Multiple Choice Questions (28/100):

Please circle the correct answer for each of the 7 multiple-choice questions. In each question, only one of the answers is correct. Each question counts 4 points.

1. Which of the following factors might cause investment to depend very heavily on current profits?

    I.   Current profits are a bad predictor of future profits.

    II. Most companies find it difficult to raise finance externally at low interest rates.

    (a) I. only.

    (b) II. only.

    (c) Both I. and II.

    (d) Neither I. nor II.

    Statement II could explain why investment depends heavily on current profits (since if it is difficult for firms to borrow, their ability to invest will depend mainly on the level of retained profits). Statement I cannot help explain why investment depends heavily on current profits. If current profits are not correlated with future profits, then current profits are not a good predictor of the NPV of profits, which is the main determinant of investment.

2. Which of the following two statements is correct?

    I.   A farsighted consumer will try to base her consumption decisions on the present discounted value of her current wealth plus future pre-tax income.

    II. A permanent change in income of 1 will generally result in a change in consumption of much less than 1.

    (a) I. true, II. true

    (b) I. true, II. false

    (c) I. false, II. true

    (d) I. false, II. false

    Neither statement is correct. The first statement is incorrect because consumption depends on the present value of <u>post-tax</u> (not pre-tax) income. The second statement is incorrect because a permanent increase in income of 1 unit allows the consumer to increase consumption by approximately 1 unit also.

3. In an open economy with a floating exchange rate, an increase in the money supply will:

   (a) Increase output, decrease the interest rate and cause exchange rate appreciation.

   (b) Increase output, decrease the interest rate and cause exchange rate depreciation.

   (c) Increase output, not affect the interest rate and cause exchange rate depreciation.

   (d) Not affect output, decrease the interest rate and cause exchange rate appreciation.

   This is the exact opposite of the monetary contraction experiment shown in Blanchard Figure 20-4.

4. The current exchange rate between the US$ and the Euro is 1.1 (i.e. E = 1.1 from the US perspective). E is expected in one year's time to be 1.0. Inflation in the US is 4 per cent. Inflation in Europe is 2 per cent. Which of the following statements is true?

   (a) The nominal exchange rate is expected to <u>DEPRECIATE</u>, and the real exchange rate is expected to depreciate by a <u>GREATER</u> percentage than the nominal exchange rate.

   (b) The nominal exchange rate is expected to <u>DEPRECIATE</u>, and the real exchange rate is expected to depreciate by a <u>LESSER</u> percentage than the nominal exchange rate.

   (c) The nominal exchange rate is expected to <u>APPRECIATE</u>, and the real exchange rate is expected to appreciate by a <u>GREATER</u> percentage than the nominal exchange rate.

   (d) The nominal exchange rate is expected to <u>APPRECIATE</u>, and the real exchange rate is expected to appreciate by a <u>LESSER</u> percentage than the nominal exchange rate.

   The real exchange rate <u>appreciates</u> (E falls). $E_{t+1} = 10/11 * E_t$.
   $P_{t+1} = 1.04 P_t$.
   $P^*_{t+1} = 1.02 P^*_t$.
   So the real exchange rate in a year will be:
   Real exchange rate$_{t+1}$ = $[(10E/11) * 1.02 P^*_t] / [1.04 P_t]$
   = $[10/11 * 1.02 / 1.04] *$ real exchange rate$_t$

   *Since the number in square brackets [10/11 * 1.02 / 1.04] is less than 10/11, the real exchange rate has appreciated by a <u>greater</u> percentage than the nominal exchange rate.*

5. Which of the following statements characterizes the response of the world economy to the end of the war in Iraq?

   I. The stock market in the US increased, as the end of the war boosted future expected profits.

   II. Oil prices fell, which reduced the cost for firms.

   III. Growth in Europe remained above its long-run average.

   (a) I. and II. are true

   (b) II. and III. are true.

   (c) I. and III. are true.

