

Practice Questions, midterm 1
266: Fin. Markets and Institutions
Spring 2015
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- 1 Questions in this document are mostly variants of those asked on past exams/quizzes/problem sets and should provide you with a guidance about what to expect and what sort of answers we are looking for.
- 2 The questions are divided into the 5 categories noted on the preview.
- 3 Don't worry, there are many more questions here than will be on the exam.

1 Brief definitions

- 1 What does 'coupon' refer to in 'coupon bond'

Answer/comment

The coupon is a fixed payment that the bond makes one or more times per year until maturity. (Note: You wouldn't have to say 'one or more times.' For example, 'the fixed payment recieved periodically by the bond holder until maturity' would do.)

- 2 Capital gain.

Answer/comment

When the price of an asset goes up, the rise in value is called a capital gain for the owner.

- 3 Duration of a bond

Answer/comment

Duration measures the "effective maturity" or "average lifetime" of all the payments bond. Note: There are many acceptable ways of saying the basic idea here and a wide variety of explanations of this basic idea were accepted.

4 Yield to Maturity **Answer/comment**

Yield to maturity is the name used for “internal rate of return” for a coupon bond. Thus, it is the fixed interest rate that equates the present value of all of the bond’s payments to its current price.

5 Indirect finance

Answer/comment

Indirect finance occurs when ultimate lenders lend to an intermediary and then the intermediary lends to the ultimate borrowers.

6 Describe the payment stream or cash flow associated with a standard 5-year coupon bond.

Answer/comment

There will be a fixed payment, say, \$ c , each year (or perhaps more than once per year) in years 1 through 5. There will also be a payment of the face value in the fifth year.

7 State the Fisher equation.

Answer/comment

Nominal rate of interest is expected inflation plus the real rate of interest.

8 Yield Curve.

Answer/comment

Take the market interest rates on, say, government bonds of different maturities at a given point in time. The plot of these interest rates against the associated maturity is called the yield curve.

9 Inverted Yield Curve.

Answer/comment

The yield curve is said to be inverted when longer-term interest rates are lower than shorter-term interest rates.

10 Liquidity

Answer/comment

The relative ease (measured in cost or time) with which the asset can be converted into cash.

11 Law of One Price.

Answer/comment

Identical items must sell for the same price in the marketplace.

12 Reinvestment risk.

Answer/comment

When you buy a short-term asset but have a longer investment horizon, you are uncertain about what interest rate you will obtain when you reinvest the proceeds after the short term asset matures.

13 Moral hazard.

Answer/comment

When party A agrees to assume part of the costs associated with risky behavior by party B, party B will tend to behave in a riskier manner.

2 Real-world quantities and facts.

1 Short-term interest rates on U.S. Treasury bills are currently at approximately what level?

Answer/comment

Approximately zero.

2 Short-term interest rates on government securities in the U.S. peaked at about what level in the period since the Great Depression?

Answer/comment

Short-term interest rate peaked at the level of about 18% around 1980.

Note answers such as 'between 15% and 20%' got full credit.

- 3 Most of the time, the yield curve representing the yields on U.S. Treasury bonds has been sloped (choose one: upward or downward) implying that longer-term interest rates are (choose one: higher or lower) than shorter-term rates?

Answer/comment

Upward/Higher.

- 4 What is the approximate magnitude of nominal GDP in the United States?

Answer/comment

About 17 trillion dollars; 'between 15 and 20 trillion dollars' gets full credit.

- 5 The debt of the household sector in the U.S. is mainly in the form of: credit card debt, mortgage debt, or other bank loans. (circle one)

Answer/comment

Mortgage.

- 6 Why were interest rates so high in 1980?

Answer/comment

Inflation and expected inflation were quite high.

- 7 Household debt in the U.S. as a share of GDP expanded rapidly in the 5 years before the recent financial crisis. Household debt as a share of GDP had _____ for several decades preceding the recent rise. Circle 1: fallen/been very stable/risen steadily

Answer/comment

risen steadily

8 Government debt as a share of GDP in the U.S. has risen steadily over the period since 1950. (true/false)

Answer/comment

False. (Note: it fell early in the period after having peaked in WWII.)

9 Government debt as a share of GDP varies widely across all advanced economies. (true/false)

Answer/comment

True. (Note: see notes on, e.g., Japan vs. Norway.)

3 Straightforward interest rate and present value calculations

Note: these question are included on the exam to check whether you are understanding the most basic financial math. In short, everyone should get these.

