule equation becomes zero (i.e. parity). Similarly, one can set the forward exchange rate and one of the currency risk free rates and then use "Goal Seek" to find the appropriate value for the remaining risk free rate.

CONCLUSION

By developing an Excel template to exploit violations of IRP, the student not only learns how to formulate a trading rule, but also how to start programming more complex logic into an Excel spreadsheet. Although the template in this paper is fairly simple, it allows more topics to be introduced such as bid-ask spreads or other transaction costs that can devour most or all of the arbitrage profits.

We suggest generating examples in which a high rate of interest in a particular

Figure 6. Continuous Time Template

	A	B	C	D
1	Quotes:	Domestic		Foreign
2		Currency:	To	Currency:
3	Spot:	***1***	To	***0.5***
4	Forward:	***2.2***	To	***1***
5	Days in Year:*	***360***		
6				
7	Risk-Free Rate:			
8	Domestic:	***10%***	APR	
9	Foreign:	***5%***	APR	
10				
11	Forward Contract:			
12	Maturity:	***180***	Days	
13				
14	Direct Quotes:	Domestic		Foreign
15		Currency:	To	Currency:
16	Spot:	2[a]	To	1
17	Forward:	2.2[b]	To	1
18				
19	Forward Premium:	19.06%[c]	APR	
20	Trading Rule Equation:	-0.1406[d]		
21	Trading Instructions:	Borrow[e]	Domestic	
22		Invest[f]	Foreign	
23				
24	Profit per Currency Unit:	0.1532[g]	Domestic	
25		0.0696[h]	Foreign	

Cell entries in bold-italic are user supplied: cells B3, D3, B4, D4, B5, B8, B9, and B12. APR means Annual Percentage Rate.

*Currency quotes vary on the basis of the number of days per year. Generally, 360 or 365 days are used.

[a]The cell formula is =B3/D3

[b]The cell formula is =B4/D4

[c]The cell formula is =LN(B17/B16)*B5/B12

[d]The cell formula is =B8-B9-B19

[e]The cell formula is =IF(B20>0, "Invest", IF(B20=0, "Parity", "Borrow"))

[f]The cell formula is =IF(B20>0, "Borrow", IF(B20=0, "Parity", "Invest"))

[g]The cell formula is =IF(B20>0,B16*EXP(B8*B12/B5)-B17*EXP(B9*B12/B5)
,IF(B20=0,0,B17*EXP(B9*B12/B5)-B16*EXP(B8*B12/B5)))

[h]The cell formula is =B24/B17 or =IF(B20>0,B16*EXP(B8*B12/B5)/B17-
EXP(B9*B12/B5),IF(B20=0,0,EXP(B9*B12/B5)-B16*EXP(B8*B12/B5)/B17))

currency may still not be enough to make that currency worthy of investment because the currency is depreciating too fast. For example, setting k_D to 2%, k_F to 10%, and k_{Fwd} to –9% (e.g. spot rate of 1 d : 1 f and a 180 day forward rate of 0.955 d : 1 f using a 360 day year convention) violates parity and is arbitraged by borrowing at the foreign rate of 10% and investing in the domestic rate of 2%. Although it appears counter-intuitive, the 9% depreciation in the foreign currency (via the forward contract) offsets much of the borrowing costs associated with the foreign currency. Consequently, the student begins to realize that interest rates must be evaluated relative to the stability of a currency's value rather than simply comparing the interest rates of the two countries.

Because Excel is so versatile in applying trading rules, the introduction of Excel into the international finance classroom for the testing of parity conditions adds logical and technical dimensions to the coursework that simply cannot be accomplished with only a textbook. Alternatively, the template can add an international finance dimension to a spreadsheet-based course or a trading-based course.

Finally, an international finance course is simply not complete unless there is a discussion about the power of the currency trading market relative to central banking policies. The tension between these two forces shape not only the past, but the future as well. The book references made in this paper provide some potentially useful reading assignments.

ENDNOTES

[1] The authors wish to thank Annette Poulsen, participants at the 2003 Financial Education Association Meetings. A portion of this paper was completed while Bonnie Buchanan was at the University of Georgia.

[2] For an excellent overview of this case, see Chancellor.

[3] In May 1997, Tiger Management hedge fund began to bet heavily against the Thai baht. By July 1, 1997 the Thai central bank was forced to drop the peg with the dollar and float the baht. On July 2, the baht plummeted in value.

[4] By the end of June 1997, Thailand had already committed nearly $29 billion in forward transactions. At this time, Thailand had only $1.14 billion in foreign exchange reserves. Basically the choice left was to float the baht or go broke defending the currency. Kristoff and Wudunn give an excellent account of the consequences of this and the subsequent contagion.

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