

International Finance
 Fin435.101
 Fall 2010
 Exam #2
 Prof. M. Rhee

1. You took a long position in three contracts of Euro futures (125,000 Euros for one contract) at 10am CST on 11/9 for 2010 December delivery at \$0.923/€. What is the initial margin requirement at a 2% initial margin? Given that you put down \$200 more than the 2% initial margin requirement, what is the ending balance of your account at the end of 11/9 if the settlement price of 11/9 is \$0.917/€? What is your new margin ratio at the end of the day of 11/9? Do you get a margin call, if the minimum maintenance margin is 1.5%? If so, how much is the variation margin? Assuming that you are going to add \$300 more than the variation margin, if you get the margin call, what would be the ending balance of 11/9? If the futures rate becomes \$0.909/€ on 11/10, do you get a margin call? What is the variation margin? What will be the ending balance if you add \$300 more than the variation margin?

Position	Long
# Contracts	3
Contract Size	€ 125,000
11/9 10 am CST	\$ 0.923
11/9 Settlement	\$ 0.917
11/10 Settlement	\$ 0.909
Initial Margin Requirement	2%
Additional Deposit for Margin Call	\$ 300

Contract Value at 10 am CST on 11/9 \$ 346,125 (= 3 × €125,000 × \$0.923/€)

(1) Initial Margin Required

Initial Margin Required = 3 × €125,000 × \$0.923/€ × 0.02 = \$ 6,922.50

(2) Settlement Balance of Account at the End of 11/9, Margin Ratio, Margin Call, Variation Margin, & Ending Balance

- Settlement Balance on 11/9 = \$6,922.50 + \$200 + {\$(0.917 - 0.923)/€ × 3 × €125,000} = \$ 4,872.50
 $\bar{\text{M}}$ argin Ratio = \$4,872.50 / (\$0.917/€ × 3 × €125,000) = 1.4169%

You get a margin call because the margin ratio is less than the minimum maintenance margin ratio of 1.5%

- Variation Margin = (\$0.917/€ × 3 × €125,000 × 0.02) - \$4,872.50 = \$ 2,005.00

- Ending Balance on 11/10 = \$4,872.50 + \$2,005.00 + \$300 = (\$0.917/€ × 3 × €125,000 × 0.02) + \$300 = \$ 7,177.50

(3) Ending Balance on 11/10, Margin Call on 11/10? Variation Margin, & Ending Balance with Additional \$300?

- Settlement Balance on 11/10 = \$7,177.50 + {\$(0.909 - 0.917)/€ × 3 × €125,000} = \$ 4,177.50
 $\bar{\text{M}}$ argin Ratio = \$4,177.50 / (\$0.909/€ × 3 × €125,000) = 1.2255%

You get another margin call because the margin ratio is less than the minimum maintenance margin ratio of 1.5%

- Variation Margin = (\$0.909/€ × 3 × €125,000 × 0.02) - \$4,177.50 = \$ 2,640.00

- Ending Balance on 11/10 = \$4,177.50 + \$2,640.00 + \$300 = (\$0.909/€ × 3 × €125,000 × 0.02) + \$300 = \$ 7,117.50

2. Given the currency rates below, determine the three-month forward bid-asked outright quotation rates and the forward premium APR rates.

$S_0(\$/\text{£})$: 1.9712 – 1.9717

Three-month 54-57

(1) Bid-Asked Outright Rates

Since the first number is smaller than the second number, the forward rates are at a premium.

For Bid, $1.9712 + 0.0054 = \$1.9766/\text{£}$

For Asked, $1.9717 + 0.0057 = \$1.9774/\text{£}$

(2) Forward Premium APR Rates

- For Bid, $[(F - S_0)/S_0] * [360/91] = [(1.9766 - 1.9712)/1.9712] * [360/91] = [0.0054/1.9712]*[360/91]= 1.084\%$

- For Asked, $[(F - S_0)/S_0] * [360/91] = [(1.9774 - 1.9717)/1.9717] * [360/91] = [0.057/1.9717]*[360/91]= 1.144\%$

3. James Clark is a currency trader with Wachovia. He notices the following quotes:

$1/S_0 = \text{SF } 1.2051/\text{\$}$, Six month forward rate ($1/F_{6mo}$) = $\text{SF } 1.1922/\text{\$}$

Six-month \$ interest rate 2.5% APR, Six-month Swiss franc interest rate 2.0% APR

- Does the CIRP hold?
- Determine the implied forward rate.
- Show steps needed to make arbitrage profits assuming that Clark is authorized to work with \$1 million or equivalent amount in SFs.

a)

CIRP Equation: $1 + i_{us} = \frac{1}{S_0} \times (1 + i_{uk}) \times F$

$$1 + (0.025/2) \quad \text{vs.} \quad (1.2051) * \{1 + (0.02/2)\} * (1/1.1922)$$
$$\text{\$1.0125} \quad < \quad \text{\$1.02092854}$$

Borrow Low

Invest High

⇒ CIRP does not hold. Borrow low in the U.S. and invest high in Switzerland

b)

$$1.0125 = (1.2051) * (1.01) * F \quad \Rightarrow \quad F = \{1.0125 / (1.2051 * 1.01)\} = \$0.831861/\text{SF}$$

