Intermediate Macroeconomic Theory / Macroeconomic Analysis (ECON 3560/5040) Final Exam (Answers)

Part A (15 points)

State whether you think each of the following questions is true (**T**), false (**F**), or uncertain (**U**) and briefly explain your answer. No credit will be given for an answer without any explanation

(1) [5 points] Staggering makes the overall level of wages and prices adjust quickly, because individual wages and prices change frequently

False. Staggered price adjustment significantly slows the adjustment of the price level. When any one firm adjusts its price, that firm will be reluctant to change its price very much, since a large change would alter its real price (its price relative to other firms). The result of these incremental changes is that even after every firm in the economy has gone through one round of price adjustment, the aggregate price level will not have fully adjusted to its new equilibrium level

(2) [5 points] If Congress raises taxes, the response of the economy to the tax increase depends on how the central bank responds

True. The impact of a change in fiscal policy depends on the policy the central bank pursues—that is, on whether it holds money supply, interest rate , or income constant. More generally, whenever analyzing a change in one policy, we must make an assumption about its effect on the other policy

(3) [5 points] The Mundell-Fleming model shows that a fiscal policy is more effective than a monetary policy

Uncertain. According to the Mundell-Fleming model, under floating exchange rates, a monetary expansion raises income whereas a fiscal expansion does not, but under fixed exchange rates, a fiscal expansion raises income whereas a monetary expansion does not. Therefore, the model shows that the effect of almost any economic policy on a small open economy depends on whether the exchange rate is floating or fixed

Part B (15 points)

Briefly answer the following questions in words.

(1) [5 points] Can an IS curve be vertical? Give an example

The slope od an IS curve depends on income and interest rate elasticities of aggregate expenditure. For example, if investment does not depend on the interest rate, then the IS curve is vertical

(2) [5 points] What is an advantage to fixed exchange rates?

Fixed exchange rates reduce some of the uncertainty in international business transactions and make irrational and destabilizing speculation difficult

(3) [5 points] Why do firms have motives for holding inventories of goods? Give an example

Firms have motives for holding inventories of goods: smoothing production, using them as a factor of production, avoiding stock-outs, and storing work in process

Part C (70 points)

(1) [14 points] **IS-LM Model**

Assume the following model of the closed economy in the short run, with the price level (P) fixed at 1.0:

$$C = 0.5(Y - T)$$
$$T = 1,000$$
$$I = 1,500 - 250r$$
$$G = 1,500$$
$$\frac{M^d}{P} = 0.5Y - 500r$$
$$M^s = 1,000$$

(a) [2 points] Write a numerical formula for the IS curve, showing Y as a function of r alone [Hint: Substitute out C, I, G, and T]

$IS : Y = -500r + 5000$

(b) [2 points] Write a numerical formula for the LM curve, showing Y as a function of r alone [Hint: Substitute out M/P]

$LM : Y = 1000r + 2000$

(c) [2 points] What are the short-run equilibrium values of Y, r, and national saving (S)?

$Y = 4000$, $r = 2$, $S = 1000$

(d) [2 points] Assume that G increases by 1,500 (i.e., $G = 3,000$). By how much will Y increase in short-run equilibrium?

Y increases by 2000

(e) [3 points] You are the chief economic adviser in this hypothetical economy. Do you believe that fiscal policy is more potent than monetary policy? Briefly discuss [Hint: Use the slope of IS and LM curve in (a) and (b)]

Since the IS curve is steeper than the LM curve, fiscal policy is relatively more effective than monetary policy

(f) [3 points] Write the numerical aggregate demand (AD) curve for this economy, expressing Y as a function of P

$Y = (10,000/3) + (2000/3P)$ *or* $Y = 3333 + 667/P$

(2) [10 points] **Classical models in the Long Run**

During early 1980s, President Reagan proposed to increase defense spending and decrease taxes. Table 1 shows how the policies affected the U.S. economy. Use the **Classical Model** to answer the following questions

(a) [3 points] Use the **closed** economy model and illustrate graphically how the model predicts national saving (S), investment (I), real interest rate (r), net export(NX), and real exchange rate (ε) in the long run

See Figure 1

(b) [2 points] Are the data in the table consistent with model predictions that you found in part (a)? Briefly discuss

