Homework #1

Title: Money & Banking — Due Date: 02/13/2014
Course: Econ 301 — Instructor: Dr. I-Ming Chiu

Requirements: (a) Please prepare your answers in a word document (i.e., type your answers). (b) A cover page is needed to state the names of your group member(s). (c) All the pages must be stapled before submission. 5 points is deducted for each requirement violation.

Part I Conceptual and Computational Questions (15 points each)
Q2~Q4 are drawn from "Questions" section at the end of each chapter

Q1. Using year 2002 as the base year, answer question part (a) to (g) that appears on page 7 and 8 of handout 1. You can demonstrate your results using a table such as the one shown in the handout.

Q2. 10, 19 (Chapter 1, pp. 19).

Q3. 1, 22 (Chapter 2, pp. 49~50)

Q4. 12, 16, 17 (Chapter 3, pp. 63)

Q5. Determine each of the following five variables is "stock" or "flow" variable.
a) real GDP, b) M1, c) government budget, d) government debt, e) wealth.

Part II Data Exploration Using R (25 points)

Q6. (a) Please find the monthly data for "Federal Funds Rate", "Three-month Treasury Bill Rate", "Aaa Corporate Bonds Rate", and "Conventional Mortgage Rate". (Choose the data from 01/2000 to 12/2013). Save the data in the spread sheet (Excel) as csv or txt file and graph them in R. (15 pts)

Instructions: (1) Use abbreviation for your variables when preparing the csv file; (2) Use different line styles to differentiate these four time series (see explanations in the next page); (3) move your curser to the graph created in R, right click and select "Copy as metafile". Move your curser to your word file and paste it. Then you can adjust the size of the graph.

(b) Examine each individual series and compare them. What can you conclude (or find)? (10 pts)

*** Data is available in the following website, instructions are given as follows:**

Steps
1. http://www.federalreserve.gov/
2. Economic Research and Data (the top panel)
3. Selected Interest Rates - H.15 (in the middle of the page)
4. Historical Data (the second top panel)
5. Choose monthly rate for
(a) Federal Funds (effective)
(b) Three-month Treasury Bills (secondary market)
(c) Corporate Aaa Bonds (Moody's Seasoned)
(d) Conventional Mortgages

***Use different line styles to differentiate these four time series**
e.g., plot(x, lty = number,lwd = number)

lty: line style
number = 0 ("blank")
= 1 ("solid") # this is default
= 2 ("dashed")
= 3 ("dotted")
= 4 ("dotdash")
= 5 ("longdash")
= 6 ("twodash")

Try the following code (modified from Handout #2):

```
rm(list=ls())
data2 = read.csv("gs2.csv", header=T)
data2 = ts(data2, start = c(2000,1), end = c(2013,12), freq = 12)
plot(data2[,1], ylim=c(0,10), main="3 Month TBill vs. 10 Year TNotes"
, ylab = "Percent(%)", xlab ="Jan/2000~Dec/2013", type = "l", lty = 2)
lines(data2[,2], lty = 3)
points(data2[,1], pch = 17, cex = 0.75) #Add symbols
points(data2[,2], pch = 22, cex = 0.75)
```

Lower case "L", which stands for line

Notice:
*the double quotation marks in the above code may become something different after you copy/paste it into the R console, therefore, it's better you resave the code as a text file, using Notepad for example, and then copy/paste again to the R console.

* http://www.statmethods.net/advgraphs/parameters.html (all the info. needed for drawing lines in R)

Solution: HW #1

Title: Money & Banking — Spring/2014
Course: Econ 301 — Instructor: Dr. I-Ming Chiu

Part I Conceptual and Computational Questions (15 points each)
Q2~Q4 are drawn from "Questions" section at the end of each chapter

Q1. Using year 2002 as the base year, answer question part (a) to (g) that appears on page 7 and 8 of handout 1. You can demonstrate your results using a table such as the one shown in the handout.
Answer: See 301_HW1Q1.xls file

Q2. 10, 19 (Chapter 1, pp. 19).
Answer: The data in Figures 3, 5, and 6 suggest that real output, the inflation rate, and interest rates would all fall.

Answer: When the dollar increases in value, foreign goods become less expensive relative to American goods; thus you are more likely to buy foreign-made jeans than American-made jeans. The resulting drop in demand for American-made jeans because of the strong dollar hurts American jeans manufacturers. On the other hand, the American company that imports jeans into the United States now finds that the demand for its product has risen, so it is better off when the dollar is strong.

Q3. 1, 22 (Chapter 2, pp. 49~50)
Answer: Yes, I should take out the loan, because I will be better off as a result of doing so. My interest payment will be $4,500 (90% of $5,000), but as a result, I will earn an additional $10,000, so I will be ahead of the game by $5,500. Since Larry's loan-sharking business can make some people better off, as in this example, loan sharking may have social benefits. (One argument against legalizing loan sharking, however, is that it is frequently a violent activity.)