   (d) I. and II. and III. are true.

6. The IMF has recently revised its growth forecast for the world economy downward for the following reasons:

   (a) Deflation in Europe is a continuing problem, Japan faces inflation, and the US faces corporate governance problems.

   (b) Corporate governance problems in Japan continue to drag profits down, the US faces the risk of inflation, and the EU is growing faster than the rest of the world.

   (c) The EU is facing structural economic problems that hamper growth, the US is struggling to recover from the burst of the stock market bubble, and Japan continues to face the risks of deflation.

   (d) The risk of overheating in the US has led to an increase in interest rates, the bad loan problems in Japan have not yet been solved, and the deflation in Europe has caused Europe to be in a recession for years.

7. The Bush tax cut has been criticized for the following reasons:

   I. The tax cut would cause the budget deficit to increase rapidly, putting pressure on long term interest rates to rise.

   II. Even though the tax cut is large relative to GDP, the average household does not profit much from it, and the impact on aggregate demand is expected to be small.

   III. The tax cut should be larger in order to finance the costs of war.

   (a) I. and II. are true.

   (b) II. and III. are true.

   (c) I. and III. are true.

   (d) I., II. and III. are true.

Long Question 1 (36/100): Expectations in the US Economy

Please read the following instructions and questions carefully. Answer each of the 6 questions as precisely as you can. Each question counts 6/100.

To answer this question, you should have in mind the extended IS-LM model which includes a role for expectations. Recall the basic structure of this model:

IS: $Y = A(Y, T, r, Y^e, T^e, r^e) + G$

LM: $M/P = Y L(r)$

where Y: Output, T: Taxes, r: the interest rate and the superscript 'e' stands for an expectation about the future value of a variable. A is the sum of consumption and investment, which depends on current Y, T and r, as well as expected future Y, T and r.

1) Is the IS curve in this model steeper or flatter relative to the basic IS-LM model? Explain why in 3-5 lines, being as precise as you can.

STEEPER. The reason is that investment now depends not just on the current interest rate, but the entire expected path of future interest rates. So if interest rate change today, but the expectation of the future interest rate remains constant, investment and output will change by only a small amount. Thus, the IS curve (which assumes constant expectations) will be very steep.

Following the end of the war in Iraq, and excitement about the new series of 'American Idol', expectations about future output improve (i.e. Y^e increases).

2) Draw an IS-LM diagram, and show how the change in Y^e affects Y and r. [Assume all other variables (M/P, T, T^e, r^e, G) stay the same.]
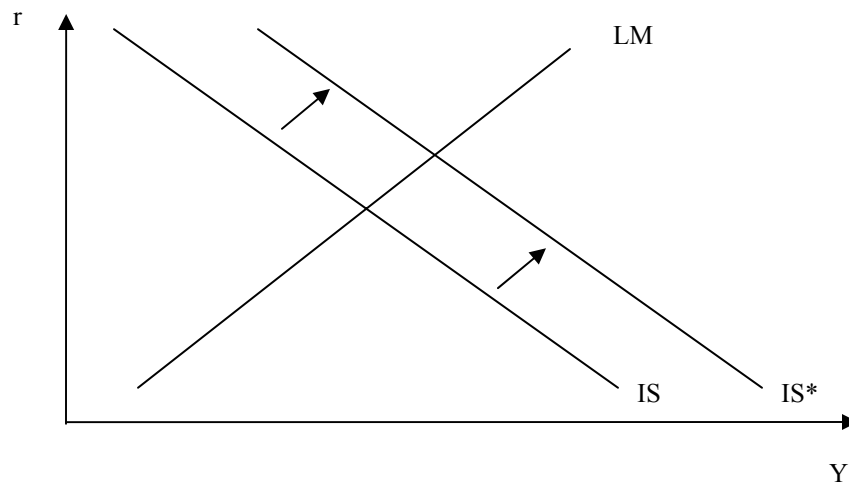
**Higher Y^e causes the IS curve to shift out, resulting in higher Y and a higher interest rate r (see diagram).**

3) What is the effect of the change in Y^e on (i) current investment and (ii) the stock market (increase, decrease or ambiguous)? Explain why in 3-5 lines, be as precise as you can.

