

Economics 155 Homework Assignments.

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Faculty and Staff

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Teaching

Econ 155 - Homeworks

Assignment 1. For Discussion in section Monday September 13, 2004

Question 1. Assume a given level of the dollar price of pound sterling that is expected today to exist at the end of 90 days, a given level of the interest rate yield on US Treasury bills with 90 day maturity, and a given level of the interest rate yield on UK Treasury bills with 90 day maturity. What is the expected time path of the dollar price of pound sterling from today until the end of the 90 day period?

Question 2. Show how your answer depends on the interest differential between US and UK Treasury bills.

Question 3. How does your answer to Qu. 1 change if one week from today there is a sudden, unexpected increase in the interest rate yield on US Treasury Bills?

Question 4. How does your answer to Qu. 1 change if today the market expects that in one week there will be an increase in the interest yield on US Treasury Bills?

Assignment 2. For Discussion in section, Monday September 20, 2004

Question 1. What are the short-run and long-run effects of a permanent increase in  $M$  the money stock, on the level of  $E$  the price of foreign exchange,  $P$  the domestic price level, and  $R_d$  the rate of interest on short-term financial assets. Use Figure 14-12 in the Text to assist you in preparing and illustrating your answer.

Assignment 3. Please answer the following questions in writing and submit to your section Monday September 27, 2004.

Question 1. Define the real exchange rate. (RER).

Qu. 2. Is the US economy better off or worse off when its RER increases? Assume the change in RER has no effect on the level of employment in the US.

Qu. 3. How does your answer to qu. 2 change if a higher RER leads to an increase in employment in the US?

Qu. 4. Is it reasonable to expect a higher RER to induce a higher level of employment in the US?

Qu. 5 Discuss the differences between the following definitions of PPP, one of which comes from page 411 of the text:

Text definition: "The major prediction of PPP is that real exchange rates never change, at least not permanently."

A rival candidate: "The major prediction of PPP is that real exchange rates do not change in the face of a constant rate of inflation."

Assignment 4. Review the following for the first hour exam.

Economics 155 - Prof. G.H. Borts - Review Questions for First Hour Exam - 2004

1. Use the Balassa-Samuelson hypothesis to explain why observations on exchange rates and price levels may be inconsistent with absolute purchasing power parity.

2. Under the uncovered Interest Rate Parity theorem, an increase in the interest rate on dollar assets relative to the foreign interest rate will lead to a change in the time path of the dollar price of foreign exchange.

Assume that the domestic and foreign interest rates were initially equal, and then become unequal as described. What are the old and new time paths of the exchange rate implied by uncovered IRP? Use a diagram in your answer.

3. Why do economists believe that the interest differential between two currencies may be used to forecast the future change in the exchange rate?

4. In 1992, short-term interest rates on dollar denominated assets were 3.25 percent per annum, while they were 12.31 percent per annum on short term assets denominated in French francs.

a. Would you expect the forward price of francs (expressed in dollars per franc) to be greater or less than the spot price?

b. Using the forward price to measure market expectations, was the market expecting the dollar price of francs to rise or fall?

5. Suppose that short-term interest rates in the US are equal to those in Europe. Now the markets learn (at the close of business) that the Federal Reserve plans to raise the short-term interest rate in the US, but will not do so for 30 days. What do you expect will happen tomorrow to the spot dollar price of European currencies? What is likely to happen to the 30 day forward price of European currencies?

6. When there is a rise in the money supply, the short-run and long-run effects on the interest rate and the price of foreign exchange will depend on what the market expects about future Central Bank actions with respect to the money supply. Explain.

7. What is Relative Purchasing Power Parity? Discuss the circumstances under which it does not hold?

8. Explain what happens to the exchange rate, domestic price level, and domestic interest rate in the short run and long run, as a result of a one-time permanent reduction in the foreign money stock.

9. Does a change in the real exchange rate contradict the purchasing power parity theorem? Discuss.

10. When the Federal Reserve Board (FED) lowered U.S. interest rates on December 20, 1991, the dollar price of foreign exchange increased about 3 percent against European currencies. Following that, for the next two months, the dollar appreciated 3.5% against these same currencies. However the fall in the price of foreign exchange exceeded the magnitude predicted by the interest differential between the dollar and these European currencies.

a. Explain why the immediate increase in the price of foreign exchange is consistent with the uncovered interest rate parity theorem (IRPT).

b. How does one verify that the fall in the price of foreign exchange exceeds what is predicted by the interest differential?

c. What are the possible reasons for the failure of the interest differential to predict correctly the magnitude of the change in the price of foreign exchange?