Answer: During the financial panic, regulators were concerned that depositors worried their banks would fail, and that depositors (especially with accounts over $100,000) would pull money from banks, leaving cash-starved banks with even less cash to satisfy customer demands and day-to-day operations. This could create a contagious bank panic (i.e., bank run) in which otherwise healthy banks would fail. Raising the insurance limit would reassure depositors that their money was safe in banks and prevent a bank panic, helping to stabilize the financial system.

Q4. 12, 16, 17 (Chapter 3, pp. 63)

Answer: The ranking from most liquid to least liquid is: (c), (a), (e), (f), (d), and (b).

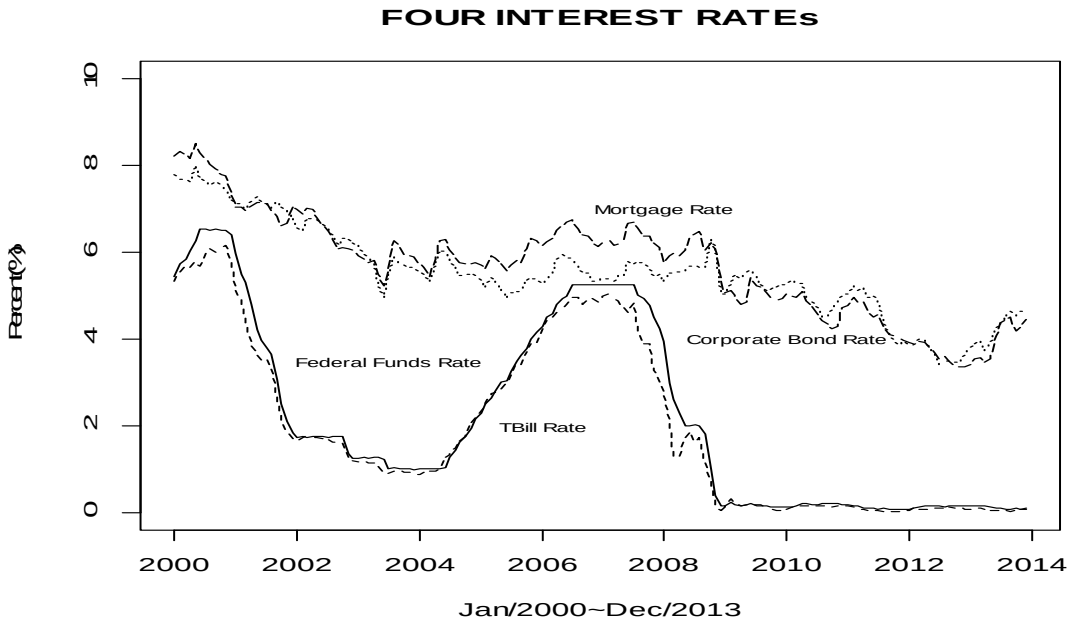
Answer: Your actions will reduce your checking account balance and increase your holdings of money market mutual fund shares. Considering this transaction only, M1 will decrease as one of its components decreased. M2 will remain constant, as M2 is composed of all items that add up to M1 plus some other types of money that are not so liquid to be considered part of M1. One of these categories is money market mutual fund shares. The decrease in your checking account balance is offset by the increase in money market mutual fund shares, and therefore M2 remains constant.

Answer: During the period in question, the M1 growth rate increased by 17 percentage points, while the M2 growth rate increased by only 3 percentage points. Although both measures are moving in the same *direction*, the *magnitude* of the difference in growth rates between the two makes it difficult to judge the appropriateness of monetary policy by just looking at the money supply measures alone. For instance, if one focused just on the M2 money supply, knowing the economy was in severe economic contraction would suggest that the growth rate of M2 perhaps should be even higher than the 3 percentage point increase over this time. On the other hand, if one just focused on the M1 growth increase of 17 percentage points, this may seem alarmingly high and suggest an inflationary problem in the future.

Q5. Determine each of the following five variables is "stock" or "flow" variable.
a) real GDP, b) M1, c) government budget, d) government debt, e) wealth.
Answer: a) flow, b) stock, c) flow, d) stock, e) stock

Part II Data Exploration Using R (25 points)
Q6. (a) Please find the monthly data for "Federal Funds Rate", "Three-month Treasury Bill Rate", "Aaa Corporate Bonds Rate", and "Conventional Mortgage Rate". (Choose the data from 01/2000 to 12/2013). Save the data in the spread sheet (Excel) as csv or txt file and graph them in R. (15 pts)
(b) Examine each individual series and compare them. What can you conclude (or find)? (10 pts)
Answer:

```
rm(list=ls())
da = read.csv("hw1.csv",header=T)
da = ts(da,start = c(2000,1), end = c(2013,12),freq = 12)
plot(da[,1],ylim=c(0,10),main="FOUR INTEREST RATEs",ylab="Percent(%)"
,xlab="Jan/2000~Dec/2013",type="l")
lines(da[,2], lty=2)
lines(da[,3], lty=3)
lines(da[,4], lty=5)
text(2003.5,3.5,"Federal Funds Rate",cex=0.7) #Add texts to the diagram; the first two
text(2006,2, "TBill Rate",cex=0.7) # values are the location (X-Y coordinates) of the texts
text(2010,4,"Corporate Bond Rate",cex=0.7)
text(2008,7,"Mortgage Rate",cex=0.7)
```



b) The Federate funds rate and three month Treasury bill rate are close to each other. Meanwhile, the Aaa corporate bond rate and conventional mortgage rate are close to each other. The latter two rates are higher than the former two rates. The gaps between these rates during different period of time are also quite different.