The closed economy model correctly predicted that national saving would fall and the interest rate would rise. But, the closed economy model predicted that investment would fall as much as saving; actually, investment fell by much less than saving. Also, the closed economy model by definition could not have predicted the effects on the trade balance or exchange rate

(c) [3 points] Now use the **small open** economy model and illustrate graphically how the model predicts national saving (S), investment (I), real interest rate (r), net export (NX), and real exchange rate (ε) in the long run

See Figure 2

(d) [2 points] Are the data in the table consistent with model predictions that you found in part (c)? Briefly discuss

The small open economy model correctly predicted what would happen to NX and the real exchange rate, but incorrectly predicted that the interest rate and investment would not change. In order to explain the U.S. experience, we need to combine the insights of the closed and small open economy models

Table 1: The Reagan Deficits

variable	1970s	1980s	actual change
S	19.6	17.4	↓
I	19.9	19.4	no change
r	1.1	6.3	↑
NX	-0.3	-2.0	↓
ε	115.1	129.4	↑

Data: decade averages; all except r and ε are expressed as a percent of GDP

(3) [6 points] **Open Economy in the Short Run**

Economic expansion throughout the rest of the world raises the world interest rate. Use the Mundell-Fleming $(IS^* - LM^*)$ model to illustrate graphically the impact of an increase in the world interest rate (r^*) on the nominal exchange rate (e) and level of output (Y) in a small open economy with a *floating-exchange-rate* system

The fiscal expansion in the rest of the world would raise the world interest rate and lower domestic investment. As a result, an increase in world interest rate will raise national income and lower nominal exchange rate

(4) [10 points] **The Model of AD and AS**

Assume that an economy is initially operating at the natural rate of output $(\overline{Y})$. A short-run aggregate supply equation is given by

$$Y_t = \overline{Y} + \alpha(P_t - P_t^e),$$

where Y is output, P is the price level, P^e is the expected price level, and $\alpha > 0$

(a) [2 points] What is the slope of the aggregate supply curve?
The slope of AS curve is $\frac{1}{\alpha}$

(b) [3 points] According to the sticky-price model, the value of α depends on the fraction of firms with sticky prices. Other things being equal, if a greater proportion of firms follows the sticky-price rule, what happens to the slope of the AS curve?
The slope of AS curve ($\frac{1}{\alpha}$) increases (decreases) as the fraction of firms with flexible prices increases (decreases) in the sticky-price model. Therefore, if a greater proportion of firms follows the sticky-price rule, the AS curve will be flatter

(c) [5 points] Use the model of aggregate demand and aggregate supply to illustrate graphically the **short-run** and **long-run** effects on price and output of an **unexpected expansionary** monetary policy change
This positive AD shock moves output above its natural rate and P above the level people had expected. Over time, P^e rises, SRAS shifts up, and output returns to its natural rate. See Figure 3

4

(5) [10 points] **The Phillips Curve**

Suppose that an economy has the Phillips curve

$$\pi_t = \pi_t^e - 0.5(u_t - 0.06)$$

(a) [2 points] What is the natural rate of unemployment (u^n)?
$u^n = 0.06$ *or* $u^n = 6\%$

(b) [4 points] Use the Phillips curve diagram to illustrate graphically how the inflation rate (π) and unemployment rate (u) change in the short run to an **unexpected expansionary** monetary policy

If the change in monetary policy is not expected, in the short run, the inflation rate increases and the unemployment falls. It causes a movement along the Phillips curve. See Figure 4

(c) [4 points] Use the Phillips curve diagram to illustrate graphically how the inflation rate (π) and unemployment rate (u) change in the short run to an **expected expansionary** monetary policy

If the change in monetary policy is fully expected, the Phillips curve shifts upward to the right in the short run. Therefore, unemployment rate stays the same, but inflation rate will be higher than what it was initially. See Figure 5

(6) [10 points] **Consumption Theories**

(a) [3 points] What were Keynes's three conjectures about the consumption function?

  i) *MPC is between zero and one*
  ii) *APC falls as income rises*
  iii) *Income is the primary determinant of consumption and the interest rate does not have an important effect on consumption*