⇒ Since actual $F > implied F$, RHS will be greater than LHS indicating "Borrow low in the U.S. and invest high in Switzerland"

c)

i. Borrow \$1M in the U.S.

ii. Convert \$1M to SFs at $S_0 = \text{\$(1/1.2051)/SF}$

$$\text{\$1M} * \text{SF}(1.2051)/\text{\$} = \text{SF } 1,205,100$$

iii. Invest SF 1,205,100 in Switzerland at $i_{CHF} = 2\%$ APR

$$\text{SF } 1,205,100 * (1 + \text{interest rate}) = \text{SF } 1,205,100 * \{1 + (0.02/2)\} = \text{SF } 1,217,151$$

iv. Convert SFs into \$s to realize revenue at $F_{6mo} = \text{\$(1/1.1922)/SF}$

$$\text{SF } 1,217,151 * \text{\$(1/1.1922)/SF} = \text{\$1,020,928.54}$$

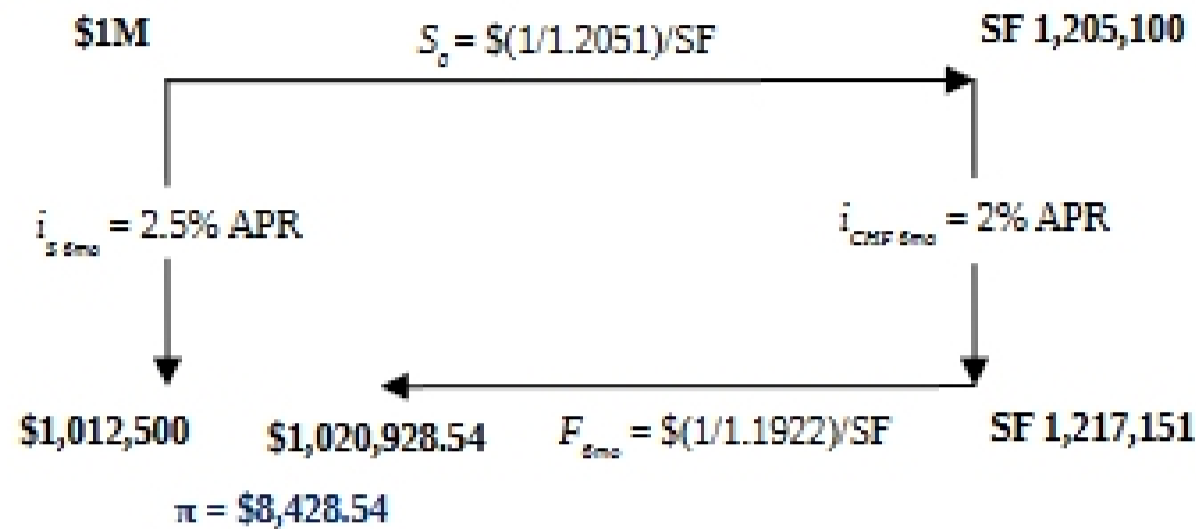
v. Calculate the debt

$$\text{\$1M} * (1 + \text{interest rate}) = \text{\$1M} * \{1 + (0.025/2)\} = \text{\$1,012,500}$$

vi. Realize profit

$$\$1,020,928.54 - \$1,012,500 = \$8,428.54$$

Comment: In reality, there exist bid – asked spread for the exchange rates, the forward rates, and the interest rates. Due to the bid – asked spread, the arbitrage opportunity may not necessarily lead to the arbitrage gain.



4. Jim Smith specializes in cross-rate arbitrage. He notices the following quotes:

SF 1.5971/\$, A\$ 1.8215/\$, A\$ 1.1440/SF.

Is there an arbitrage opportunity? What steps would he take to make an arbitrage profit based on H and L? How much would he profit if he has \$1 million available for this purpose?

Location A: SF/\$ = 1.5971
 Location B: A\$/\\$ = 1.8215
 Location C: A\$/SF = 1.1440
 Investment fund: \$1,000,000

(1) Triangular Arbitrage Opportunity?

Location A: \$/SF = 1/1.5917 = 0.62613 **Sell High**
 Location B & C: another \$/SF = \$/A\$ * A\$/SF = (1/1.8215) * 1.1440 = 0.62805 **Buy Low**
 ⇒ Yes, there exists a triangular arbitrage opportunity

(2) Realizing Triangular Arbitrage (Buy from B & C and sell to A, Since C does not have \$, you need to start at B first)

- i. Buy A\$ using \$1,000,000 in location B
 $\$1,000,000 * A\$1.8215/\$ = A\$1,821,500$
- ii. Sell A\$ for SF in location C
 $A\$1,821,500 * SF (1/1.1440)/A\$ = SF1,592,220.28$
- iii. Sell SF to get \$ revenue in location A
 $SF1,592,220.28 * \$(1/1.5917)/SF = \$1,000,326.87$
- iv. Profit
 $\pi = \$1,000,326.87 - \$1,000,000 = \$326.87$

5. a) Differentiate between futures and forward contracts

b) Given the following information, determine the forecasting error using the formula, $(|F-R|/R)$.

Which forecast between the British pound and the Mexican peso is more accurate? (Hint: F=forecast, R=actual, realized).

F = \$2.0/£, R = \$1.95/£
 F = \$ 0.10/MP, R = \$0.095/MP