Homework #2

Title: Money & Banking
Course: Econ 301

Due Date: 03/04/2014
Instructor: Dr. I-Ming Chiu

Requirements: (a) Please prepare your answers in a word document (i.e., type your answers). (b) A cover page is needed to state the names of your group member(s). (c) All the pages must be stapled before submission. 5 points is deducted for each requirement violation.

Part I Conceptual and Computational Questions (Q1~Q4, 20 points each)
The following questions are drawn from Questions and Applied Problems at the end of the chapter

Q1. 3, 6 (Chapter 4, pp. 85).

Q2. 19, 24, 25 (Chapter 4, pp. 86)

Q3. 2, 10 (Chapter 5, pp. 115)

Q4. 13, 18 (Chapter 5, pp. 116)

Q5. 25 (optional; Chapter 5, pp. 117)

Part II (20 points)
Q5. The following R code is used to calculate the monthly payment for a fully amortized mortgage. Please modify it by including an additional term, property tax (T), and then recalculate the monthly payment. To test the accuracy of the code, assuming P = $300,000; I = 5; L = 15; and T = 9,000. Use the function: mymortgage(P = 300000, I = 5, L = 15, T = 9000) to calculate monthly payment. [Instruction: Copy and past of your code/output from R console to your word document]

Code begins here

```
rm(list=ls())
pmt = numeric() #set the unknown payment "pmt" as a numerical value
P=numeric()     # set the principal "P" (i.e., the size of mortgage) as a numerical value
I = numeric()   # set the annual interest rate "I" as a numerical value
L = numeric()   # set the length of mortgage "L" (in years) as a numerical value
mymortgage = function(P, I, L){
p = P           #rename P (Upper case) as p (lower case)
i = I/1200      #I = 5, divided by 100 becomes 5%, divided by 12 becomes monthly rate
n = L*12        #the size of overall monthly payment
pmt = p*((1/i)*(1 - (1/(1+i)^n)))^(-1)
return(pmt)
}
```

Solution: HW #2

Title: Money & Banking — Spring/2014
Course: Econ 301 — Instructor: Dr. I-Ming Chiu

Part I Conceptual and Computational Questions (Q1~Q4, 20 points each)
The following questions are drawn from Questions and Applied Problems at the end of the chapter

Q1. 3, 6 (Chapter 4, pp. 85).
(3) Answer: If the interest rate were 12 percent, the present discounted value of the payments on the government loan are necessarily less than the $1,000 loan amount because they do not start for two years. Thus the yield to maturity must be lower than 12 percent in order for the present discounted value of these payments to add up to $1,000.
(6) Answer: People are more likely to buy houses because the real interest rate when purchasing a house has fallen from 3 percent (= 5 percent - 2 percent) to 1 percent (= 10 percent - 9 percent). The real cost of financing the house is thus lower, even though mortgage rates have risen. (If the tax deductibility of interest payments is allowed for, then it becomes even more likely that people will buy houses.)

Q2. 19, 24, 25 (Chapter 4, pp. 86)
(19) Answer:
Yield to maturity for 20 year bond

$\Rightarrow 800 = \frac{120}{(1+i)} + \ldots + \frac{120}{(1+i)^{20}} + \frac{1000}{(1+i)^{20}}$, for 20 year bond current yield ≈ interest rate

Yield to maturity for 1 year bond

$\Rightarrow 800 = \frac{40}{(1+i)} + \frac{1000}{(1+i)} \Rightarrow i = 30\%$

The latter has higher yield to maturity

(24) Current yield = 100/960 = 10.42%; Expected capital gain = $\frac{980-960}{960}$ = 2.1%;

Expected rate of return = 10.42% + 2.1% = 12.52%
(25) 8%; $1080; 1050*(1 + 6%) = $1,113 … A shortage of $33

Q3. 2, 10 (Chapter 5, pp. 115)
(2) Answer: Apply the asset demand theory.
a) Yes, because wealth↑.
b) Yes, relative return increases due to a decrease in cost (commission cost). Meanwhile, people may be more willing to buy a house due to a higher relative liquidity.
c) No, relative return↓.
d) Yes, relative risk↓.
e) No, relative return↓.