(i) AMBIGUOUS and (ii) AMBIGUOUS. The increase in Y^e will increase future expected profits; however, since r is higher, future profits will be discounted at a higher rate, so the NPV of profits (the main determinant of investment) may either increase or decrease. Similarly the stock market, which reflects the NPV of future dividends may either increase or decrease (stock prices and investment will move together consistent with the q-theory of investment)

4) Following the increase in Y^e, how must the Fed change the size of the money supply (M/P) to return the interest rate to its old level (increase M/P, decrease M/P, ambiguous)? Use a diagram to help answer this question.

The Fed must increase M/P (ie cause the LM curve to shift out) to reduce interest rates to their original level (see diagram).
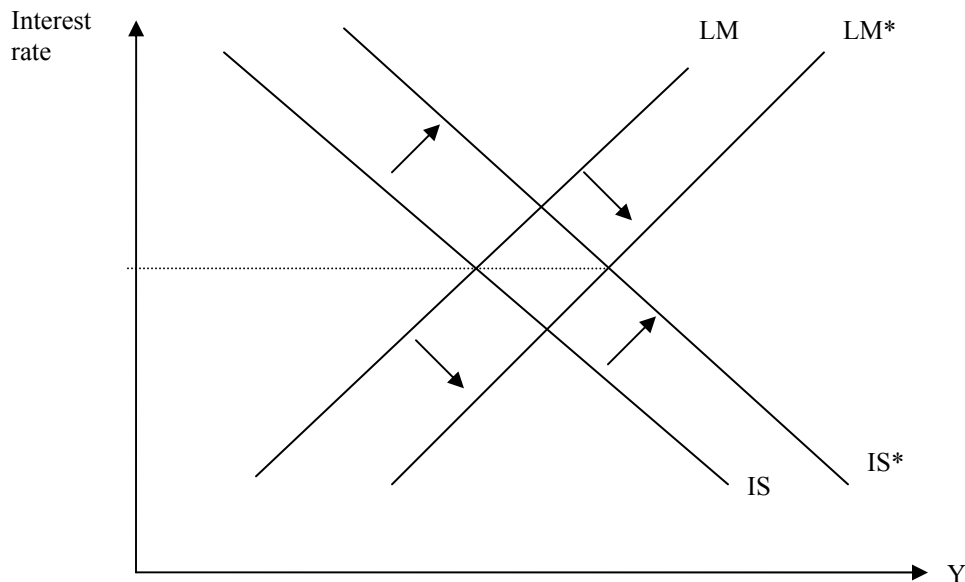
Assume for the next two questions that the Fed has undertaken the action you suggested in the previous question 4), so the interest rate has remained unchanged following the increase in Y^e.

5) What is the effect of the increase in Y^e on (i) current consumption and (ii) current investment (increase, decrease, ambiguous)? [Again, assume all other variables (r, T, T^e, r^e, G) stay the same.] Explain why in 3-5 lines, be as precise as you can.

(i) INCREASE and (ii) INCREASE. Y^e has increased, which (since interest rate at which future profits are discounted remains constant) increases the NPV of total wealth of consumers and the NPV of future profits. This increases consumption and investment respectively.

Suddenly, concerned about the cost of the war in Iraq, the government passes through Congress a new tax increase, scheduled to take effect in a year.

6) Based on the IS-LM framework, what will happen to current output following the tax increase? (State the answer to this question, there is no need to draw a diagram). Explain <u>how</u> and <u>why</u> your answer would be different if Ricardian equivalence was true. (Explain in 3-5 lines, be as precise as you can).