11. In 1980, US short-term interest rates rose relative to the rest of the world, and the differential remained in effect until 1986. Under the uncovered interest rate parity theorem, this interest differential implies a depreciation of the foreign exchange value of the dollar. Yet the dollar continued to appreciate for five years. One of the possible

explanations for this anomalous behavior is the arrival of new information into the marketplace concerning the date at which the interest differential is expected to disappear. Show how this might resolve the paradox.

12. Explain how Purchasing Power Parity may be used to predict the correct exchange rate following a war? Can you think of reasons why the prediction might not be accurate?

13. It has been observed that countries with relatively low levels of real income have price levels that are lower than predicted by Purchasing Power Parity. Discuss possible theoretical explanations.

14. During the 1980's, the dollar price of the yen fell, despite the fact that inflation in the US exceeded the rate of inflation in Japan. At the same time, the real interest rate in the US exceeded the real interest rate in Japan. What are the implications for uncovered interest rate parity and purchasing power parity?

Economics 155 – Hour Exam – Friday October 8, 2004 – Answers.

(25 minutes)

1. Assume that next year the Central Bank increases the money stock by \$500 Billion (about 40%). What will be the long-run effects on the price of foreign exchange, the domestic rate of interest, and the domestic price level? Use diagrams in your answer. Make sure to cover the following possible cases:
  - a. The increase in the money stock is expected to be temporary. At the end of one year the money stock will return to its original level;

ANSWER: If the increase in the money stock is expected to be temporary, there will be no long-run effect on the price of foreign exchange, the domestic interest rate, or the domestic price level. The reason is that the money stock returns to its original level, so that the original conditions of equilibrium will continue in the long run.

- b. The increase in the money stock is expected to be permanent. The money stock will remain at its new higher level.

ANSWER: If the increase in the money stock is permanent, and there are no further changes in the money stock, the long-run effects are as follows:  
The price of foreign exchange will increase in proportion to the increase in the money stock.

The domestic rate of interest will be unaffected by the increase in the money stock. Long-run equilibrium in the foreign exchange market requires that the domestic and foreign rates of interest be equal. This implies that the increase in the price level (discussed immediately below) will be sufficient to return the value of real balances to their initial level.

The domestic price level will increase in proportion to the increase in the money stock so that in the long run there is no change in the level of real balances. These changes are shown in the accompanying two-quadrant diagram of the IRP curve and the demand for money function. The IRP curve will shift up in proportion to the increase in the long-run expected exchange rate, and the new equilibrium price of foreign exchange will occur at the intersection of the IRP curve and the domestic rate of interest.

- c. The increase in the money stock is expected to continue annually into the future at the same rate of growth.

ANSWER: In this case, the price of foreign exchange will increase every year by the rate of increase of the money stock, the domestic rate of interest will exceed the foreign interest rate by the rate of expected domestic inflation, and the domestic price level will increase every year by the rate of increase of the money stock. The value of real balances will be constant at a level that reflects the higher nominal rate of interest on domestic assets. The IRP curve will shift up every year by the increase in the expected price of foreign exchange.

(15 minutes)

2. a. Define absolute and relative purchasing power parity.

ANSWER: Absolute purchasing power parity exists when the value of the real exchange rate is equal to unity. The real exchange rate is defined to be a ratio whose numerator is the product of the price of foreign exchange and the foreign price level, and whose denominator is the domestic price level. Written symbolically, it is equal to  $E \times P_f / P_d$ .

Relative purchasing power parity exists when the value of the real exchange rate is equal to a constant, not necessarily unity. Thus  $E \times P_f / P_d = k$ .

- b. Assume that the world consists of two countries. Show that if either relative or absolute PPP holds, then changes in the price of foreign exchange may be predicted by comparing differences in the inflation rates of the two currencies.

ANSWER: If the real exchange rate is constant, then it is necessary that changes in the three terms satisfy the condition that changes in the exchange rate will offset changes in

the ratio of foreign to domestic prices. This implies that the percentage increase in the price of foreign exchange must equal the excess of the rate of domestic inflation over foreign inflation.