1 The interest rate on a one-year Treasury bill is 0.25 percent. If the face value is \$100, what is the current price?

Answer/comment

$$\frac{\$100}{1.0025} \approx \$99.75$$

2 The interest rate on a one-year Treasury bill is 0.25 percent. If the current value is \$99.75, what is the face, or par, value?

Answer/comment

$$\$99.75 \times (1 + 0.25/100) \approx \$100$$

- 3 Suppose I buy a 6-month Treasury Bill with a face value of \$100 at the price of \$99.04. What is the implied annualized rate of return, in percent, on this investment?

Answer/comment

Implied annualized rate of return can be calculated using the following formula:

$$1 + i = \left(\frac{\text{Future Value}}{\text{Present Value}} \right)^{\frac{1}{\text{Holding Period}}}.$$

By plugging in the prices, we have

$$1 + i = \left(\frac{100}{99.04} \right)^{\frac{1}{12}} = (1.009)^2 = 1.019.$$

Thus, $i = 0.019$ the return in percent is 1.9%. Please remember to report the **annualized** rate of return, and report it in **percent** as requested in the problem.

- 4 Over the two years following the onset of the financial crisis, the value of my home fell from \$850,000 to \$500,000. What was my annualized rate of capital gain in percent over this period? (Hint: this involves a *loss* which you should state as a negative *gain*.)

Answer/comment

Let i denote the annualized rate of capital gain. Since the value of my house decreased from \$850,000 to \$500,000 over *two* years, the following relationship holds:

$$\$850,000(1 + i)^2 = \$500,000.$$

Solving this for i , we get

$$i = \left(\frac{500}{850} \right)^{1/2} - 1 \approx -0.233.$$

Thus, the annualized rate of capital gain is -23.3 percent.

4 Quantitative problems

- 1 If the interest rate on 2-year loans today (at time t) is 1 percent and the rate on 7 year loans two years from now (at $t+2$) is expected to be 3 percent, according to the expectations theory of the term structure, the current 9-year interest rate is what?

Answer/comment

According to the expectations theory, both investments:

- the combination of 2-year loan today and 7-year loans two years from now
- 9-year loan today

should have the same return. (Otherwise, there will be an arbitrage opportunity.) In other words, we have

$$(1 + i_{9,t})^9 = (1 + i_{2,t})^2(1 + i_{7,t+2})^7 \quad (1)$$

$$= 1.01^2 * 1.03^7 = 1.255 \quad (2)$$

$$1 + i_{9,t} = (1.255)^{\frac{1}{9}} \quad (3)$$

$$= 1.026 \quad (4)$$

As a result, we obtain that the nine year interest rate is 2.6%.

Some students derived 9-year interest rate by calculating a weighted average of 2-year and 7-year interest rates:

$$1\% \times \frac{2}{9} + 3\% \times \frac{7}{9} = 2.6\%. \quad (5)$$

This is an approximate result using our standard trick ($\ln(1+z) \approx z$). Thus, this answer was accepted. Just remember that this is an approximation that is only accurate for small z (in our case, small interest rates).

- 2 Note: this question was asked a few years ago when there was concern about default by Spain and Italy. This risk seems much lower at present. The following table gives the payoff (in dollars) in 1 year of on 1-year zero coupon bond issues by the Italian and Spanish governments. The face value of all bonds is \$100.

	outcome	prob.	Spanish	Italian
Payoff (in dollars)	1	0.9	100	100
	2	0.05	50	100
	3	0.05	50	50

where ‘prob.’ is the probability of the outcome.

- 2.1 The Spanish bond pays in full with 90 percent probability. With 10 percent probability the Spanish government will default and in this case, the government pays \$50 at maturity. Today’s price of the bond is \$80.

What is the yield to maturity of the bond (annualized, in percent)?

Answer/comment

$$\frac{\$100}{\$80} - 1 \approx 0.25$$

So the yield to maturity is about 25 percent. (Note: yield to maturity is based on promised, not expected, payments.)

- 2.2 If the price of the Spanish bond today is \$80, what is the expected rate of return if you hold it until maturity (annualized, in percent)?

Answer/comment

$$\frac{0.9(100) + 0.1(50)}{80} - 1 \approx 0.19$$

About 19 percent

- 2.3 You buy the Spanish bond today for \$80. Suppose you sell the bond for \$82 in nine months. What is your holding period yield (annualized, in percent)?

