FIN 832

Global Financial Risk Management – Sample Exam II

Professor Koch
Covers: Hull, Chapters 5-7
Answer all questions. Points possible appear in the margin beside each question.
There are 90 Points Possible.

1.(9) Compare and contrast the valuation models for the following types of futures contracts:

(i) A futures on an asset that provides no income; $F^* = Se^{rT}$
(ii) A futures on an asset that provides a known income; $F^* = (S-I)e^{rT}$
(iii) A futures on an asset that provides a known dividend yield. $F^* = Se^{(r-q)T}$

2. Consider a futures contract on a T. Bond with:

maturity = six months;
spot price = S = $66,000;
futures price = F = $68,000;
current 6-month T.Bill Rate = r = 6%; and the yield curve is flat.

Suppose that total transactions costs = $200, for a complete arbitrage with one contract.

A. If no coupon is paid on this bond during the next six months:
(4) (i) What is the theoretical futures price? $F^* = Se^{rT} = 66{,}000e^{.06(.5)} = \boxed{68{,}010}$
(6) (ii) Discuss specific arbitrage opportunities.
None; $F^* - F =$ \$10 < Transactions Costs = \$200

B. Now suppose a coupon is paid on this bond in 6 months, just prior to expiration of the forward contract. The present value of this coupon payment is $900.
(4) (i) What is the theoretical futures price? $F^* = (S-I)e^{rT} = 65{,}100e^{.06(.5)} = \boxed{67{,}082}$
(6) (ii) Discuss specific arbitrage opportunities.
$F > F^*$; sell futures, borrow & buy spot, invest coupon, use proceeds ...

C. Consider again the situation in A. above (no coupon during the next six months). Suppose that, on day 1, you buy one T. Bond futures contract with K = $68,000. Then, after 3 months the spot price increases to S = $67,500, $T = .25$ while the yield curve remains flat at 6%.
(4) (i) What is the new theoretical futures price? $F^* = Se^{rT} = 67{,}500e^{.06(.25)} = \boxed{68520}$
(6) (ii) What is the value of your futures contract?
$f = (F^* - K)e^{-rT} = S - Ke^{-rT} = 67{,}500 - 68{,}000e^{-.06(.25)} = 67{,}500 - 66{,}987.61 = \boxed{512.39}$

3. (3) A. Briefly describe the T.Bill futures contract.
Promise to buy/sell a 90-day T.Bill sometime in future at price agreed on today.

(6) B. Briefly describe the Eurodollar futures contract, how its price is quoted, and how it is different from the T.Bill futures contract.
Promise to lend/borrow \$1000 000 face value ED deposits in future for 90 days at a forward rate agreed on today.
Futures quote $= Q = 100 - R$ where R = fwd LIBOR rate promised.
Value of one contract $= F_c =$ \$10,000$[100 - .25R]$
ED futures is truly a futures on an interest rate; settled in cash.
TBill futures is futures on a T.Bill; delivers a 90-day T.Bill.

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4. Suppose you manage a bond portfolio worth \$50,000,000. The duration of your bond portfolio is 14 years. $P = \$50\ MM$

$D_p = 14$

(6) A. Discuss the expected change in the value of your bond portfolio if the yield curve experiences an upward parallel shift of 20 basis points (0.2% or .002).

$\Delta B = -BD\Delta y = -(50MM)(14)(.002) = \boxed{-\$1.4\ MM}$

(6) B. A T. Bond futures contract that expires in 2 months currently has a futures price of 91-12 (\$91,375), and the cheapest-to-deliver bond currently has a duration of 5.5 years. How would you immunize the portfolio against changes in interest rates over the following two months?

$N^* = PD_p / F_c D_F = (50MM)(14)/(91{,}375)(5.5) = 1{,}392.9$ $\boxed{\text{Short } 1393 \text{ contracts}}$

(6) C. How would you change the duration of your bond portfolio to 7 years?

Short $N^*/2 = \boxed{696 \text{ contracts}}$

(6) D. Discuss the complications specific to the hedging problem in B. and C. above, that make this hedge less effective. (↑ Basis Risk)

① hedge horizon may not = expiration of futures (2 months)
② this assumes small parallel shifts — if big, convexity is problem; if nonparallel, less effective

5. Companies A and B have been offered the following rates per annum on a \$20 Million loan extending for five years:

	fixed rate	floating rate
Company A	12.0%	LIBOR+0.1%
Company B	13.4%	LIBOR+0.6%
	1.4%	0.5%

→ Difference = 0.9% = margin

Company A requires a floating-rate loan, while Company B requires a fixed-rate loan. Design an interest rate swap that will net a bank, acting as intermediary, 0.1% per annum and that will appear equally attractive to both companies (i.e., split the remaining margin between A and B).

see next page

6. A. Explain what a SWAP rate is.

Average (midpoint) of the bid and offer fixed rates in a bank's SWAP quote.

B. What is the relationship between SWAP rates and par yields?

A SWAP rate is a LIBOR par yield — the coupon rate on a LIBOR (floating rate) bond that makes it worth par.

C. Explain the difference between credit risk and market risk for an interest rate SWAP.

Credit risk — of default

Market risk — if floating rate changes, market value changes.

see SWAPs notes pages 4 & 5

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Margin = 0.9%; Bank gets 0.1%; A & B each get 0.4%

problem 5

	A	Bank	B
A borrows fixed	⟨12.0%⟩	—	—
B borrows floating	—	—	⟨LIBOR + 0.6⟩
A pays Bank	12.3%	⟨12.3%⟩	—
Bank pays A	⟨LIBOR⟩	LIBOR	—
B pays Bank	—	⟨LIBOR⟩	LIBOR
Bank pays B	—	12.4%	⟨12.4%⟩
Net borrowing costs	⟨LIBOR − 0.3⟩		⟨13.0%⟩
Net Margin Captured	+0.4%	+0.1	+0.4%
	(would have to pay LIBOR + 0.1)		(would have to pay 13.4)