(15 minutes)

3. a. Define Covered and Uncovered Interest Rate Parity.

ANSWER; Interest rate parity requires the rate of return on holding domestic financial assets to equal the rate of return on holding foreign financial assets. The return on domestic financial assets equals the domestic interest rate. The return on foreign financial assets equals the foreign interest rate plus the expected capital gain or loss from holding an asset in foreign currency and then converting the proceeds back to domestic currency at the time the foreign asset matures.

There are two ways to express the value of the expected capital gain on holding the asset in foreign currency. The first is the excess of the forward price of foreign currency over the spot price as a percent of the spot price. When this definition of the capital gain is used, the equality of rates of return is referred to as covered interest parity, because all of the exchange risk has been hedged or covered by the purchase of the forward exchange contract.

The second way to express the value of the expected capital gain is the excess of the expected future price of foreign currency over the spot price as a percent of the spot price. Using this definition of capital gain implies that the exchange risk is not covered but rather borne by the arbitrageur, thus the term uncovered.

b. Assume that the world consists of two countries. Show that under interest rate parity, an interest differential between assets denominated in the two currencies implies that the price of foreign exchange will change over time.

ANSWER: The Interest Rate parity condition may be written symbolically as the following equality:  $R_d = R_f + [F - E]/E$ . In this expression F is used to denote either the contracted forward exchange rate or the expected exchange rate, both evaluated at the time the asset matures and the proceeds converted back to domestic currency. E stands for the spot exchange rate. It can be seen that when there is an interest differential, the IRP condition implies that the market expects a change in the price of foreign exchange, because the term  $F - E$  will not be zero. When F exceeds E, the market expects that E will rise over time, and conversely when F is less than E.

Assignment 5. Please answer the following questions in writing and submit to your section Monday , October 18, 2004.

What is the effect of the following on Aggregate Demand, and on the DD curve defined in Chapter 16?

1. Higher price of foreign exchange.
2. Higher domestic price level.
3. Higher foreign price level.
4. Higher price of imported oil.
5. Tariff on imports.

Assignment 6. Homework due in section October 25, 2004.

1. Assume that the exchange rate is free to fluctuate and that the economy is at long-run equilibrium. The country experiences a decline in world demand for its exports.
  - a. Use the AA-DD model to show the intermediate run effect on the price of foreign exchange, the domestic rate of interest, and on the level of real GDP.
  - b. Use the AA-DD model to determine whether any of the following policies could be used to return the economy to long-run equilibrium.
    - i. Fiscal Policy
    - ii. An increase of the money stock.
    - iii. A policy of waiting for the price level to fall.
2. Explain the effects of a balance of payments surplus on the money supply of the surplus country and the deficit country.
3. Demonstrate that the central bank cannot control the money stock when it is committed to a fixed exchange rate policy.

Assignment 7. Homework- Due in Section Monday November 1, 2004.

The world consists of two countries, A and B. The Central Bank of A fixes the price of its currency against the currency of B. Moreover, the Central Bank of A holds all of its foreign exchange reserves in the form of balances in the commercial banks of B. Now households in country B decide that they wish to spend a higher fraction of their income on goods imported from A, and a correspondingly lower fraction on home goods.

1. Show that B's increased demand for imports will create a deficit in its balance of payments, a decline in its real GDP, and surplus in country A's balance of payments.
2. Show that the fixed exchange rate prevents the Central Bank of A from using monetary policy to offset its balance of payments surplus and the effects of the surplus on its money stock and price level.
3. Show that the fixed exchange rate does not prevent the government of B from successfully using fiscal policy to restore its level of real GDP.
4. Show that the Central Bank of B cannot devalue its currency (i.e., increase the price of foreign exchange) to offset the balance of payments deficit and restore B's level of real GDP.
5. Finally, show that country B's balance of payments deficit will have no effect on its money stock.

Economics 155 – Prof. G.H. Borts – Review for Hour Exam – November 12, 2004

1. (10 minutes) Monetary policy will not be effective in offsetting shocks to aggregate demand in a country whose central bank sets a fixed exchange rate. Discuss and explain why the statement did not apply to the US in the 1960's.
2. (25 minutes) The exchange rate is flexible. Assume that in response to a decline of private investment expenditure, the government increases spending on public works. It has the option of financing the spending in one of two ways:
  - d. (10 minutes) Sale of debt.
  - e. (15 minutes) Increase in the money stock.