(b) [2 points] What is the consumption puzzle?
Studies of household data and short time-series found a relationship between consumption and income similar to the one Keynes conjectured (short-run consumption function). But studies of long time-series found that the APC did not vary systematically with income (long-run consumption function)

(c) [3 points] How does the Permanent Income Hypothesis (PIH) resolve the puzzle?
The PIH implies that people try to smooth consumption by emphasizing that people experience random and temporary changes in their income from year to year. The PIH explains the consumption puzzle by suggesting the standard Keynesian consumption function uses the wrong variable for income. The APC is a decreasing function of income if much of year-to-year variation in income is transitory. In long time-series data, however, variations in income are largely permanent; therefore, consumers do not save any increases in income, but consume them instead

(d) [2 points] Demographers predict that the fraction of the population that is elderly will increase over the next 20 years. What does the Life-Cycle Hypothesis (LCH) predicts

for the influence of this demographic change on the national saving rate? That is, will the national saving rate increase or decrease? Why?

The life-cycle model predicts that an important source of saving is that people save while they work to finance consumption after they retire. If the fraction of the population that is elderly will increase over the next 20 years, the life-cycle model predicts that as these elderly retire, they will begin to dissave their accumulated wealth in order to finance their retirement consumption: thus, the national saving rate should fall over the next 20 years

(7) [10 points] **Money Supply and Inflation**

To increase tax revenue, the US government in 1932 imposed a two-cent tax on checks written on deposits in bank accounts (In today's dollars, this tax was about 25 cents per checks)

(a) [2 points] How do you think the check tax affected the ***currency-deposit ratio***? Briefly explain

The introduction of a tax on checks makes people more reluctant to use checking accounts as a means of exchange. Therefore, they hold more cash for transactions purposes, raising the currency-deposit ratio

(b) [2 points] Briefly discuss how this tax affected the money supply using the model of the money supply under a fractional-reserve banking system

The higher the currency-deposit ratio, the lower the proportion of the monetary base that is held by banks in the form of reserves and, hence, the less money banks can create

(c) [3 points] Now use the $IS-LM$ model to discuss the impact of this tax on the economy in the short run. Was the check tax a good policy to implement in the middle of the Great Depression?

The contraction of the money supply shifts the LM curve upward, raising interest rates and lowering output. This was not a sensible action to take during the Great Depression

(d) [3 points] Explain how this tax influenced nominal interest rates and inflation rates in the long run using the Quantity Theory of Money (QTM) and the Fisher effect

In the long run, the Quantity Theory of Money says that the monetary tightening should reduce inflation. The Fisher Effect says that the fall in inflation rate should cause an equal fall in nominal interest rate

Part D (10 points)

If you are a ***Graduate*** student, you should answer the following questions. This is a bonus question for ***Undergraduate*** Students

(8) [10 points] Suppose that the central bank strictly followed a rule of keeping the real interest rate at 3% per year. That rate happens to be the real interest rate consistent with the economy's initial equilibrium

(a) [5 points] Assume that the economy is hit by a money demand shock only. Under the central bank's rule, how will the money supply respond to a money demand shock? Will the rule make aggregate demand more stable or less stable than it would be if the money supply were constant?

If the Fed targets the real interest rate, then money demand shocks are offset by changes in the money supply, so the LM curve does not move. Since the shock causes the money supply to change, but does not affect output, the money supply is acyclical. By following the interest-rate-targeting rule, the AD curve is unaffected by money-demand shocks (since they are offset by money-supply changes), so it is more stable than if the Fed did not respond at all

(b) [5 points] Assume that the economy is hit by IS shocks only. Under the central bank's rule, how will the money supply behave? Will the interest-rate rule make aggregate demand more stable or less stable than it would be if the money supply were constant?

