Midterm Exam 1: Answers
266: Fin. Markets and Institutions
Spring 2015
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1 [**Do 4 of 5 parts**] (4 points each). Briefly define the following terms. A sentence or two should suffice.

1.1 Capital gain
Answer/comment
When an asset's price rises, the change in value is a capital gain to the holder.

Note: If you only referred to a change in the asset's price, and not specifically to a rise, you got full points. In addition, if you referred to 'rate of capital gains' which is capital gains over original price, though it is not what we are looking for, you will get full points this time.

1.2 Credit rating agency
Answer/comment
A firm that rates the quality of bonds (and other assets) in terms of the probability of default.

1.3 Moral hazard
Answer/comment
The glossary in the book says, essentially: The risk that one party to a transaction will take actions that are not in the interest of the other party.

Note: This answer got full points, but is a bit too summary in nature. You should also know that moral hazard is usually taken to mean a bit more: If party A agrees to bear some of the costs of actions by party B, then there is a risk that party B will be more likely to take those costly actions. For example, if I insure your house against damage by fire, you may be less careful

with matches than if you were not insured.

1.4 Current yield (on a bond)
Answer/comment
Current yield on a bond is the coupon value divided by current price.

1.5 Fisher equation
Answer/comment
Real interest rate is nominal interest rate minus inflation rate. I.e.

$$r = i - \pi$$

where i, r and π represent nominal interest rate, real interest rate and inflation rate, respectively.

Note: You could state the equation with any arrangement of the terms, e.g. $i = r + \pi$. If you gave the equation in symbols (e.g., i, r, π), then failure to define the symbols cost 2 points.

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2 [**Do 4 of 5 parts**] (4 points each). General facts. Where relevant, be sure to state the units.

2.1 What is the approximate value of the nominal GDP of the United States at present?
Answer/comment
Around $17 trillion.

Note: Between $15–20 trillion got 3 points.

2.2 Approximately what is the capitalization of world stock markets at present (in U.S. dollars)?

Answer/comment

Around $75 trillion.

Note: $50 - 100 trillion got 2 points. $60-85 got 3 points.

2.3 Real interest rates on U.S. Treasury bills have been negative in recent years. (True/False)

Answer/comment

True.

2.4 The debt of the household sector in the U.S. is mainly in the form of (circle one):

[credit card debt][mortgage debt][other bank loans]

(clarification: 'other bank loans' means other than any bank loans that are part of credit card or mortgage debt.)

Answer/comment

Mortgage debt

2.5 Which of these is true of the ratio U.S. government debt as a share of GDP (circle one):

a) Up until the financial crisis, the ratio was roughly constant for most of the period since 1950.
b) The ratio rose steadily over the entire period since 1950.
c) The ratio has both fallen and risen for extended periods over the years since 1950.
d) The ratio is now higher than the ratio in all other advanced economies.

Answer/comment

(C)

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3 [**Do all parts**] (4 points each). Calculation. I buy a claim to a barrel of oil for \$95. Five months later, the price of this barrel of oil has fallen to \$45.

3.1 What was the percent change in the value of my oil (not annualized)?

Answer/comment

Initial price is $P = \$95$. Final price is $P' = \$45$. The percentage change is
$$\frac{P' - P}{P} = \frac{45 - 95}{95} = -0.5263,$$
or -52.63%.

Note: One point off if not stated in percent.

3.2 What was the annualized rate of change in the value of my oil over the 5 months?

Answer/comment

Annualized percent change is $100 \times i$ where $1 + i = \left(\frac{FV}{PV}\right)^{1/h}$ where h is the time that passed.

In our case, $1 + i = \left(\frac{45}{95}\right)^{12/5}$, so that the annualized percent change is: -83.36%.

Note: some of you may use
$$\frac{12}{5} \times (-52.63)$$
to get the answer 126.32%. This used the approximation $(1 + z)^n \approx nz$. The approximation is not very good for z as big as 50. In any case, this answer got 2 points.

4 **[Do all parts]** (4 points each). Coupon bond. Consider a bond with a face value of $1,000 that has 8 years to maturity, a 3% coupon rate, and makes annual coupon payments. The yield-to-maturity on the bond is 4%.

4.1 Is the bond currently selling at par, above par, or below par?
Answer/comment
Below. The bond is currently selling below par since coupon rate is lower than yield to maturity.

4.2 Interest rates change and the yield to maturity rises to 5%. At the new interest rates, is the duration of the bond longer than or shorter than before?
Answer/comment
Shorter. The duration of a coupon bond falls as interest rates rise.

5 **[Do all parts]** (4 points each). Risky bond calculations. Take a 1-year, zero coupon bond, with a face value of $100 that currently sells for $89. The bond has default risk: with 95 percent probability the bond pays in full; with 5 percent probability, the bond defaults and pays only $15.

5.1 What is the yield-to-maturity on this bond?
Answer/comment
The yield to maturity of this bond is i in

$$1 + i = \frac{\$100}{\$89}.$$

Thus, 12.36%

5.2 What is the expected yield on this bond?
Answer/comment

With probability 95%, the bond holder gets the full payment with a return of 12.36%.