(10) Answer: The slower rate of money growth will lead to a liquidity effect, which raises interest rates, while the lower price level, income, and inflation rates in the future will tend to lower interest rates. There are three possible scenarios for what will happen: (a) if the liquidity effect is larger than the other effects, then interest rates will rise; (b) if the liquidity effect is smaller than the other effects and expected inflation adjusts slowly, then interest rates will rise at first but will eventually fall below their initial level; and (c) if the liquidity effect is smaller than the expected inflation effect and there is rapid adjustment of expected inflation, then interest rates will immediately fall.

Q4. 13, 18 (Chapter 5, pp. 116)
(13) Answer: The interest rate will be lower. The process of this lower rate is the opposite process of the higher inflation expectation explained in class using supply and demand model in the bonds market.
(18) The slower rate of money growth will lead to a liquidity effect, which raises interest rates, while the lower price level, income, and inflation rates in the future will tend to lower interest rates. There are three possible scenarios for what will happen: (a) if the liquidity effect is larger than the other effects, then interest rates will rise; (b) if the liquidity effect is smaller than the other effects and expected inflation adjusts slowly, then interest rates will rise at first but will eventually fall below their initial level; and (c) if the liquidity effect is smaller than the expected inflation effect and there is rapid adjustment of expected inflation, then interest rates will immediately fall.

Q5. 25 (optional; Chapter 5, pp. 117)
(25) Answer: I'll explain how to solve it after exam 1.

Part II (20 points)
Q5. Use the function: mymortgage(P = 300000, I = 5, L = 15, T = 9000) to calculate monthly payment.

```
---
rm(list=ls())
pmt = numeric()
P=numeric()
I = numeric()
L = numeric()
T = numeric()     # set the property tax "T" as a numerical value
mymortgage = function(P, I, L, T){
p = P
i = I/1200
n = L*12
t = T/12          #monthly property tax payment collected by the mortgage issuer
pmt = p*((1/i)*(1 - (1/(1+i)^n)))^(-1) + t
return(pmt)
}
> mymortgage(P = 300000, I = 5, L = 15, T = 9000)
[1] 3122.381
```

Homework #3

Title: Money & Banking — Due Date: 03/25/2014
Course: Econ 301 — Instructor: Dr. I-Ming Chiu

Requirements: (a) Please prepare your answers in a word document (i.e., type your answers). (b) A cover page is needed to state the names of your group member(s). (c) All the pages must be stapled before submission. 5 points is deducted for each requirement violation.

Part I Conceptual and Computational Questions (Q1~Q4, 20 points each)
The following questions are mostly drawn from Questions and Applied Problems at the end of the chapter

Q1. Two long-term bonds, bond A and bond B, initially are similar in all respects and thus have the same yield to maturity. Assume the interest payment of bond A becomes exempt from federal income tax.
a) Please illustrate the impact on the interest rates of the two bonds by using the "Supply and Demand framework".
b) A bond investor is in the 40% marginal tax bracket. If the interest rate is 6% for bond A, what would be the interest rate for bond B that makes this investor indifferent in holding either bond?

Q2. 5, 6 (Chapter 6, pp. 138)

Q3. 16, 17(Chapter 6, pp. 139)

Q4. 21, 24(Chapter 6, pp. 139~140; you can use either Excel or R for the graphs on 24)

Part II Data Exploration (20 points)

Q5. After you read the article "The Yield Curve as a Predictor of U.S. Recessions", you should have a better understanding about how to use the yield curve to detect the future recession. In this exercise, you are asked to apply the inverted yield curve to detect the recession that happened in early 1990s. The quarterly data needed is from 1988:Q1 ~ 1991:Q2.
a) Please draw the real GDP growth rate and the yield slope (defined below) in one graph. (use the "301_HD06_R Script.txt" as the main reference; you only need to modify a small portion of the code to generate the diagram; see next page)
b) Please identify the timing of the recession (using the general definition) in your diagram.
c) When did the yield curve become inverted? Did it happen before the recession? How far is the lag (in terms of quarters)?

Yield slope = the interest rate of ten year Treasury Notes – the interest rate of three month Treasury Bills

DATA SOURCES:

Quarterly real GDP
http://www.bea.gov/ ⇒ click on "Gross Domestic Product (GDP)" ⇒ click on "Current-dollar and "real" GDP" ⇒ download the excel file (save as) ⇒ Use the "GDP in billions of chained 2009 dollars" column from the excel file you just download ⇒ copy and paste the real GDP data between 1988:Q1 ~ 1991:Q2 to a new excel file and name it "GDP".

Interest Rates (3-month Treasury Bills (TB) and 10-year Treasure Notes (TN))
http://www.federalreserve.gov/releases/h15/data.htm ⇒ Treasury constant maturities ⇒ Monthly Data (3 month and 10 year) from January/1988 to Jun/1991 ⇒ Convert the monthly data to quarterly data (choose the interest rate in March, June, September and December and use them as quarterly data) ⇒ Copy and paste these two columns of data to the excel file where you store real GDP.