When there are IS shocks, the rule does not work very well. Suppose a shock shifts the IS up and to the right. Targeting the real interest rate requires the Fed to increase the money supply to shift the LM curve down and the right. While this maintains the real interest rate at its initial level, output is above full-employment output. The money supply is procyclical, since the shift in the IS curve caused output to rise, and the increase in the money supply caused output to rise further. This response to IS shocks makes the aggregate demand curve less stable, as it shifts the AD curve farther to the right in response to an IS shock than it would have if the LM curve did not respond
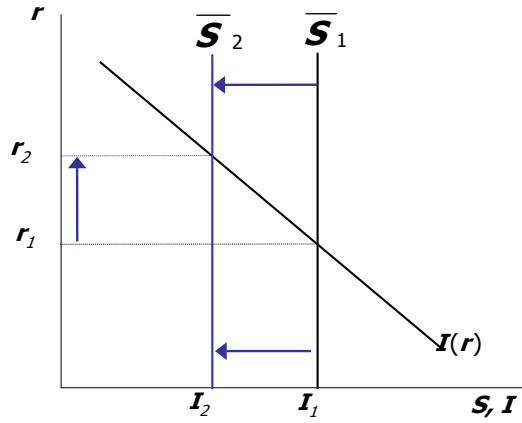
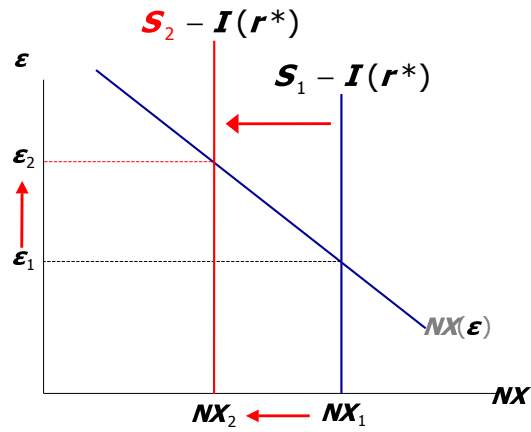Figure 1: The Reagan deficits: Closed Economy Model

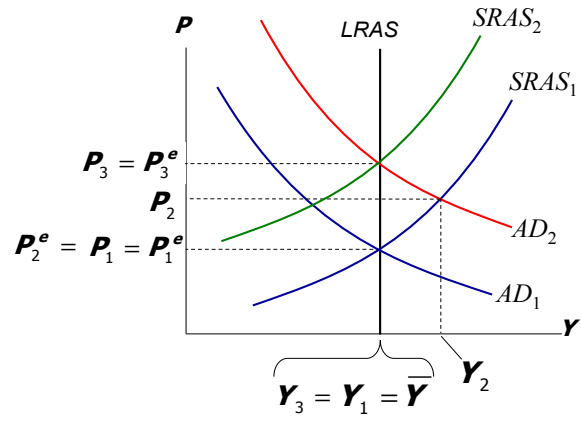Figure 2: The Reagan deficits: Open Economy Model

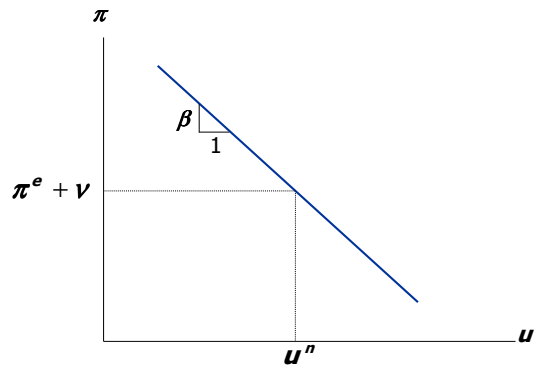Figure 3: Effects on Price and Output of an Unexpected Expansionary Monetary Policy Change

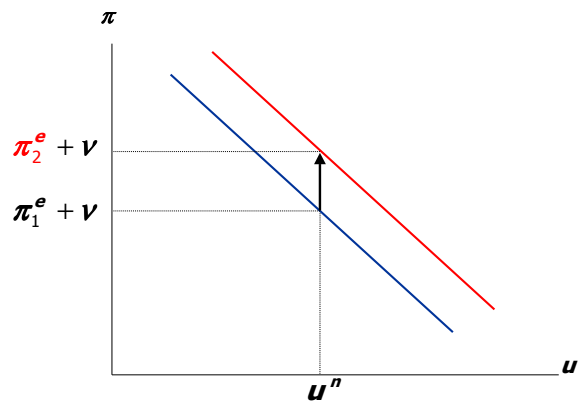Figure 4: Effects on Unemployment and Inflation of an Unexpected Expansionary Monetary Policy Change

Figure 5: Effects on Unemployment and Inflation of an Expected Expansionary Monetary Policy Change