Under IS-LM, the increase in T^e will cause a fall in current output. Under Ricardian equivalence, unless the change in T^e also reflects a change in future government spending, there will be <u>no change in current output</u>. The reason is that consumers care only about the total NPV of the future taxes they pay, not the timing of these taxes. If expectations about G remain the same, an increase in T^e next year must imply lower taxes at some time in the more distant future, leaving the NPV of future taxes unchanged.

Long Question 2 (36/100): Managing Vermont's Economy

Please read the following instructions and questions carefully. Answer each of the 6 questions as precisely as you can. Each question counts 6/100.

Vermont has been an independently minded state for some time. It finally decides to introduce its own currency, the VT$. You are lucky and get the job as Vermont's first central bank president. In order to determine the best economic policy, you write down the following open economy model for Vermont:

IS: $Y = A + \alpha\, Y - \beta\, T - \gamma\, i + \delta\, Y^{US} + \phi\, E$

LM: $M = Y - \lambda\, i$

UIP: $i = i^{US} + (E^e - E) / E$

With the following notation:

Y: Vermont's Real GDP

Y^{US}: Real GDP of the US

T: Vermont's Taxes

i: Vermont's nominal interest rate

i^{US}: Nominal interest rate of the US

E: US$ in terms of VT$

E^e: Expected future US$ in terms of VT$

M: Vermont's stock of money in circulation

The only trading partner of Vermont is the US. Please note that the level of prices is normalized to 1 in both Vermont and the US, and there is no inflation. All of the coefficients α, β, γ, δ, ϕ and λ as well as the constant A are assumed to be positive. Capital is perfectly mobile.

1) For the IS relationship, interpret each of the coefficients as well as the constant A. (Hint: relate your answer to the marginal propensity to consume, invest, export, and import). **(4 points)**

- **A is the sum of autonomous investment, autonomous consumption, and autonomous exports. Autonomous imports cannot be part of A, as imports are multiplied by the exchange rate.**
- **The coefficient α is the sum of the marginal propensity to consume and the marginal propensity to invest with respect to GDP.**
- **The coefficient β is the marginal propensity to consume with respect to GDP.**
- **The coefficient γ is the sensitivity of investment with respect to the interest rate.**
- **The coefficient δ is the marginal propensity to export with respect to US GDP.**
- **The coefficient ϕ is the sensitivity of net exports with respect to the interest rate.**

Assume that you start with a fixed exchange rate regime such that US\$ 1 is VT\$ .5, i.e. the fixed exchange rate $E^*=.5$. Financial markets expect the exchange rate regime to prevail in the future ($E^e=E^*$).

2) Suppose that the level of taxes in Vermont is changed from T to T'>T. How do you as the central banker need to adjust your money supply? Explain why, relating your answer to the interest parity condition. **(6 points)**

By the UIP condition and the fact that the exchange rate is fixed, Vermont's interest rate is equal to the US interest rate. Replacing this in the IS relationship and solving for Y gives:

$$Y = (1 - \alpha)^{-1} (A - \beta\, T - \gamma\, i^{US} + \delta\, Y^{US} + \phi\, E^*)$$

where it is assumed that α<1. This is the level of output as a function of exogenous variables. Replacing into the LM relationship gives:

$$M = (1 - \alpha)^{-1} (A - \beta\, T - \gamma\, i^{US} + \delta\, Y^{US} + \phi\, E^*) - \lambda\, i^{US}$$

Now we can see how the central bank has to change money supply in response to an increase in taxes in order to keep the exchange rate fixed:

$$(M' - M) = -(T' - T)\,\beta / (1 - \alpha)$$

The reasoning is the following: an increase in taxes from T to T' decreases GDP by β/(1-α)(T'−T); this is the usual goods market multiplier with fixed interest rates. Because GDP decreases, money demand decreases (transaction motive), Vermont's households buy Vermont's bonds and thus reduce their money holdings. By the UIP, the interest rate (and hence the price of bonds) cannot change under fixed exchange rates. The central bank thus has to sell bonds to households, decreasing the amount of money in circulation.

