Problem set 1
266: Fi. Markets and Institutions
Spring 2010
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Directions. You are to do this problem set alone.

Due Date/time. Your work is due by beginning of class (1:30 PM) March
4. You can hand the work in to me at the beginning of class. If you put the
work under my office door or in my mailbox, it must be in before I leave
for lecture at about 1:20pm. If you have an electronic version of your work,
you can email it to me. The time stamp must be no later than 1:30pm.

Questions. If you have questions, email me or Chris, or Weifeng, raise
them in class, or come to office hours.

Grading. All parts have equal value.

Note: Be sure to note the proper units (e.g., millions, billions, etc.) in the
following answers.

1 In this problem you will examine some data on all commercial banks
   insured by the FDIC.

   To get the data, go to the FDIC website (http://fdic.gov), click on tab
   'industry analysis'; then link 'bank data and statistics'; then 'historical
   statistics on banking'; then 'commercial bank reports'.

   1.1 Find the data for total equity capital and net income. Plot the
        ratio of net income to total equity capital for the period since
        1950. (You need not hand in the plot.) What do you observe?
        (Hint: If you highlight the entire table of data, you should be
        able to cut and paste the data from the FDIC website into a
        spreadsheet.)

1.2 Find the data for net interest income and total noninterest income. Plot the ratio of total noninterest income to net interest income since 1950. What do you observe?

1.3 Find the data for deposits. Plot the ratio of interest bearing versus noninterest bearing deposits since 1950. (You need not hand in the plot.) What do you observe?

2 Now we will shift to data for a single bank—actually a bank holding company: Citigroup. We have discussed that big banking institutions have become very complex. One way to get a real taste of this is by looking at the 10-k report of the institution that is filed with the SEC.

If you are interested in finance, you could learn a great deal by reading this 10-k. The following questions are my attempt to introduce you to 10-k reports.

2.1 What is the SEC's 10-k report?

2.2 Obtain the 10-k report for Citigroup for 2009 (issued in early 2009, it covers mainly 2008).
Specifically, i) go to http://www.sec.gov/, ii) Under 'filings and forms,' click on 'search for company filings', iii) Click on the link labelled 'Company or fund name, ticker symbol, CIK (Central Index Key), file number, state, country, or SIC (Standard Industrial Classification)' iv) Enter **C** for ticker symbol and then hit the 'find companies' button. v) Put **10-k** in the 'filing type' box and hit the search button. You should see an entry for the 10-k filed in Feb. 2009. vi) click the 'documents' button. In the resulting list of items, click the 'd10k.htm' link. This will take a while to load. You will see a table of contents for the 10-k.

2.3 What was Citigroup's return on assets in 2008?

2.4 What loss did Citigroup report on subprime related direct exposures in 2008? And what is its remaining exposure? (Hint: search the 10-k on the word subprime, among the first few references to subprime, you'll find the answer.)

2.5 Background. Credit derivatives allow a financial insititution to buy protection against default or other adverse event for an underlying credit instrument such as a bond. Citigroup both sells protection (in which case it is the guarantor) and buys protection (in which case it is the beneficiary).

The notional value of a credit derivative is the amount of the underlying asset on which you have purchased protection. If you buy protection against default on underlying bonds valued at $1 million, then the notional amount of the derivative contract is $1 million.

Question. What was the notional amount of credit derivatives in 2008 in which Citibank was the gurantor and the notional amount in which it was the beneficiary?

(Hint: search the 10-k for credit derivative.)

2.5 Citigroup stated a 'significant focus' on fostering a culture based on what policy toward risk?

(Hint: See the 'Risk management' heading under 'Managing global risk')

3 Some analytic problems

The next few parts refer to Table 1, which gives the price of 3 assets at time $t+1$ under 3 different outcomes along with the probability of those outcomes. (Notes: The assets pay no coupon at $t+1$. Throughout the question, prices in $; t is measured in complete years.)

Table 1

outcome	pr.	Price at $t+1$		
		A	B	C
1	0.25	1	17	55
2	0.50	1	20	50
3	0.25	1	23	45

3.1 Asset B (Table 1) sells for $19 at time t. What is the expected return from buying B at t and selling at $t+1$?

3.2 What is the sign of the covariance of the price of streams B and C at $t + 1$ (Table 1)? Explain briefly.

3.3 I want to buy a car that costs $20,000 today, and I have the $20,000. I decide to wait 18 months to buy instead. The inflation rate for all prices 4.8 percent; car prices grow at the same rate as general price inflation.

If I invest my $20,000 for 18 months, what *real rate of return* will I have to obtain in order to have enough money to buy the car in 18 months?

The next few parts refer to Table 2. The Table defines 4 different payment streams labelled A,...,D.

Table 2

stream	payments		
	t+1	t+2	t+3
A	20	60	0
B	20	40	0
C	7	9	5
D	1	1	1

3.4 If the internal rate of return on stream A (Table 2) is 3.5 percent, what is the price at time t of stream A?

3.5 Does stream A or B (Table 2) have longer duration? Explain. (hint: you should be able to answer this without computing the durations.)

3.6 Ketchup theories: There is a way to form a portfolio of streams B and D such that the payments of the combined stream will be identical to that of stream C. This will imply a fixed relation among the prices for streams B, C, D (Table 2). Give the formula for this relation.

(Hint: If I buy 3 units of asset D and 0.5 units of asset B, the combined portfolio stream will have payments in $t+1$, $t+2$, $t+3$, of 13, 23, 3, respectively. You need to pick amounts to buy—

portfolio weights—such that the resulting stream payments are identical to those on stream C.)