Answer/comment

$$\left(\frac{\$82}{\$80}\right)^{4/3} - 1 \approx 0.0335.$$

Thus the annualized holding period return is 3.35 percent.

- 2.4 The covariance of the price of Spanish and Italian bonds is positive, negative or zero? Explain. (Note: you should not need to calculate the covariance.)

Answer/comment

Positive. This is because when the payoff of the Spanish government bond is high, the payoff of the Italian bond is high and vice versa, i.e., the two payoffs (tend to) move together.

- 2.5 Suppose you have all your wealth invested in the Spanish government bond. Then it dawns on you that you should diversify. Give a reason why Brazilian government debt might provide you better diversification potential than Italian government debt.

Answer/comment

The best asset for diversifying has a negative covariance with the Spanish government bond risk. Such asset would work like an insurance for the Spanish government bond. We know that the Italian bond does not provide this property, given the positive covariance. Because Brazil is outside Europe and not tied up in all the problems with the euro, it seems plausible that the Brazilian bond is more likely to provide diversification benefits than would the Italian bond.

- 3 Consider a bond with a face value of \$1,000 which has 3 years to maturity, a 6% coupon rate, and makes annual coupon payments. If the yield (YTM) on the bond is 4%, what is its duration?

Answer/comment

$$PV_1 = \frac{60}{1.04} \approx 57.69 \quad (6)$$

$$PV_2 = \frac{60}{1.04^2} \approx 55.47 \quad (7)$$

$$PV_3 = \frac{1060}{1.04^3} \approx 942.34 \quad (8)$$

$$PV = PV_1 + PV_2 + PV_3 = 1055.50 \quad (9)$$

Using the duration formula from the cheat sheet,

$$DUR \approx 2.84$$

is the duration.

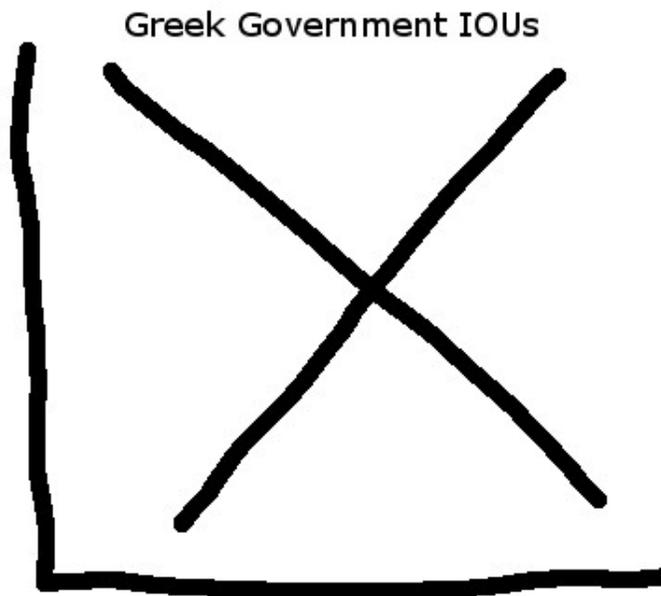
4 Is the bond selling at, above, or below par?

Answer/comment

Since the yield is below coupon rate, the bond is selling above par.

5 Short-answer questions.

1 The following is a figure depicting the supply and demand curves for the IOUs of the Greek government. Price of the IOUs is on the vertical axis.



1.1 On the fig. above, label the horizontal axis and the supply and

demand curves.