Things start to go wrong in Vermont's economy. The exchange rate is still fixed at the level E^*, but financial markets now expect that this exchange rate will be abandoned in the future for a higher exchange rate $E^\# > E^*$ (financial markets expect a devaluation).

3) If the initial exchange rate E^* is maintained, how is Vermont's interest rate affected by the anticipation of a future devaluation? What is the appropriate central bank policy that you need to undertake in order to maintain the fixed exchange rate? Give an explanation, and complete the open economy the IS-LM diagram below. **(8 points)**
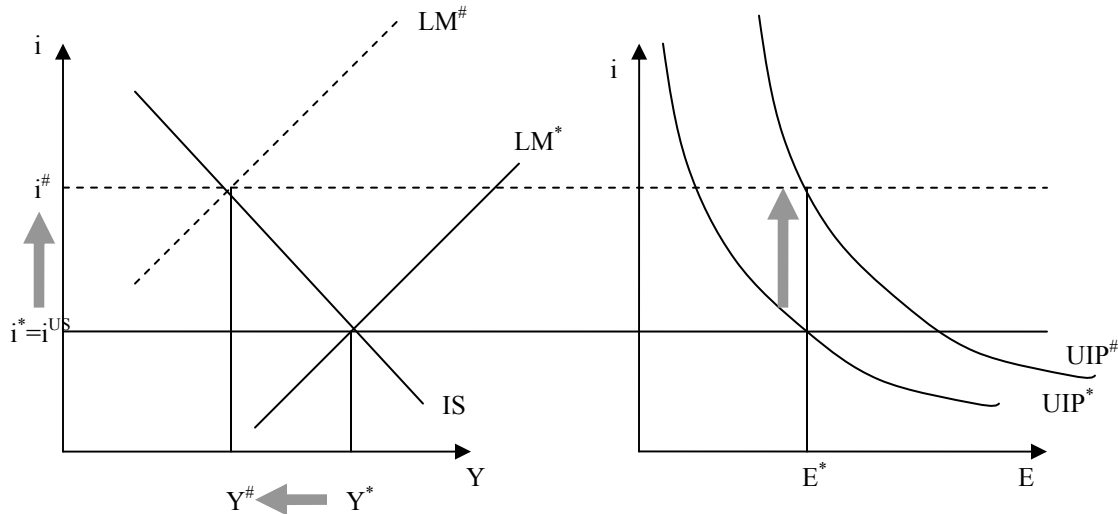

The current exchange rate is E^*, the expected future exchange rate is $E^\# > E^*$. By the interest rate parity, this implies $i > i^{US}$. The intuition is that investors must be compensated for the expected devaluation; the interest rate in Vermont must therefore be higher than the US interest rate. The increase in the interest rate shifts the equilibrium up and to the left in the IS-LM diagram, leading to lower GDP. The lower GDP together with the higher interest rate in Vermont lowers money demand. In order to keep the exchange rate fixed at E^*, the central bank must sell bonds and thus reduce money supply.

In the diagram, the shift in expectations shifts the UIP up from UIP^* to $UIP^\#$. Because the exchange rate is fixed at E^*, this implies that Vermont's interest rate moves up from i^* to $i^\#$. This corresponds to a move along the IS curve, and a shift in the LM curve from LM^* to $LM^\#$.

After a number of months of financial turmoil, you decide to abandon the fixed exchange rate and let the VT$ float.

