

AFM

Week 5 Assignment

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AFM Week 5 Assignment Question and Answer

Question

Background

The finance director of a UK-based company has recently reviewed the company's monthly cash budgets for the next year. As a result of needing to buy new machinery, the budget shows a deficit £3.25 million in six months' time and for which a bank has agreed to provide finance to cover the deficit. The company is looking forward to selling a redundant factory in 12 months' time and so expects to make full payment of the borrowed amount when the proceeds from the factory disposal become available. The finance director is concerned that interest rates could rise or fall by as much as 75 basis points depending upon economic conditions over the next quarter.

Hedging methods

The following information on short term sterling index futures are available on the London International Financial Futures and Options Exchange (LIFFE).

Futures have a contract size of £500,000 and a tick size of 0.01%. Margin requirements may be ignored.

The following quotes are available:

March	96.56
June	96.29

Options on short sterling have a contract size of £500,000. Premiums are annual % amounts.

<i>March</i>	<i>CALLS</i>	<i>June</i>	Strike Price	<i>March</i>	<i>PUTS</i>	<i>June</i>
0.445		0.545	96.25	0.085		0.185
0.280		0.390	96.50	0.170		0.280

The current interbank rate is 3.5% and the company is able to borrow at the interbank rate plus 100 basis points

A UK bank has offered the following FRA rates to the company

6 v 6 – 4.16%

6 v 9 – 4.18%

6 v 12 – 4.20%

It can be assumed that settlement for the futures and options contracts is at the end of the month and that basis diminishes to zero at contract maturity at a constant rate, based on monthly time intervals. Assume that it is 1 December now and that there is no basis risk.

Required:

Advise the company on and recommend an appropriate hedging strategy for the £3.25 million it expects to borrow in six months. Show all relevant calculations to support the advice given.
(20 marks)

SUGGESTED SOLUTION

(a) (i) **Futures hedge**

1 *Set up the hedge:*

- (A) Buy/sell? Loan: Sell £ futures.
- (B) Number of contracts: $(£3.25m/£0.5m) * (6 \text{ months}/3 \text{ months}) = 13$ contracts.
- (C) State the hedge: Sell 13 £ June contracts at a price of 96.29.

Tick value = $0.0001 \times £500,000 \times 3/12 = \mathbf{£12.50}$

Determining the closing future price:

	Rise by 0.75%	Fall by 0.75%
Current interbank rate (1 December)	3.50%	3.50%
June end futures price 96.29 equivalent to $(100 - 96.29)$	<u>3.71%</u>	<u>3.71%</u>
Basis (7 months)	0.21%	0.21%
Interbank at the date of borrowing June 1 st $(3.5\% \pm 0.75\%)$	4.25%	2.75%
Add 1-month unexpired basis $1/7 \times 0.21\%$	<u>0.03%</u>	<u>0.03%</u>
	4.28%	2.78%
Estimated closing futures price $(100 - 4.28)$ and $(100 - 2.72)$	95.72	97.22

Profit or loss on futures

Opening position: Sell at	96.29	96.29
Closing position: Buy back at	<u>95.72</u>	<u>97.22</u>
Profit / loss	0.57 = 57 ticks	(0.93) = 93 ticks
Profit = 57 ticks x £12.50 x 13 contracts =	£9,262.50	
Loss = 93 ticks x £12.50 x 13 contracts =		£15,112.50

Cash flows

	Rise by 0.75%		Fall by 0.75%
	£		£
Actual interest paid £3,250,000 *(3.5%+1%+0.75%) x 6/12	85,312.50	Actual interest paid £3,250,000 *(3.5%+1%-0.75%) x 6/12	60,937.50
Profit on futures	(9,262.50)	Loss on futures	15,112.50
Net cost	76,050	Total cost	76,050
Effective (76050/3,250,000) *12/6	4.68%		4.68%

The futures contract locks into the effective interest of 4.68%.

Options on futures

1 *Set up the hedge:*

(A) Calls/puts? Loan: Sell £ futures: Buy June £ puts

Number of contracts: 13 contracts (already calculated in futures part of the question).

Premiums

At a strike price of 96.25

At a strike price of 96.50

18.5 ticks x £12.50 x 13 contracts = £3,006

28 ticks x £12.50 x 13 contracts = £4,550

When rates rise by 0.75%

Strike Price (sell)	96.25	96.50
Closing futures price (Buy)	95.72	95.72
Exercise?	Yes	Yes
Gain on options	0.53% = 53 ticks	0.78% = 78 ticks
Profit on options	53 x £12.50 x 13 = £8,612.50	78 x £12.50 x 13 = £12,675
<i>The cash flows</i>		
	£	£
Actual interest paid (as before)	85,312.50	85,312.50
Premium	3,006	4,550
Profit on options	(8,612.50)	(12,675)
Net cost	79,706	77,187.50
Effective interest rate	4.90%	4.75%

When rates fall by 0.75%

Strike Price (sell)	96.25	96.50
Closing futures price (Buy)	97.22	97.22
Exercise?	No	No

<i>The cash flows</i>		
	£	£
Actual interest paid (as before)	60,937.50	60,937.50
Premium	3,006	4,550
Total cost	63,943.50	65,487.50
Effective interest rate	3.93%	4.03%

FRA

Need to choose a 6 v 12 FRA at 4.2%

When interbank rate rises by 0.75% ie $(3.5\%+0.75\%)$ to 4.25%, this exceeds the FRA rate so the company will receive from the FRA bank 0.05%

When interbank rate falls by 0.75% ie $(3.5\% - 0.75\%)$ to 2.75%, this is less than the FRA rate so the company will pay to the FRA bank 1.45%

Cash flow

	£		£
Actual interest payable	85,312.5		60,937.50
Receive from bank £3,250,000 * $(0.05\%) \times 6/12$	(812.5)	Pay to bank £3,250,000 * $(1.45\%) \times 6/12$	23,562.50
Net cost	84500	Total cost	84,500
Effective	5.2%		5.2%

ADVICE

If interest rate were to rise by 0.75%, the futures offer the lowest overall cost of **4.86%** cheaper than the case of the option and the FRA. However, this 4.68% rate is not certain, since the futures price in six months' time might not be three basis points different from the cash market rate, because there might not be a linear decline in basis, i.e. basis risk might exist. If basis is not from three basis points, the effective cost of borrowing will also be different. The rate of 4.68% is also not certain because the estimation has ignored margin requirements, taxes and commissions.

If interest rates were to fall rather than increase, the option with the exercise price of 96.25 offers the lowest overall cost of **3.93%**. This highlights the fact that option could be allowed to lapse (or sold for time value if any) and advantage taken of the lower cash borrowing rates. Options are therefore used in hedging to limit the downside risk. Options offer a more flexible hedge than futures, but have a much higher cost due to the premium.

If management takes the view that it is more important to be protected against a likely rise in interest rate, then futures hedge should be selected over both the FRA and the option.

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