

Adil_Gokturk_HW04.R

HAG

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# Adil Gokturk
# FIN 659
# HW4 INTEREST RATE FUTURES

# Textbook Reference:          Section 6.2, pp. 138-143; Section 6.3, pp. 143-148; Section 6.4, pp. 143-148

# Problem 1
# The December Eurodollar futures contract is quoted as 98.40 and
# a company plans to borrow $8 million for three months starting in December at LIBOR plus 0.5%.

# Working Directory
setwd("~/Desktop/Spring2020/FIN659/Assignments/hw4") # set working directory
getwd() # check it

## [1] "/Users/HAG/Desktop/Spring2020/FIN659/Assignments/hw4"

Quoted.futures.price=98.40
Time.to.maturity.of.contract=3 # (months)
Principal=8000000#US$
Spread.over.LIBOR=0.5 # %
Euro.Dollar.Contact.Value=1000000
Actual.three.month.rate.at.settlement=0.013 #1.3%
## Question: What position should the company take in the contracts?
## Answer: SHORT position

## Question: How many contracts they need to hedge their position?
(contracts <- Principal/Euro.Dollar.Contact.Value)

## [1] 8
## Answer: 8 contracts

## Question: What rate can the company lock in by using the Eurodollar futures contract?
round((Euro.dollar.rate <- ((100-Quoted.futures.price)+Spread.over.LIBOR)/100*100),2) # %

## [1] 2.1
## Answer: 2.1 %

## Question: If the actual three-month rate turns out to be 1.3%,
## what is the final settlement price on the futures contracts?

(Final.settlement.proce <- 100 - (100*Actual.three.month.rate.at.settlement))

## [1] 98.7
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## Final settlement price is US$98.70

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# Problem 2
## On August 1, a portfolio manager has a bond portfolio worth $50 million.
## The duration of the portfolio in October will be 7.1 years.
## The December Treasury bond futures price is currently 91-12 and
## the cheapest-to-deliver bond will have a duration of 8.8 years at maturity.

Value.of.bond.portfolio <- 50000000 # US$
Duration.of.the.portfolio <- 7.1 # years
Duration.of.cheapest.to.deliver.bond <- 8.8 # years
Face.value.of.a.Treasury.bond.futures <- 100000 # US$

## Question: What is the December Treasury bond futures price as a decimal?

(December.Treasury.bond.futures.price <- 91+(12/32)) #US$

## [1] 91.375

## Answer:the December Treasury bond futures price = US$91.375

## Question: What is the value of one December Treasury bond futures contract?
(December.Treasury.bond.futures.contract <- December.Treasury.bond.futures.price/100*Face.value.of.a.Tr

## [1] 91375

## Answer: The value of one December Treasury bond futures contract is $91375

## Question: What position should the portfolio manager use to immunize
## the portfolio against changes in interest rates over the next two months?

## Answer: We own the asset. Position for the future contracts should be SHORT

## Question: How many contracts they need to hedge their position?

(contracts2 <- (Duration.of.the.portfolio*Value.of.bond.portfolio)/(Duration.of.cheapest.to.deliver.bond

## [1] 441.4874
round(contracts2,0)

## [1] 441

## Answer:441 contracts

New.duration.of.the.portfolio <- 10.0 # years

## Question: What position should the portfolio manager use to change the duration from
## its original duration of 7.1 years to
## a new duration of 10.0 years over the next two months?

## Answer:We should take a LONG position in order to increase the duration of the portfolio

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## Question: How many contracts they need to hedge their new position?
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(contacts3 <- ((New.duration.of.the.portfolio - Duration.of.the.portfolio)*Value.of.bond.portfolio)/(Du
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## [1] 180.3258
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round(contacts3,0)
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## [1] 180
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## ## Answer:180 contracts
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