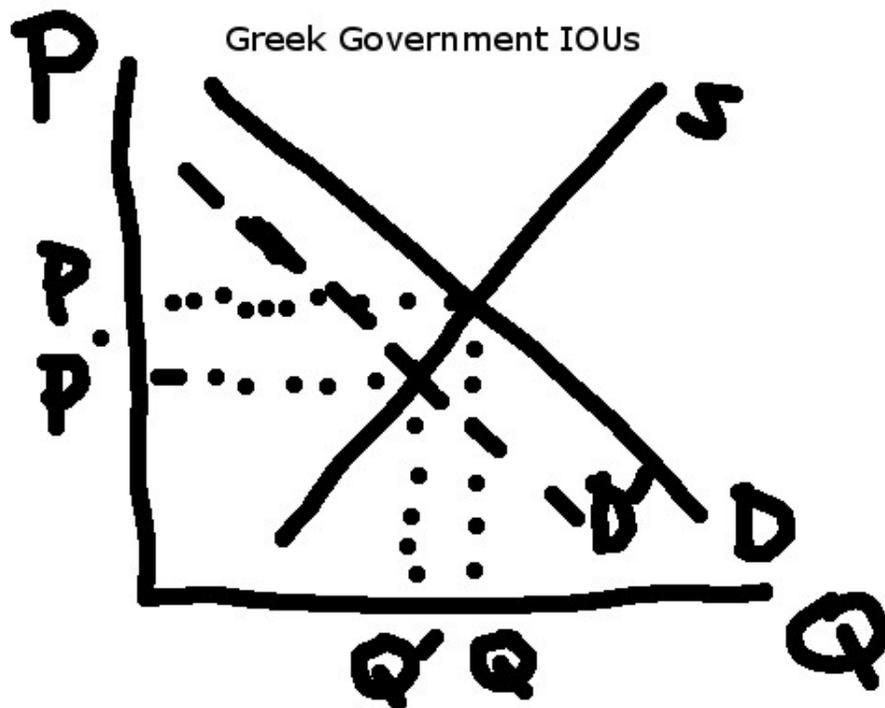
Answer/comment

Horizontal axis is quantity (and labeled as Q), the downward sloping curve is the demand curve upward sloping curve is the supply curve.

1.2 On the fig. above label the equilibrium price and quantity.

Answer/comment

Equilibrium price and quantity are reached at the intersection (crossing point) of downward and upward sloping curves given above.



1.3 Why does the supply curve slope the way it does?

Answer/comment

At higher prices (or equivalently at lower interest rates), the

Greek government would like to borrow more money (because it's cheaper to borrow), meaning that the government supplies more IOUs.

- 1.4 Suppose that riots break out in Athens over proposed new taxes on Greek citizens. What might this do to the demand curve for these Greek IOUs?

Answer/comment

The demand curve shifts inward. Investors might think that the Greek government actually will not implement the proposed new taxes because of riots in Athens. If that turns out to be true, the default risk of Greek government debt will increase. Anticipating that, the demand for Greek IOUs decrease today and the demand curve shifts inward.

- 2 Shakespeare wrote, 'neither a borrower nor a lender be' and, in fact, there was very little borrowing and lending in Shakespeare's time. Explain how one type of law adopted since Shakespeare's time has made potential lenders more likely to lend.

Answer/comment

There are lots of options here. Accounting rules and fraud laws make lenders more confident that they understand the borrower and are likely to get their money back. Legal bankruptcy rules reduce uncertainty about what happens in default and may make lenders more comfortable lending.

- 3 Explain why debt (as opposed to equity) finance gives rise to a need for bankruptcy laws and institutions.

Answer/comment

The equity holder is only entitled to a share of profits (which maybe zero); so there is no specific promise to pay anything. Debt involves some promise to pay a given amount in the future. If the firm claims that it cannot pay, we need some way to resolve the claims. Bankruptcy laws and institutions exist to play this role.

- 4 Consider a standard 30-year mortgage (stream: 360 equal monthly payments) and a standard 30 year coupon bond (stream: you should know this). Which of these has longer duration? (Hint: you don't need to calculate anything about duration to answer this.)

Answer/comment

Although both assets pay off over a period of 30 years, the bond has a larger payoff at the last date than at the earlier dates—that is, you get coupon plus face in the last payment. The mortgage pays off in equal amounts every period. Because a larger share of the present value of the bond's payments come later, it has a longer duration.

- 5 Give one example of how asymmetric information has important effects in financial markets.

Answer/comment

Many different examples have been given in class and were acceptable here. The basic idea is that asymmetric information in a market for goods, services, or in particular assets refers to differences (or asymmetries) between the information available to buyers and the information available to sellers. Problems arising in markets due to asymmetric information are typically divided into two basic types: 'adverse selection' and 'moral hazard.' I consider lending you money to set up a factory, but I don't really know if you will invest it or will throw a party and declare bankruptcy.

- 6 What role do limited liability laws play in financial markets?

Answer/comment

Limited liability laws limit what owners of a firm and lenders to the firm can be forced to pay if the firm incurs liabilities it cannot pay off. Thus, if a corporation in the U.S. cannot pay its debts, you cannot legally go to the owners of the firm or lenders to the firm to extract payment. Without these laws, lenders would be quite reticent to provide funding to firms unless the lenders were in a position to closely monitor the behavior of the firms. Thus, the advent and advance of limited liability laws is often cited as playing an important role in the industrial revolution.

