

Practice Second Midterm Exam

1. Mac Inc., a U.S. firm, plans to invest in a new project that will be located either in Venezuela or in Colombia. Assume the U.S. risk free rate is 3%. You have the following data on expected returns, volatility, correlations, and weights for each project:

	Mac	Venezuela	Colombia
Expected return	13%	20%	32%
Standard deviation	15%	25%	50%
Correlation with existing Mac's portfolio	1.00	.35	.12
Weight on overall portfolio	-	.25	.10
Beta	.90	1.10	1.40

- A. Based on the Sharpe Ratio, which project would you recommend to Mac?
- B. Based on the Treynor Ratio, which project would you recommend to Mac?
- C. Is Mac, under both criteria, better off without adding any project?

2. Charlie Kelly, an Irish design company, wants to refinance debt amounting to USD 200 million. An investment bank suggests issuing a straight bond, with annual coupon payments. The investment bank has the following data available:

- Irish government bond yields: 4-year 5.75 % (p.a.)
- U.S. Treasury government bond yield: 4-year 1.85 % (s.a.)
- German government bond yield: 4-year 2.25 % (s.a.)
- Kelly Euro-Eur bond yield (outstanding debt): German government bonds + 345 bps (s.a.)

Given the current tight market conditions, an investment bank suggests: a 4-year full-coupon USD Eurobond and an issue price of 100% ($P=100$).

- (1) Following usual market practices, set the coupon and the yield of the new Kelly bond.
- (2) A year from now, there is a big debt crisis in Europe. What would the effect of this crisis be on the value of the bond? Briefly explain your logic.
- (3) Two years from now, the Irish government has a budget surplus. What would the effect of this budget surplus be on the value of the bond? Briefly explain your logic.
- (4) Three years from now, Kelly wants to buy back the bond. If the yield to maturity for similar bonds is 8% and $S_t = 1.20$ USD/EUR, how much does Kelly have to pay (in EUR) for the bond buyback?

3. The annual Chinese yuan (CNY) interest rate is 5% (s.a.), while the annual USD interest rate is 1% (s.a.). Paddy's Co., a U.S. firm, entered into a currency swap with a swap dealer, where Paddy's pays 3% semi-annually in USD and receives 4% semi-annually in CNY. The notional principals in the two currencies are USD 6 million and CNY 26 million and they are not exchanged at the end of the swap. The swap will last for another two years. The exchange rate is 0.16 USD/CNY. For simplicity, assume the term structure in Chinese and in the U.S. is flat.

- A. Draw a diagram showing the semi-annual swap cash flows (in CNY and in USD).
- B. Value this currency swap for Paddy's Co.
- C. Suppose CNY interest rates increase. Without doing any calculations, does the value of the swap increase or decrease for Paddy's Co.?
- D. A year from now, the exchange rate is 0.14 USD/CNY. Assuming that nothing else has changed, use the forward contract decomposition approach to calculate the new value of the swap for Paddy's Co.

4. LIFFE has an active market for the Italian government bond (BTP) CDB futures contract. The underlying asset is a notional long-term government bond with a yield of 6%. The size of the contract is EUR 100,000 of nominal value. On April 19, 2012, the Italian term structure of interest rates is flat. The current rate is 4%. The bond futures price (Z) for delivery in September is equal to 107.1%. One Italian government bond that can be used for delivery is the May 25, 2020. It pays annual coupon. It has the following characteristics:

Maturity	Price (P)	Coupon (C)	cf	bpv
May 25, 2020	107.50	5%	0.938	.072

Another Italian government bond, the BTP 6.25 October 25, 2021, has a $cf=1.003$, a $BAC=2.85$, and a $bpv=.102$.

- a. You want to determine on April 21, 2012, the cheapest to deliver bond against the September 15, 2012 LIFFE BTP bond futures contract.
- b. You want to hedge an Italian bond portfolio with a face value of EUR 12,000,000 and a $bpv=.210$. What is the number of LIFFE BTP government bonds futures contracts needed to hedge the Italian bond portfolio?

5. In 2016, ChemChina, the Chinese chemical giant, bought Syngenta, a Swiss agrochemical company in a USD 43 billion takeover. The takeover was financed mainly by debt; ChemChina's contribution was only USD 5 billion, raising concerns about the company's ability to shoulder the heavy debt burden.

- a) What kind of additional risks would ChemChina take?
- b) Assume the CHF cost of debt for big Swiss agrochemical companies is 160 bps over government risk-free rate, which is -0.75%. Last month, ChemChina borrowed at 5.15% in China, while Syngenta borrowed at 1% in Switzerland. What would be the cost of debt of the Syngenta's acquisition for ChemChina? Briefly justify your answer.
- c) Do ChemChina's latest foreign acquisitions decrease, stay the same or increase ChemChina's cost of capital? Briefly explain (saying "increase" or "decrease" without justification will get you zero points).

d) You want to determine the cost of capital for Syngenta. Suppose Syngenta's D/E split is 30%-70%. Use the data from question 2. Syngenta has a beta equal to 1.1. The Swiss stock market risk premium is 3.6%, while the Chinese stock market risk premium has an average return of 6%. The Swiss effective tax rate is 20%.

e) Let's complicate the WACC calculation. Suppose that 90% of Syngenta's profits are generated from sales abroad Switzerland. Suppose you estimate a weighted country equity risk premium for the abroad part, WCER, to be equal to 2%. Taking this into account, recalculate the cost of capital.

f) At that time, Chinese analysts said "the better-than-expected November PMI indicates China's manufacturing sector continues to boom." What is the effect of this good economic news on Chinese country's risk?

1) • May 25, 2020

$T_1 = 34$ (April 21 to Sep 15)

$T_2 = 146$ (April 21 to Sep 15)

Coupon = 5%

(It's an Italian bond, annual coupon payments on May 25)

$P = 107.5$

$r_1 = r_2 = .04$

A_1 (accrued interest from 5/25/11 to 4/21/12) = $.05 \times 332/366 \times 100 = 4.5355$. (Day count actual/365)

A_2' (accrued interest from 5/25 to 9/15) = $.05 \times 112/365 \times 100 = 1.5342$

$F = (107.5 + 4.5355) (1 + .04 \times 146/360) - 5 \times (1 + .04 \times 146/360) / (1 + .04 \times 34/360) - 1.5342 = 107.2568$

$I = Z \times cf = 107.1 \times .938 = 100.4598$.

$BAC = F - I = 107.2568 - 100.4598 = 6.7970$

• Oct 25, 2021

$BAC = 2.85$ (Cheapest to Deliver!)

B.-

hedge ratio = $-(bp_{v_{bond}}/bp_{v_{CDB}}) \times cf = -(0.210/0.102) \times 1.003 = -2.0650$

Number of contracts = $EUR\ 12,000,000 \times -2.0650 / EUR\ 100,000 = -247.8$ contracts.

That is, we need to short 248 contracts.