To make sure you get the right data, the first observation (1988:Q1) for all three variables are listed below:

GDP	TB	TN
8330.4	5.87	8.37

Instructions:
(1) Save your file again as "csv" file once you complete all three columns. There is no need to have the time period as the first column; a time stamp will be added to your data set when you use "ts" command in R. Your created file should look like the "doubledip.csv" file used in handout#6.

(2) The portion of R codes needs to be modified is highlighted in yellow (refer to "301_HD06_R Script.txt") as shown below;

```
da = ts(da, start=c(2000,1), end=c(2002,2), freq=4)
plot(growth,main="Yield Curve and Recession",ylim=c(-1,5),xlab="2000:Q1~2002:Q2"
,ylab="%",type="l",col="blue")
text(2001.4,0.5,"Real GDP Growth Rate",col="blue", cex=0.7,font=3)
text(2001.5,3,"Yield Curve",col="dark red", cex=0.75,font=3)
```

You need to justify the locations of the texts by try and error.

(3) If you want to know how to use certain written-in function in R, for example "diff", you can type ?diff in R console to find more information. Google search is another way to get the information you need.

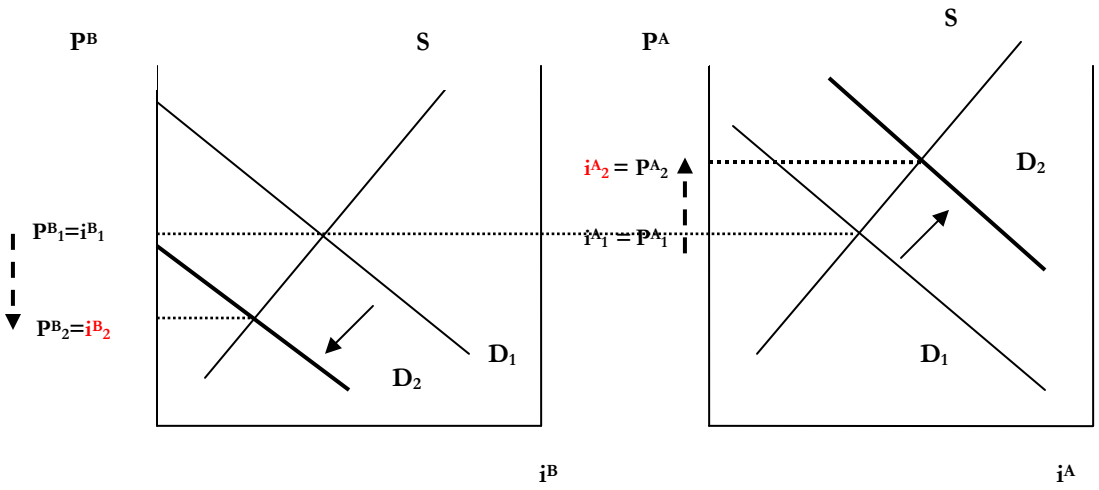
Solution: HW #3

Title: Money & Banking — Spring/2014
Course: Econ 301 — Instructor: Dr. I-Ming Chiu

Part I Conceptual and Computational Questions (Q1~Q4, 20 points each)
The following questions are mostly drawn from Questions and Applied Problems at the end of the chapter

Q1. Two long-term bonds, bond A and bond B, initially are similar in all respects and thus have the same yield to maturity. Assume the interest payment of bond A becomes exempt from federal income tax.
a) Please illustrate the impact on the interest rates of the two bonds by using the "Supply and Demand framework".
b) A bond investor is in the 40% marginal tax bracket. If the interest rate is 6% for bond A, what would be the interest rate for bond B that makes this investor indifferent in holding either bond?

Answer:
a) The demand for bond A (B) is going to increase (decrease). Therefore, the price (interest rate) of bond A is going to be higher (lower) than the price of bond b.



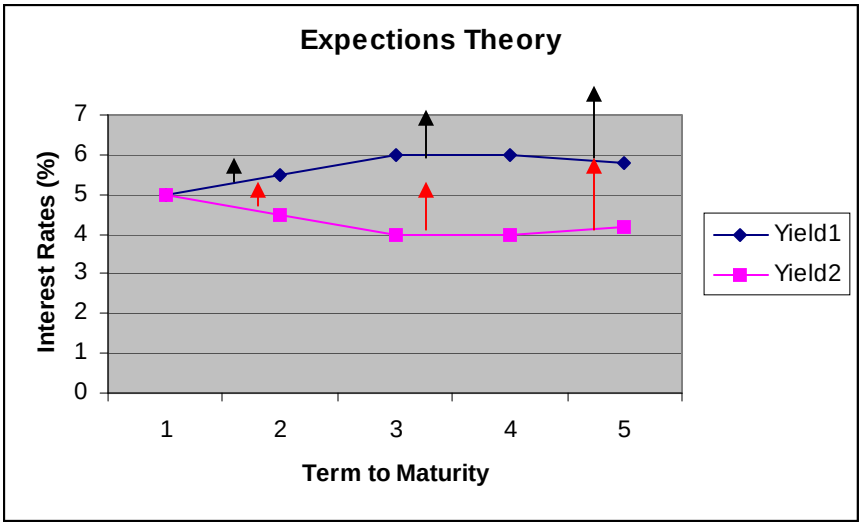
b) $\frac{\%6}{1-40\%} = 10\%$

Q2. 5, 6 (Chapter 6, pp. 138)
(5) Answer: During business cycle booms, corporations do well and there is less default risk on corporate bonds, which lowers their risk premium. Conversely, during recessions default