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- 7 Why do we say that real interest rates (as opposed to nominal rates) are what investors should be most concerned with?

Answer/comment

Real interest rates are nominal interest rates that have been adjusted for expected changes in the price level (which is expected inflation). Nominal interest rates only tell you how much money your investment will payoff in money terms, whereas real rates reflect how much you will be able to buy with that money. Therefore, real interest rates more accurately reflect the true price of borrowing and are more likely to be a better predictor of the incentives to borrow and lend.

- 8 True/False and explain: Variance of an asset return tells an investor most of what she needs to know about the riskiness of the asset.

Answer/comment

False. Although variance provides a general estimate of the risk of an asset's returns, other measurements of risk are also important. An investor needs to know how an asset's return varies relative to other assets' returns to evaluate the overall risk of their portfolio. Covariance measures how returns vary together. If the return on the asset being considered varies negatively with the investor's current asset portfolio, then purchasing the asset will reduce the risk of their portfolio.

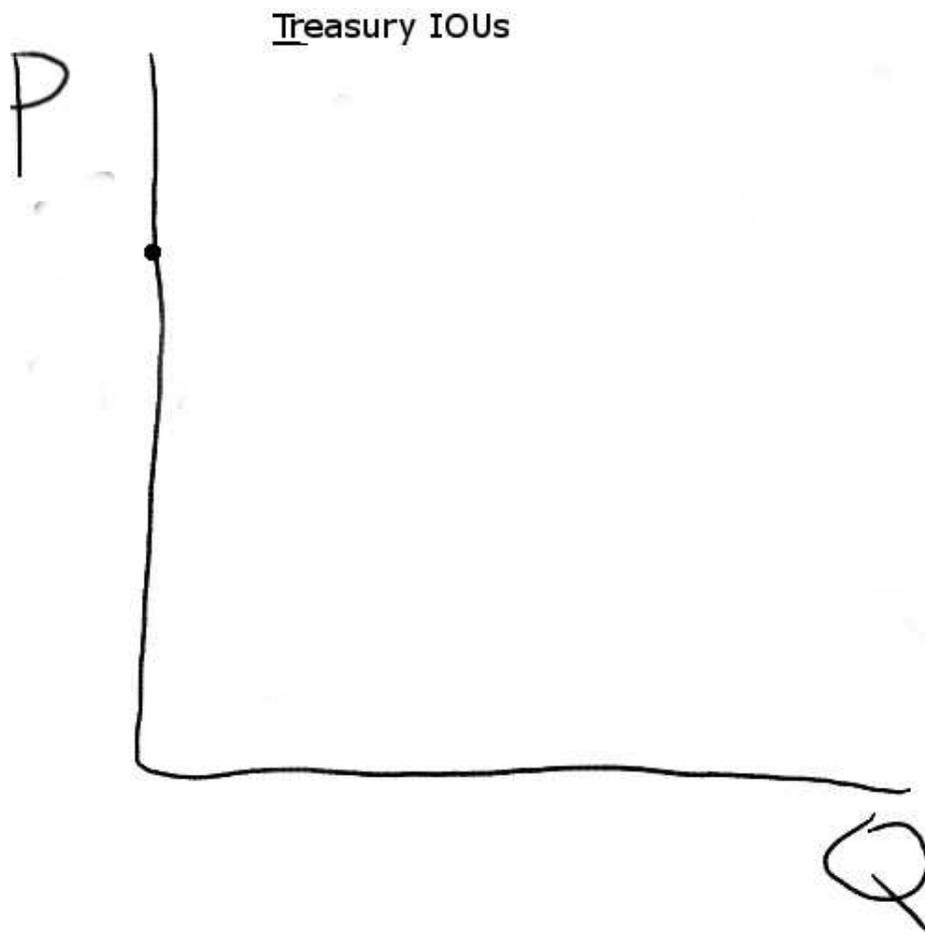
15. The financial press has lately had much analysis like the following:

'Treasuries rose on Friday for the first time in three sessions as demand increased for safe-haven assets on . . . signs of escalating political turmoil in the Middle East and North Africa.' (WSJ, March 4, 2011)

This is a quote about U.S. Government Treasury securities

From the reason stated, does 'Treasuries rose' refer to prices or yields on Treasuries? Using a supply and demand figure for Treasury IOUs, depict what the quote indicated happened in the Treasury market. Explain briefly why turmoil in the Middle East and North Africa might be expected to have this effect on the Treasury market.