What is the effect in each case on the price of foreign exchange?

3. (15 minutes) a. Use the AA-DD model to show why the shock of higher world oil prices in the 1970's caused a recession and a deficit balance on current account in oil

importing countries, and a boom and a surplus balance on current account in oil exporting countries.

b. Would higher world beer prices have the same effects?

4. Starting in 1990, the West German government budget went into deficit to finance reunification with East Germany and reconstruction of its industry and infrastructure. In answering questions a) and b) below, assume that there was a fixed exchange rate between West Germany and other countries, and that the West German mark served as a reserve currency for Germany's trading partners, who set the exchange rate with their currency.

a) (20 minutes) Use the (AA-DD) model to show the effects of the reunification budget deficit on West German real GDP, domestic interest rate, balance of payments, international reserves, and money supply.

b) (10 minutes) Use the AA-DD model to show the effects on the real GDP, interest rate, balance of payments, international reserves, and money supply of the countries trading with Germany.

5. (15 minutes) In 1999, the US had a current account deficit of \$293 Billion. In the same year, the following transactions took place in the financial markets:

- i. US private residents acquired \$492 Billion of foreign assets.
- ii. Foreign private residents acquired \$729 Billion of US assets.
- iii. The US central bank sold \$11 Billion of foreign assets.
- iv. Foreign central banks acquired \$43 Billion of US assets.

a) In 1999 was the US Balance of Payments in deficit or surplus, and by how much?

b) What role did the US central bank play in financing the balance of payments?

6. Assume an economy is in long-run equilibrium, with output at full employment, the exchange rate at its long-run expected level, and the domestic interest rate at the world level. The money stock is fixed by the Central Bank, and the exchange rate is free to float. There is a sudden reduction in world prices of import goods.

a. (10 minutes) Using an AA-DD diagram, show the intermediate-run effects on the level of real GDP, the price of foreign exchange, and the domestic interest rate.

b. (25 minutes). Using diagrams, indicate whether a protective tariff on imports will return the economy to long-run equilibrium.

7. (15 minutes)

a. Assume that  $N - 1$  countries in the world fix their exchange rates against the currency of country Z, and they use that currency as their international reserve. Is it true that the

Central Bank of Z can conduct monetary policy without concern for the possible loss of international reserves? Explain.

b. Suppose Z's central bank guarantees convertibility of its currency into gold at a fixed price. Would that affect the willingness of other countries to hold reserves in Z currency?

8. Analyze the following two statements and determine if they are correct:

a. (12.5 minutes) Under a flexible exchange rate, central bank monetary policy can stabilize the level of output in the face of a decline in the world demand for the country's exports.

b. (12.5 minutes) However, the long-run effect of stabilization through monetary policy is a higher price level than one would observe under fixed exchange rates.

9. (10 minutes) Assume a freely floating exchange rate without central bank intervention. There is a sudden drop in the world demand for the country's exports.

a. Using a diagram, describe the intermediate-run effect of the shock on the price of foreign exchange, the level of real GDP and the interest rate. The intermediate run is defined to be an adjustment period in which the price level and long-run expected exchange rate are unchanged, but the price of foreign exchange, domestic interest rate, and real GDP are variable.

b. Analyze whether it is possible to return to long-run equilibrium through either of the following two policy responses:

i. (7.5 minutes) an increase in the domestic money stock through a central bank open market purchase of government debt.

ii. (7.5 minutes) an increase in government spending.

10. Your country is at full employment. There is an unexpected increase in the world interest rate. All of the questions below relate to this shock. Until you are told otherwise, the country's price level, money stock, long-run expected exchange rate, and world prices are all assumed to be fixed. Assume a freely floating exchange rate.

a. (10 minutes) Using a diagram, describe the intermediate run effect of the shock on the price of foreign exchange and the level of real GDP. The intermediate run is defined to be an adjustment period in which the price level and long-run expected exchange rate are unchanged, but the current price of foreign exchange, domestic interest rate, and real GDP are free to vary.

b. Analyze whether it is possible to return to long-run equilibrium through either of the following responses:

i.. (7.5 minutes) a change in the domestic money stock through a central bank open market purchase or sale of government debt.

ii. (7.5 minutes) a fall in the price level.

c. Now assume that the central bank follows a policy of fixing a specific exchange rate, buying or selling foreign exchange and allowing the money stock to vary. The central bank maintains a sufficient reserve of foreign exchange to convince traders that the policy is credible.