4) What is the impact on Vermont's economy (output, interest rates, exchange rate, trade balance) of an increase in i^{US} for a fixed M and fixed exchange rate expectations ($E^e=E^\#$)? Explain your answer using an open economy the IS-LM diagram. **(8 points)**
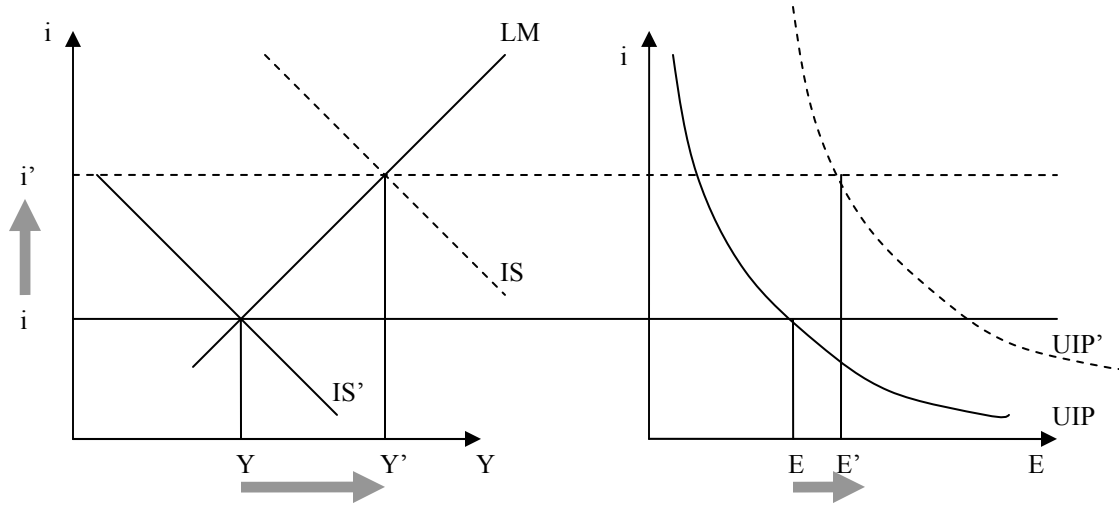
The increase in the US interest rate leads to shift upwards of the UIP curve, and a shift to the right of the IS curve. Output increases from Y to Y'>Y, the interest rate increases from i to i'>i, and the exchange rate increases ($VT depreciates). The effect on the trade balance is ambiguous, as Y goes up (imports go up), and E depreciates.

The intuition is the following: at a given Vermont interest rate, the increase in the US interest rate must compensate investors with an <u>expected appreciation</u> of the VT$, thus implying an <u>immediate depreciation</u>. This depreciation (at a fixed interest rate) increases net exports, leading to a shift of the IS curve to the right. The LM curve does not shift, as money supply is given. The depreciation thus leads to an increase in output and the domestic interest rate. The increase in Vermont's interest rate is stronger than the increase in the US interest rate due to the depreciation of the VT dollar.

5) Can the Central Bank of Vermont use monetary policy to offset the impact of the increase in i^{US} on Vermont's GDP? What does this imply for the exchange rate? (You can use the diagram from question 4). **(4 points)**

Money supply can be lowered, shifting the LM curve to the left. This leads to an appreciation of the VT$, and a reduction in GDP, and an increase in the interest rate. Monetary policy exactly offset the impact on Vermont's GDP of the increase in the US interest rate.

After a number of years as central bank president, you become finance minister. You analyze the state finances and come up with the following assessment: the Vermont primary deficit is close to zero, real interest rates are high, and the growth rate of real GDP is low.

6) What do you expect to happen to the debt-to-GDP ratio over time? How would your answer be different if Verm ont's GDP was growing rapidly? **(6 points)**

Recall the government's budget constraint relative to GDP:

$$B_t / Y_t - B_{t-1} / Y_{t-1} = (r - g) B_{t-1} / Y_{t-1} + (G_t - T_t) / Y_t$$

When the real interest rate r is high, GDP growth g is low, and the primary deficit $(G_t - T_t)$ is zero, this constraint reduces to:

$$B_t / Y_t - B_{t-1} / Y_{t-1} = r \ B_{t-1} / Y_{t-1}$$

Inspecting the equation, it is clear that the debt-to-GDP ratio is growing. The answer would be different if g > r, in which case the ratio would be falling.