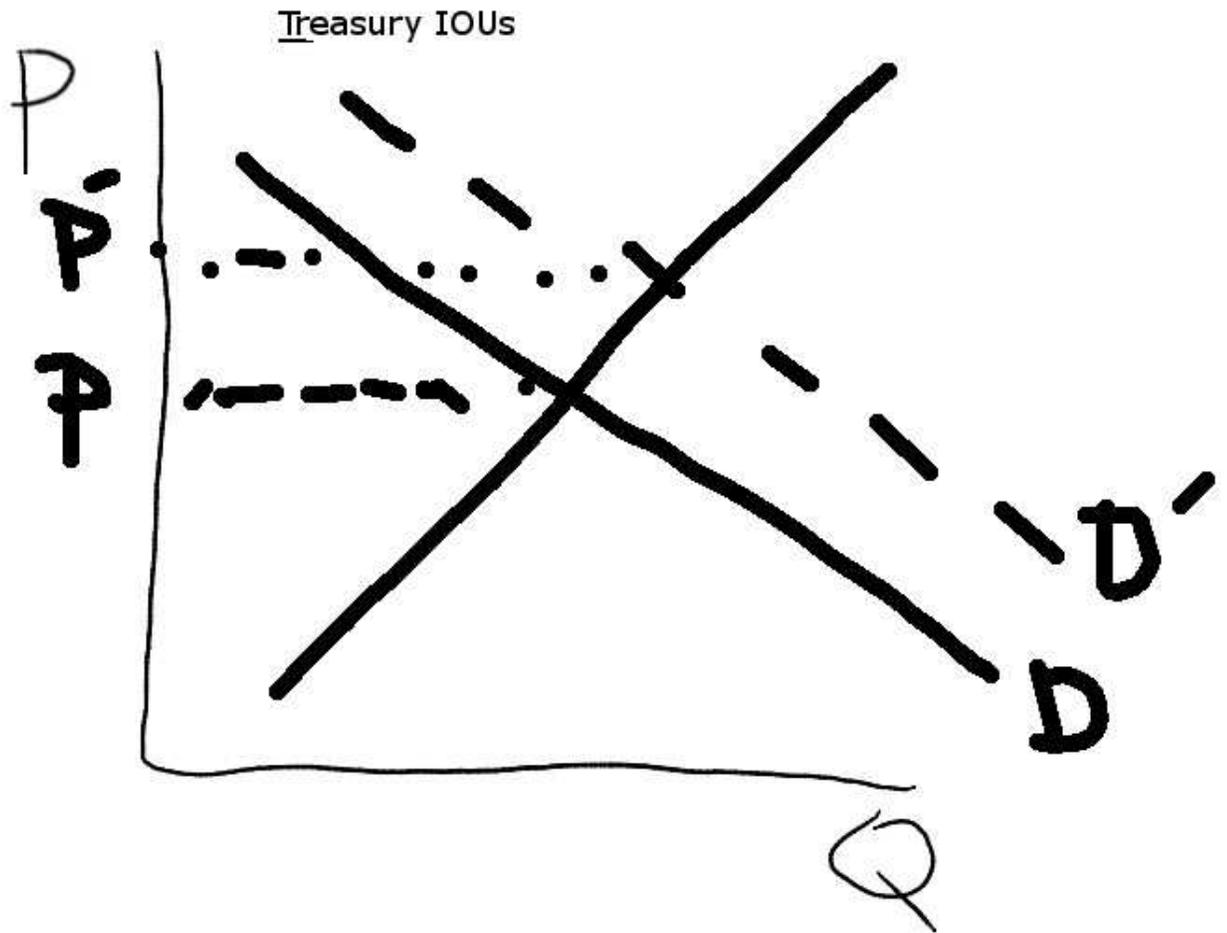
Answer/comment



'Treasury rose' refers to prices on Treasuries.

If demand increased for safe-haven assets, then prices on those assets must rise. Because prices and yields have an inverse relationship, if prices rise, yields must decline. Then, 'Treasury rose' cannot refer to yields.

An increase in the riskiness of other assets causes an increase in demand for riskless assets, which is in this case government securities. Then using our usual supply and demand framework, demand curve shifts right. This increases the equilibrium price and quantity of Treasuries. Price goes from P to P' .



Uncertainty in the Middle East could make the payoff of almost any asset less certain. When general uncertainty rises, people tend to shift funds generally toward safer assets and U.S. Treasuries are currently viewed as the safest (nominal) return in the market.