(10 minutes) Using a diagram, describe the effect of the shock on the level of real GDP, the interest rate, and the money stock in the intermediate run. Here, the intermediate run is defined to be an adjustment period in which the money stock and real GDP are variable, while the price level, exchange rate, world prices, and the long run expected exchange rate are not.

d. Analyze whether it is possible to return to long-run equilibrium through the following responses:

i. (7.5 minutes) A change in the domestic money stock through a central bank open market purchase or sale of government debt.

ii. (7.5 minutes) A fall in the price level.

11. Assume a country is in long run equilibrium in the goods market and money market. Now there is a sudden worldwide decline for the country's export product.

a. (15 minutes) What is the intermediate-run effect of the decline in demand for exports on the exchange rate, rate of interest, and level of real GDP? Use diagrams in your answer. The intermediate-run is to be interpreted as a period of time long enough for any economic shock to have an effect on the exchange rate, interest rate, and level of real GDP, but no effect on the price level, or the expected future price of foreign exchange.

b. (15 minutes) Is it possible for the government to use monetary policy or fiscal policy, or any combination of the two to return the economy to the original equilibrium level of the exchange rate, interest rate, and real GDP? Explain using diagrams.

c. Instead of the above, assume that the exchange rate is fixed by the Central Bank, which announces that it stands ready to buy and sell foreign exchange for a fixed price. What is the intermediate-run effect of the decline in demand for exports on the money supply, rate of interest, and level of real GDP? Use diagrams in your answer.

d. (15 minutes) Is it possible for the government to use monetary policy or fiscal policy, or any combination of the two to return the economy to the original equilibrium level of the money stock, interest rate, and real GDP? Explain using diagrams.

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Answer All Questions. The suggested time allocation is shown in parentheses. Use the AA-DD model as well as other models you have learned in this course, where it is helpful to answer question 1.

1. In the last few days, the dollar price of the Euro currency has reached a historic high. The six-year old Euro is now 57% more expensive than it was in 2000. The President of the European Central Bank, Jean Claude Trichet, warned (11/8/04) of the impact of brutal moves in the exchange rate. The Wall St. Journal (11/9/04) notes that “Fears of growing U.S. budget deficits in the wake of the re-election of President Bush have put the dollar under pressure against a range of currencies.”

a. (5 minutes) Does the depreciation of the dollar against the Euro hurt or help the economy of the Euro area?

**Answer:** Depreciation of the dollar against the Euro both hurts and helps the economy of the Euro area.

**HURTS:** A cheaper dollar means that more dollar-priced goods will enter the Euro market and compete with Euro goods. It also means the Euro- priced goods sell for a higher dollar price in the US, and they will suffer a decline in demand. Thus the Euro area will suffer a decline in aggregate demand for real GDP. So from a macro perspective, depreciation of the dollar hurts the Euro economy

**HELPS:** A cheaper dollar means that dollar-priced goods are cheaper in the Euro area, yielding a higher standard of living to a person whose income is paid in Euros. So from a micro perspective, depreciation of the dollar helps the Euro economy.

b. (5 minutes) Does the depreciation of the dollar against the Euro hurt or help the US economy?

**Answer:** Depreciation of the dollar against the Euro both hurts and helps the economy of the US. For the reasons given immediately above in answer to 1a, depreciation of the dollar against the Euro helps the US economy from a macro perspective, expanding the real GDP of the US through a more positive current account, while hurting the US economy from a micro perspective because Euro-priced goods are now more expensive to persons whose incomes are paid in dollars.

c. (5 minutes) Does an increase in the U.S. budget deficit hurt or help the Euro area?

**Answer:** Using the AA-DD model, it can be shown that an increase in the US budget deficit (either through higher government spending or lower taxes) shifts our DD curve to the right. The result is higher real GDP in the US, a lower dollar price of the Euro, and a

higher domestic rate of interest in the US. The impact of these changes on the Euro economy is mixed:

- f. Higher real GDP in the US will stimulate US imports of goods from the Euro area.
- g. A lower dollar price of the Euro means that US consumers will demand more goods from Euro area countries, and that Euro consumers will demand fewer goods from the US.
- h. A higher domestic interest rate in the US means that the Euro area IRP curve will shift upward, the AA curve in the Euro area will shift to the right, leading to greater real GDP in Europe, and a higher Euro price of the dollar.