risk on corporate bonds increases and their risk premium increases. The risk premium on corporate bonds is thus anticyclical, rising during recessions and falling during booms.
(6) Answer: True. When bonds of different maturities are close substitutes, a rise in interest rates for one bond causes the interest rates for others to rise because the expected returns on bonds of different maturities cannot get too far out of line.

Q3. 16, 17(Chapter 6, pp. 139)
(16) Answer: The flat yield curve at shorter maturities suggests that short-term interest rates are expected to fall moderately in the near future, while the steep upward slope of the yield curve at longer maturities indicates that interest rates further into the future are expected to rise. Because interest rates and expected inflation move together, the yield curve suggests that the market expects inflation to fall moderately in the near future but to rise later on.
(17) Answer: The steep upward-sloping yield curve at shorter maturities suggests that short-term interest rates are expected to rise moderately in the near future because the initial, steep upward slope indicates that the average of expected short-term interest rates in the near future is above the current short-term interest rate. The downward slope for longer maturities indicates that short-term interest rates are eventually expected to fall sharply. With a positive risk premium on long-term bonds, as in the preferred habitat theory, a downward slope of the yield curve occurs only if the average of expected short-term interest rates is declining, which occurs only if short-term interest rates are expected to fall far into the future. Since interest rates and expected inflation move together, the yield curve suggests that the market expects inflation to rise moderately in the near future but fall later on.

Q4. 21, 24(Chapter 6, pp. 139~140; you can use either Excel or R for the graphs on 24)
(21) Answer: If the Federal Reserve purchases a significant amount of longer-term treasury debt, this will reduce the effective supply of treasuries of those particular maturities, resulting in a higher price and lower yield. This should have the effect of lowering the "long end" of the curve, decreasing medium and longer-term yields. In other words, the yield curve will shift down, but mostly on medium and long-term maturities.
(24) Answer: a) 5%, 6%, 7%, 6%, 5% , b) 5%, 4%, 3%, 4%, 5%



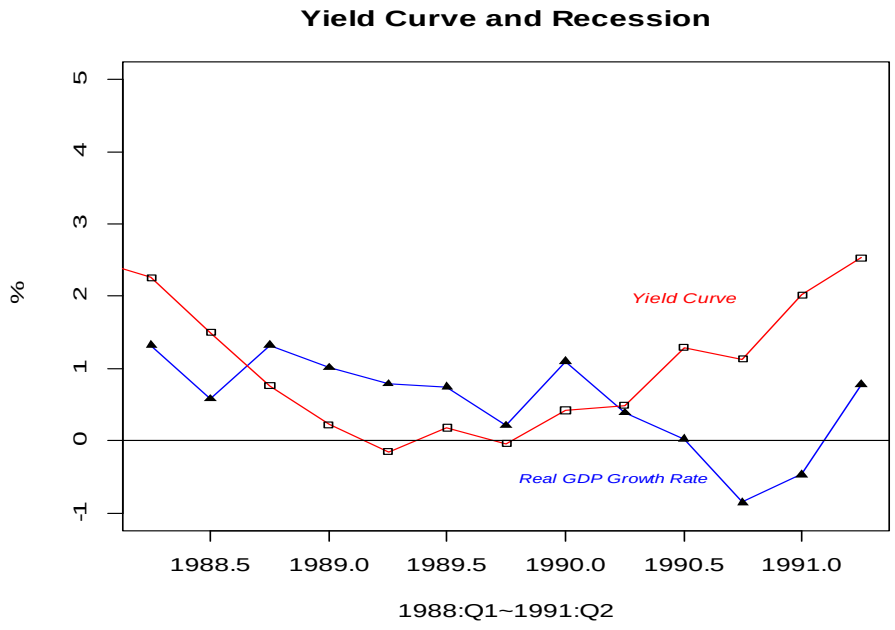
The length of arrows indicates the magnitude of liquidity premium; longer the maturity larger the premium

If people preferred shorter-term bonds over longer-term bonds, then the demand for short-term bonds is relatively larger than the demand for long-term bonds. The price (interest rate) of short-term bonds is going to be higher (lower) than that of long-term bonds. The above two curves will shift upwards when the yield to maturity is longer.

