

Name: \_\_\_\_\_

Midterm exam I  
266: Fi. Markets and Institutions  
Spring 2016  
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Directions:

You have 70 min. to do the exam (unless other arrangements have been made).

Some questions offer a bit of choice on which parts you do, so read carefully. If you answer too many parts, we will grade the first ones and ignore extras.

Where computations are required, full points will be given for the correct answer. Partial points will be given. For example, the proper formula with the relevant values plugged in will get near full points.

You may write on the backs of the exam pages and request additional paper.

If your answer extends outside the space provided, you must label clearly where the additional portion is located.

The last page of the exam is marked, 'The End'.

**1 Definitons. Do 4 of 5.**

1.1 Moral hazard.

1.2 Collateral.

1.3 Real interest rate.

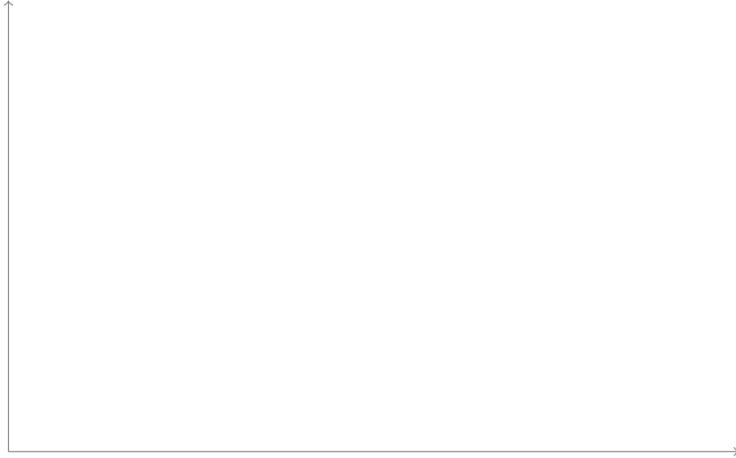
1.4 Net interest margin (of a bank)

1.5 Return on equity (ROA).

2 **Facts.** Give answers to the following questions. Be sure to state units when appropriate.

2.1 Short-term nominal interest rates in the U.S. reached a peak value of about [insert value:]\_\_\_\_\_ around what year? [insert year:]\_\_\_\_\_.

2.2 Provide a rough sketch of the yield curve from three-months to 10-years for Treasury securities in the United States. Be sure to label properly.



2.3 Name two central banks that currently have negative interest rates.

Circle Two: U.S. Fed, Bank of Japan, Bank of England, European Central Bank, Central Bank of Brazil, Central Bank of China

2.4 Before the crisis, approximately what percent of bank reserves in the U.S. were excess reserves? And after the crisis, approximately what percent of bank reserves have been excess reserves?

2.5 What is the approximate value for U.S. nominal GDP?

2.6 Household sector debt as a share of GDP in the U.S. has risen fairly steadily since the early 1950s. True/False.

2.7 U.S. government debt as a share of U.S. GDP has risen fairly steadily since the early 1950s. True/False.

### **Short questions**

3 Annualizing rates. The number of workers on nonfarm payrolls in the U.S. fell from 138 million in Sept 30th, 2008, to 130 million in Dec 31st, 2009. What is the percent change? What is the annualized rate of change?

(Note: You may assume that each month is  $1/12^{th}$  of a year.)

4 Contingent Convertible bonds. Trump Bank issues CoCos worth \$10 million. Suppose that these bonds will convert into equity if the bank's ratio of equity to total assets falls below 5%.

4.1 Trump Bank also issues otherwise identical bonds that are not convertible (they are 'plain vanilla' bonds). Will the CoCos or plain vanilla bonds sell for a higher price? Higher or lower and explain.

4.2 Here is Trump Bank's balance sheet, in \$millions. Fill in the missing value:

Trump Bank			
A		L	
Loans	50	Deposits	30
		CoCos	10
		<b>Net worth</b>	_____

4.3 Suppose that the value of Trump Bank's loans fall to \$42 million. What is Trump Bank's net worth after the fall, taking account of whether or not the CoCos convert? (Note: assume that when the CoCos convert, they simply cease to be a liability.)

5 Expectations theory of interest rates. Suppose the current 1-year spot rate is 1 percent, the 2-year spot rate is 3 percent, and the 3-year spot rate is 3 percent, or  $i_{1,t} = 0.01$ ,  $i_{2,t} = 0.03$ , and  $i_{3,t} = 0.03$ .

Note: In this question, you may use the standard approximate formulation we have used.

5.1 Under the expectations theory of the term structure, what do market participants expect the 1-year rate to be 1 year from now? And 2 years from now?

5.2 Suppose the Fed causes the 1-year spot rate to increase to 2 percent ( $i_{1,t} = .02$ ), but expectations of future 1-year rates in years 2 and 3 remain as in the previous question. What is the new value for the 3-year spot rate  $i_{3,t}$ ?

(Note: If you did not get the previous part, you may simply posit values for  $i_{1,t+1}^e$  and  $i_{1,t+2}^e$ .)

6 Stress tests. The Fed's stress tests describe an adverse macroeconomic scenario. Banks then use a model of likely outcomes to project what would likely happen to the bank's net worth in that scenario. Suppose that the Fed considers a bank to be adequately capitalized if the bank's ratio of net worth to assets exceeds 5%.

6.1 Name two macroeconomic variables that the Fed uses to describe the adverse scenarios.

6.2 Here is a balance sheet for a bank. Fill in the three blanks with the proper values.

Bank of DiCaprio (\$Billions)			
A		L	
Cash	20	Deposits	90
Loans	80		
<b>Total Assets</b>	_____	<b>Total Liab.</b>	_____
		<b>Net worth</b>	_____

6.3 In the Fed's adverse scenario, the Bank of DiCaprio projects that its loans will fall in value by \$6 billion. Would the bank remain adequately capitalized? Yes/No.

6.4 Suppose that as a result of a stress test, the Fed decides that a bank needs to have a stronger capital position. Name 2 actions that the Fed might require of the bank to improve its capital position.

## 7 General Banking.

7.1 List 3 steps a commercial bank can take to restore liquidity if it faces unexpected deposit outflows. Rank the three steps from least to most costly to the bank.

7.2 List three standard steps banks take to mitigate the asymmetric information problem between banks and business borrowers.

7.3 Explain why the too-big-too-fail problem might mean that very large banks would be able to sell debt or raise capital more cheaply than smaller banks.

7.4 The financial crisis greatly weakened banks in both the U.S. and Europe. Supposing that the weakness was roughly the same in the U.S. and Europe, why might that bank weakness have posed bigger problems for the general economy in Europe?

## 8 Duration.

For your reference: The duration formula for an asset that makes  $n$  payments with payment  $c_j$  coming  $j$  years in the future, and assuming a constant interest rate  $i$ :

$$DUR = \frac{\sum_{j=1}^n j \times \frac{c_j}{(1+i)^j}}{PV}$$

where  $PV$  is the present value of the flow of payments.

The approximate rate of capital gain (RCG) associated with a change in interest rates from  $i_0$  to  $i_1$  is:

$$RCG = -DUR \times \frac{i_1 - i_0}{1 + i_0}$$

For the question: Take a two-year bond with an annual coupon payment of \$3 and face value of \$100.

8.1 What is the present value of the bond at  $i = 0.02$ ?

8.2 And the duration of the bond?

8.3 And what would be the approximate rate of capital gain if the interest rate rose to  $i = 0.025$ ?

**Congratulations. The End.**