Thus the Euro area is helped by greater US demand for Euro goods, but hurt by the higher Euro price of the dollar and the consequent higher Euro cost of dollar priced goods. There is no clear answer.

d. (10 minutes) Is there any reason why an increase in the U.S. budget deficit would cause a depreciation of the dollar against the Euro?

**Answer:** The previous answer has already pointed out that an increase in the US Budget deficit would not cause a depreciation of the dollar. This result would be contradicted if at the same time that the US budget deficit increased, the Fed were to increase the money supply in the US, perhaps to prevent an immediate rise in interest rates. For then the dollar would not appreciate, but very likely depreciate as the stock of dollars increased every year, and the US price level increased. This depreciation will be intensified if investors lose confidence in the ability of the US government to pay the interest burden on its debt, a possibility if the interest component of the federal budget grows so large that Congress is unwilling to increase taxes to cover higher interest payments.

e. (5 minutes) Is there any policy action that the European Central Bank could take to prevent the depreciation of the dollar against the Euro?

**Answer:** Yes, the ECB can prevent the depreciation of the dollar against the Euro by purchasing dollars in the market.

f. (5 minutes) Is there any policy action that the Federal Reserve System could take to prevent the depreciation of the dollar against the Euro?

**Answer:** Yes, the Fed can prevent the depreciation of the dollar by increasing interest rates and reducing the US money stock.

2. In 1990, the US had a current account deficit of \$79 Billion. In the same year, the following transactions took place in the financial markets:

- i. US private residents acquired \$86 Billion of foreign assets.
- ii. Foreign private residents acquired \$133 Billion of US assets.
- iii. The US central bank purchased \$2 Billion of foreign assets.
- iv. Foreign central banks purchased \$34 Billion of US assets.

- a. (5 minutes) In 1990, was the US Balance of Payments in deficit or surplus, and by how much?

**Answer:** The US Balance of payments was in deficit by \$32 Billion. There are two ways to calculate this result.

The simplest is through the transactions of the US central bank and foreign central banks. The US central bank purchased \$2 Billion of foreign assets, representing a \$2 Billion increase in holdings of foreign assets. By itself this transaction would offset a \$2 Billion surplus in the US. Balance of Payments. At the same time, foreign central banks purchased \$34 Billion of US assets, which by itself would offset a \$34 Billion deficit in the US Balance of Payments. Netting the two sets of transactions yields financing for a US Balance of Payments deficit of \$32 Billion.

The second way to calculate the US Balance of Payments is to add up the transactions involving private entities, i.e. add up the transactions that comprise the Balance on Current Account and the Balance on Financial Account.

We are given the fact that the Balance on Current Account is a deficit of \$79 Billion. In addition, we are told that US private entities acquired \$86 Billion of foreign assets and foreign private entities acquired \$133 Billion of US assets. The sum of these two entries is a surplus on financial account of \$47 Billion ( $\$133 \text{ Billion} - \$86 \text{ Billion} = \$47 \text{ Billion}$ ). The overall Balance of Payments is then the sum of the Current Account Balance ( $-\$79 \text{ billion}$ ) and the Financial Account Balance ( $+\$47 \text{ Billion}$ ) =  $-\$32 \text{ Billion}$ .

- b. (5 minutes) What role did foreign central banks play in financing the US balance of payments?

**Answer:** Foreign central banks purchased \$34 Billion of US assets. They financed the US deficit of \$32 Billion and also offset the \$2 Billion purchase of foreign assets by the US central bank.

- c. (5 minutes) Would you expect that the money stock in foreign countries had increased or decreased in 1990?

**Answer:** One should expect that the money stock in foreign countries increased in 1990. The reason is that foreign central banks purchased \$34 Billion of US assets, paying for these funds by creating liabilities to match the increase in foreign assets. The liabilities created consisted of currency and reserve deposits of foreign commercial banks. It is difficult to say by how much the money stock increased in foreign countries, for two reasons: First, each foreign country has a different money multiplier, so that increases in commercial bank reserves would have a different impact on the money stock. Second, some foreign central banks may have attempted to reduce the expansion of money by sterilizing the purchase of US financial assets.