Part II Data Exploration (20 points)

Q5. After you read the article "The Yield Curve as a Predictor of U.S. Recessions", you should have a better understanding about how to use the yield curve to detect the future recession. In this exercise, you are asked to apply the inverted yield curve to detect the recession that happened in early 1990s. The quarterly data needed is from 1988:Q1 ~ 1991:Q2.
a) Please draw the real GDP growth rate and the yield slope (defined below) in one graph. (use the "301_HD06_R Script.txt" as the main reference; you only need to modify a small portion of the code to generate the diagram; see next page)
b) Please identify the timing of the recession (using the general definition) in your diagram.
c) When did the yield curve become inverted? Did it happen before the recession? How far is the lag (in terms of quarters)?

Answer:
(a)



(b) The real GDP growth rate becomes negative in 1990:Q4 and 1991:Q1.
(c) Yield curve becomes negative in 1989:Q2 and Q4. Using the latter, the negative yield precedes the recession by one year.

Notice: the common mistake I found is the real GDP growth rate becomes two straight lines

in the diagram. The cause happens during the data cleaning process when you prepare the csv file. R can not recognize the elements in the first column (GDP column) as numerical value. Here is the remedy; Open your csv file and highlight the GDP column. Right click and select "Format Cells" from the popped up window. Choose "General" or “Number” under the "Category" and save the file again. It should work now.

Homework #4

Title: Money & Banking
Course: Econ 301

Due Date: 04/10/2014
Instructor: Dr. I-Ming Chiu

Requirements: (a) Please prepare your answers in a word document (i.e., type your answers). (b) A cover page is needed to state the names of your group member(s). (c) All the pages must be stapled before submission. 5 points is deducted for each requirement violation.

Part I Conceptual and Computational Questions (Q1~Q5, 14 points each)
The following questions are drawn from Questions and Applied Problems at the end of the chapter

Q1. 6 (Chapter 7, pp. 159)

Q2. 8 (Chapter 7, pp. 159)

Instruction: you need to research what "random walk" is on the internet.

Q3. 12 (Chapter 7, pp. 159)

Q4. 23 (Chapter 7, pp. 159)

Q5. 24 (Chapter 7, pp. 159~160)

Part II Data Exploration (30 points)

Q5. Please read the article "The Capital Asset Pricing Model: An Overview" from the internet link: http://www.investopedia.com/articles/06/capm.asp

Once you have a better understanding about how CAPM works, I would like you to conduct a regression analysis to find the "Beta" of the company Bed, Bath & Beyond Inc. (BBBY is its stock symbol), which is a NJ based company traded on NASDAQ. The data file "hw4.xls" is collected between January 2001 and January 2014 from Yahoo.com/Finance section (except for the first column which ends in December 2013) and can be found on sakai. The first several rows of data look like following;

Rf	BBBY	NASDAQ	Rj	Rm
5.16	26.56	2772.73	(A)	(B)
5.1	24.62	2151.83	:	:
4.89	24.56	1840.26	:	:

Where Rf, BBBY and NASDAQ are the yield to maturity of 10-year government bonds, the stock price of the BBBY company and the NASDAQ index. You will only see the first three columns in the data file; the other two columns need to be created by yourself. They represent the returns for the BBBY and NASDAQ, respectively. For example, cell A is calculated as $\frac{24.62 - 26.56}{26.56} * 100$, so the return is -7.3 (i.e., -7.3%). By the same token, the market return for cell B is $\frac{2151.83 - 2772.73}{2772.73} * 100$, so the return is -22.4 (i.e., -22.4%).

Please complete the Rj and Rm columns by yourself and save your new file as a "csv" file. Notice that all three columns must have the same length after you convert the last two columns into returns. Once the data is cleaned as instructed, please

(a) find the "Beta" of the BBBY company and interpret it.

(b) draw a scatter diagram, add a regression line to it and add the text "Rj-Rf = $\beta_0 + \beta_j$*(Rm-Rf)" to the next of the regression line. β_0 and β_j need to be replaced by the estimated values from the regression outcome.

(c) Summarize the article in two short paragraphs.

Solution: HW #4

Title: Money & Banking — Spring/2014
Course: Econ 301 — Instructor: Dr. I-Ming Chiu

Part I Conceptual and Computational Questions (Q1~Q5, 14 points each)

Q1. 6 (Chapter 7, pp. 159)
Answer: Although Joe's expectations are typically quite accurate, they could still be improved by his taking account of a snowfall in his forecasts. Since his expectations could be improved, they are not optimal and hence are not rational expectations.

Q2. 8 (Chapter 7, pp. 159)
Answer: True, as an approximation. If large changes in a stock price could be predicted, then the optimal forecast of the stock return would not equal the equilibrium return for that stock. In this case, there would be unexploited profit opportunities in the market and expectations would not be rational. Very small changes in stock prices could be predictable, however, and the optimal forecast of returns would equal the equilibrium return. In this case, an unexploited profit opportunity would not exist.

Q3. 12 (Chapter 7, pp. 159)
Answer: Probably not. Although your broker has done well in the past, efficient markets theory suggests that she has probably been lucky. Unless you believe that your broker has better information than the rest of the market, efficient markets theory indicates that you cannot expect the broker to beat the market in the future.

