

FINA 7360 - CASE II: SOLUTIONS

General Situation:

Underlying Position (UP): Short **JPY 200 M** (T=May 17, around 168 days.)

Transaction Exposure (TE): **JPY 200 M** * **.01247 USD/JPY** = **USD 2.494 M**

Hedging Position (HP): Long Futures/Long JPY Calls.

Note: The optimal hedge ratio (futures position) should be (using the average interest rate –mid-quotes): $h = (1+.0024643*168/360)/(1+.00151815*168/360) = 1.00044$ (Very close to 1. Assuming $h=1$ is not a bad assumption in this example).

1) You should have found much more volume and open interest in the futures market than in the option markets. Thus, it is easier to close a position in the futures markets.

2) We generate 6-month arithmetic returns, up to December 2012 (Excel output)

Note: The data is in JPY/USD, but the question is in terms of USD/JPY.

Mean (s_t)	0.03132
ST Dev (s_t)	0.06547
Min	-0.09857
Median	0.02700
Max	0.20995
Observations	61
H0(Mean=0)	3.736376868

95% C.I. for st: $[0.03132 \pm 1.96 * 0.06547] = [-0.0970, 0.1596]$

VaR(97.5%) = **JPY 200 M** * **.01247 USD/JPY** * $(1 + 0.1596) =$ **USD 2.892114 M**

VaR-mean(97.5%) = **USD 2.892114 M** – **USD 2.494 M** = **USD 0.398114 M**

3) 6-Monthly Arithmetic Returns (Excel output)

a) Worst case scenario (largest 6-mo appreciation of JPY against USD): **0.21** (21.00% appreciation of JPY against USD)

Worst case = **JPY 200 M** * **.01247 USD/JPY** * $(1 + 0.21) =$ **USD 3.017621 M**

b) Best case scenario (largest 6-mo depreciation of JPY against USD): **-0.0986** (9.86% depreciation of JPY against USD)

Best case = **JPY 200 M** * **.01247 USD/JPY** * $(1 - 0.0986) =$ **USD 2.248169 M**

4) Different results for different simulations. I got: [**USD 2.279 M, USD 2.969 M**].

5) Data

$F_{t=Dec\ 6, T=June} = .01257$ USD/JPY

$F_{t=May\ 6, T=June} = .010002$ USD/JPY

U.S. short interest rates for two months or less = .0909-0.1165.

There are 42 days to maturity (3rd Wednesday of June)

Assume $h=1$ (HP size is JPY 200M)

$$\text{Value of forward contract} = \frac{F_{May\ 6, June} - F_{Dec\ 6, June}}{[1 + i_{USD} * (T/360)]} = \frac{(.010002 - .01257) * 200\ M}{[1 + .001165 * (42/360)]} = \text{USD } -0.5135\ M$$

Total payment in May 6:

$$\text{JPY } 200\ M * .01004 \text{ USD/JPY} + \text{USD } 0.5135\ M = \text{USD } 2.5215\ M$$

6) Check the Lecture Notes, Example VIII.8.

Amount in JPY to be deposited = **JPY 200 M** / (1 + .0015158 * 180/360) = JPY 199.84853 M

Convert to USD = JPY 199.84853 M * .012470 USD/JPY = USD 2.4921112 M (=< amount to borrow from US bank)

$$\text{Loan repayment after 180 days} = \text{USD } 2.4921112\ M * (1 + .0026205 * 180/360) \\ = \text{USD } 2.4986418\ M$$

The cash flows will occur in June 5. To compare with 4), we need to discount the cash flows back to May 6.

$$\text{Discounted Cash flows} = \text{USD } 2.4986418\ M / (1 + .001165 * 29/360) = \text{USD } 2.49841\ M$$