With probability 5%, the bond holder gets

$$i_{\text{default}} = \frac{\$15}{\$89} - 1,$$
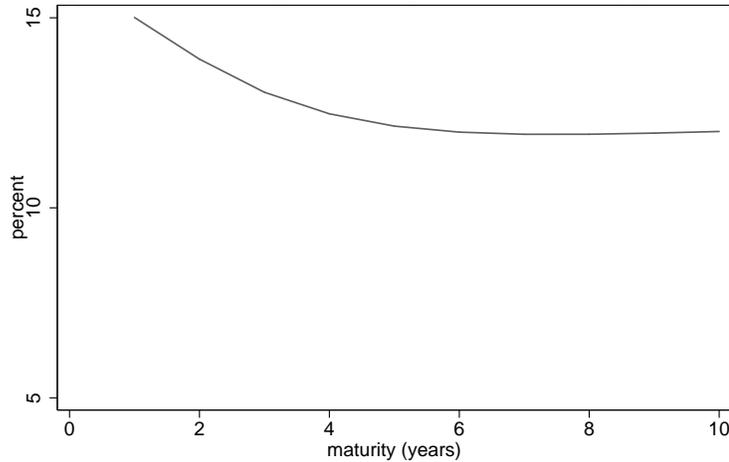
or -83.15%.

Thus, expected yield is,

$$0.95 \times 12.36\% + 0.05 \times (-83.15\%) = 7.58\%$$

Note: you get the same answer if you simply put expected future value over present value.

6 [**Do all parts**] (4 points each). Yield curve. Fig. 1 shows an estimate of the yield curve in the U.S. in April 1980.

Fig. 1: U.S. Treasury Zero Coupon Yield Curve (Apr. 1980)

source: Fed

6.1 Why were short-term nominal interest rates so high in 1980?
Answer/comment
Inflation and expected inflation were very high in 1980.

Note: If you mentioned either or both of 'inflation' and 'expected inflation', you got full points.

6.2 Under the expectations theory of the term structure, what were market participants expecting the 1-year spot interest rate to do over the next several years after 1980?
Answer/comment
They expected the one-year spot rate to decline. Under the expectations theory, if long-term rates are lower than short-term rates, short-term rates are expected to fall.

6.3 On figure 1, the 3-year interest rate is 13% and the 4-year rate is 12.5%. What does the expectations theory say is the expectation of the 1 year rate that will prevail 3 years in the future?
Answer/comment
Under the expectations theory the return on the 4-year bond should be same as the expected return for holding a three-year bond and roll over the proceeds into a 1 year bond.

$$(1 + 0.13)^3 (1 + i^e_{1,t+3}) = (1 + 0.125)^4$$

Solving this for $i^e_{1,t+3}$ gives approximately 11 percent.

Note: There are several equivalent ways to have written this.

6.4 Continuing with the same facts, what is the 1-year forward interest rate for 3 years in the future?
Answer/comment
The expectations theory says that expected interest rates are equal to forward rates, so 11 percent.

In short, going from the expectations theory to forward rates, you do essentially nothing except change the name:

$$i^e_{1,t+3} \equiv f_{1,t+3}$$

where f is the one-year forward interest rate for 3 years hence.

7 [**Do all parts**] (4 points each). Adverse selection.

7.1 Briefly explain how adverse selection could cause problems in some particular market. Be sure to explain the role that asymmetric information plays. (Pick any market—the market for used cars, for IOUs, etc.)
Answer/comment
Many different examples have been given in class and will be acceptable here. Please see the notes for them. Briefly, for used cars: There is asymmetric information in that the seller knows if the car has been well-treated, but the buyer cannot verify this. Skeptical buyers will drive the price below the fair price for good cars. At the lower price, some sellers of good used cars elect not to sell. Thus, the proportion of lemons in the market rises. This causes the price to fall further as buyers are more skeptical, and so forth.

Note: To get full points, you needed to use a case where the seller knows the product better than the buyer (asymmetric information), and discuss how this could drive the price down and leading the pool of sellers to look even worse.

7.2 Why might the adverse selection be a larger problem in markets where the parties to the transaction are largely anonymous than in markets where the parties to the transaction have a close relationship?

Answer/comment

The problem of asymmetric information would be worse when people do not know each other. People who know each other might be able to understand whether the other party is likely being honest. Further, if there is an ongoing relationship, the buyer might imagine that there will be some opportunity for redress if the car (in the example we are using here) turns out to be a bad one.

8 [**Do all parts**] (4 points each). Supply of IOUs. Hint: Remember that the supplier of IOUs is the borrower.

8.1 What is measured on the horizontal axis of the standard supply and demand diagram? What is meaured on the vertical axis?
Answer/comment
horizontal: Quantity

vertical: Price

Note: if you answered that i is on the vertical axis, and then answered all the remaining parts correctly for this case, you received one total point off. This would not be the 'standard' diagram.

8.2 Under our standard view, what is the sign of the slope of the supply of IOUs by households? Why does the curve slope this way?
Answer/comment
All else equal, suppliers will sell more IOUs if they receive more money for it.

8.3 Present and explain an example of bad (negative) economic news that might cause the household supply curve of IOUs to shift outward.
Answer/comment
Any news that makes current prospects for the households fall relative to future prospects. The households may borrow to get by in tough times.

Classic example, if the wage earner(s) in the household lose their jobs but expect to become reemployed, it is natural to increase borrowing.