Q4. 23 (Chapter 7, pp. 159)
Answer: $P_0 = \frac{D_0 * (1+g)}{(k_e - g)} = \frac{3*(1+0.07)}{(0.18-0.07)} \approx \$29.18$

Q5. 24 (Chapter 7, pp. 159~160)
Answer:

$$P_0 = \frac{D_1}{(1+k_e)} + \frac{D_2}{(1+k_e)^2} + \ldots + \frac{D_5}{(1+k_e)^5} + \frac{P_5}{(1+k_e)^5}$$

$65.88 = \frac{1}{(1+0.1)} + \frac{1}{(1+0.1)^2} + \ldots + \frac{1}{(1+0.1)^5} + \frac{P_5}{(1+0.1)^5}$, solve for P_5 and it equals \$100

R code to solve for P_5

```
> a = 0.1
> V = 1/(1+a) + 1/(1+a)^2 + 1/(1+a)^3 + 1/(1+a)^4 + 1/(1+a)^5 #the first five terms
> V
[1] 3.790787
> (65.88 - 3.79)*(1+a)^5 # solve P5 using 65.88 = V + P5 /(1+0.1)^5; where V = 3.79
[1] 99.99657 # P5 is about $100
```

No, the current stock price will not increase by the full dollar. Since the future stock price is discounted by the required return, the current stock price will only increase by $\$1/(1+0.1)^5$, or \$0.62.

Part II Data Exploration (30 points)

Q5. (a) Find the "Beta" of the BBBY company and interpret it.
(b) Draw a scatter diagram, add a regression line to it and add the text "Rj-Rf = β_0 + β_j*(Rm-Rf)" to the next of the regression line. β_0 and β_j need to be replaced by the estimated values from the regression outcome.
(c) Summarize the article in two short paragraphs.
Answer:
R code:

```
da = read.csv("hw4.csv", header=T)
attach(da)
names(da)
y = Rj-Rf
x = Rm-Rf
Model = lm(y~x)
summary(Model)
plot(y~x,main="CAPM Analysis for BBBY")
abline(lm(y~x), lty="dotted")
text(-0.15,-0.1,"y = -0.28 + 0.74*x",cex=2, col="red") #you need to retype the double quotation mark "" in the R console after copy/paste the code.
```

Coefficients:

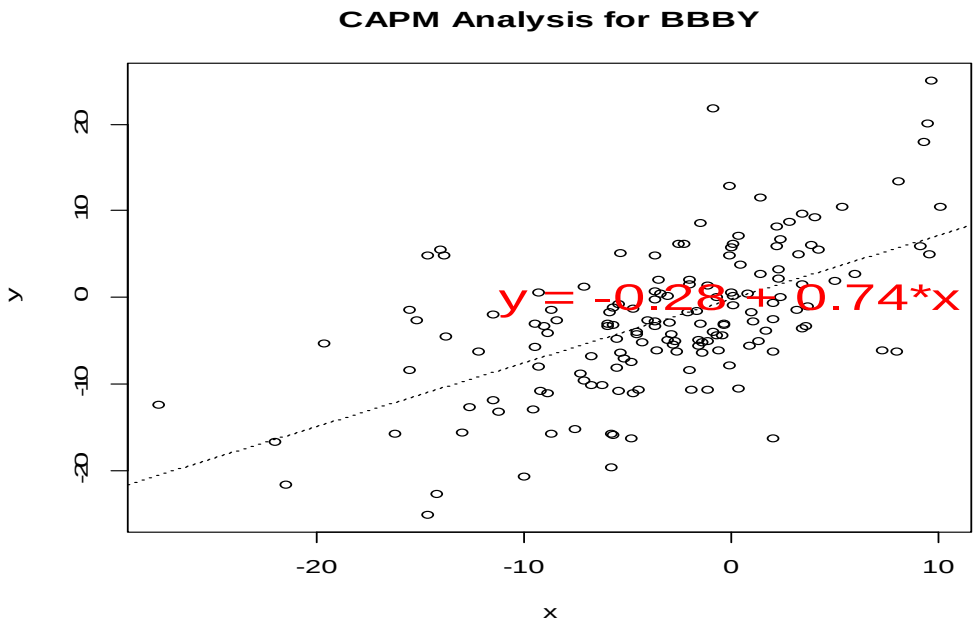
	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	-0.28172	0.60912	-0.463	0.644
x	0.73692	0.08289	8.891	1.52e-15 ***

(a) The above table shows that Beta for BBBY is about 0.74, which indicates that the stock is defensive (Beta < 1). Meanwhile, the intercept is "insignificant" as predicted by the CAPM; "insignificance" is a statistical terminology meaning that the intercept is proved to be not important according to the hypothesis testing.

We conclude that
Rj - Rf = 0.74*(Rm - Rf)

If Rf = 3% and Rm = 8%, then CAPM predicts that Rj should be 3% + 0.74*(8% - 3%) = 6.7%. We can use the predicted Rj as the expected required return in the Golden Growth model.

(b)



(c) Do read the article.