

## Homework Assignment #4: Answer Sheet

1. Consider a small open economy with a flexible exchange rate. Explain what happens to the exchange rate, and if it will overshoot or not if:

(a) *the money supply contracts*

**brief answer** The exchange rate depreciates once full adjustment is completed. Hence, to maintain money market equilibrium, the money supply must fall even more today. So there is overshooting. In figure 1 we start at  $e_0$  and  $P_0$ . The money supply contraction leads to a new equilibrium at  $\bar{e}$ ,  $P_1$ . Before prices adjust, the currency appreciates to  $e_1$ , it then depreciates as the  $P \rightarrow P_1$ .

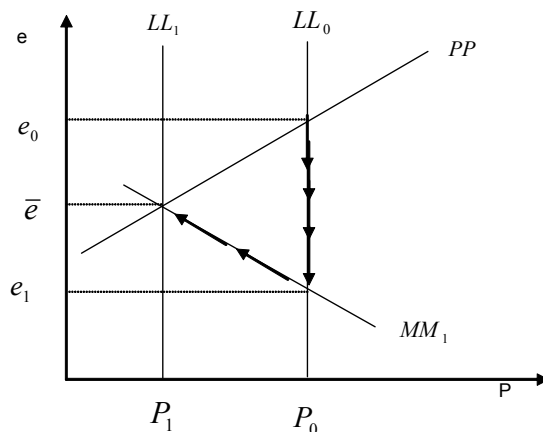


Figure 1: Response to Monetary Contraction

(b) *there is a fiscal expansion*

**brief answer** A fiscal expansion causes interest rates to rise and so the exchange rate depreciates. But it does not affect money market equilibrium, so the price level does not change (or output if it is a fix-price model). Hence, there is no overshooting. Consider figure ???. We start at  $e_0$ . The fiscal expansion raises aggregate demand and interest rates causing the currency to appreciate in value. In the figure, since aggregate demand rises at any exchange rate,  $YY \rightarrow YY_1$ . With flexible exchange rates the depreciation reduces competitiveness and offsets exactly the effects of the fiscal expansion. So output does not change. Hence there is no reason for overshooting. We just go from  $e_0 \rightarrow e_1$ .

(c) *the world interest rate decreases*

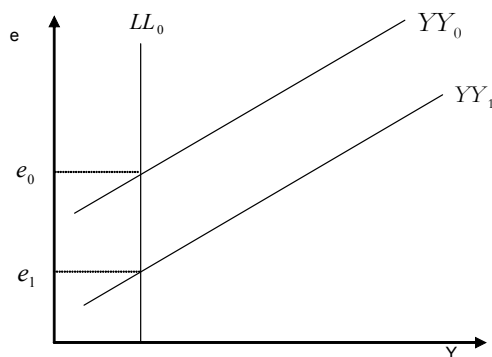


Figure 2:

**brief answer** Recall that money market equilibrium implies  $i^* = \frac{1}{h} \left( kY - \frac{M^s}{P} \right)$ .<sup>1</sup> So if  $i^* \downarrow$ , we see that either  $Y$  must fall if  $P$  is fixed, or  $P$  must fall if  $Y$  is fixed. So the  $LL$  curve must shift to the left. But then we are left with the same answer as in part (a). In the model with fixed  $Y$ , the parallel is exact. In the model with fixed prices, however, while the  $LL$  curve shifts left, the  $YY$  curve shifts right, since lower interest rates increase investment. So the magnitude of the exchange rate depreciation is enhanced, but the answer is the same.

(d) *the foreign price level rises*

**brief answer** Nothing effects money market equilibrium, so we know the  $LL$  curve does not shift. We have PPP, so  $e = \frac{P}{P^*}$ , so for any  $P$  we have lower  $e$ , thus  $PP$  shifts down. The new exchange rate is lower, but there is no overshooting. In the fix-price case, higher foreign prices makes us more competitive shifting  $YY$  to the right, but the fall in  $e$  offsets this effect. Again all that happens is  $e \searrow e_1$  (as in part (b)).

2. *True, False, Uncertain, and Explain. Explain your answers briefly and cite relevant theories.*

(a) *Under the Bretton Woods system, the country at the center (the U.S.) can set its monetary policy at will. Other countries will have to adjust their monetary conditions.*

**brief answer** False. While it is true that under Bretton Woods the U.S. had some degree of monetary autonomy, ultimately the U.S. was constrained by its commitment to keep the dollar pegged to gold. Because the U.S. was the center country in the monetary system, it was able to undertake expansionary policy to keep the U.S. at full employment and force other countries to follow in order to maintain their pegs against the dollar. In the long run, however, this expansionary policy put upward pressure on the gold price and undermined the Bretton Woods system.

(b) *Governments with economies in deficit usually face more intense pressures to restore external balance than do surplus countries. As a result, the external balance problem of a deficit country is more severe than that of a surplus country.*

<sup>1</sup>This is equation (3) from the lecture note on exchange rate fluctuations.

**brief answer** True. In general, this statement is true. While there are costs to excessive surpluses, the costs of external deficits are likely to be higher. In particular, deficit countries that are borrowing from the rest of the world often face more acute pressure to reduce imbalances as capital markets become reluctant to continue lending to a deficit country. Moreover, in settings where deficits are financed by central bank selling of reserves, then there is a hard binding constraint on imbalances –namely, when reserves run out, adjustment must follow.

- (c) *Under a fixed exchange rate regime, a country can generally attain internal and external balance using only fiscal policy.*

**brief answer** False. In general, under a fixed exchange rate regime, it is necessary for a country to use both fiscal policy and exchange rate adjustments to achieve both internal and external balance. You should be able to illustrate this in the internal-external balance diagram. The underlying idea is that the country has two objectives – internal and external balance– and two instruments –the exchange rate and fiscal policy. If the country uses only one instrument, say fiscal policy, it will be able to achieve only one of the two objectives. To achieve both objectives, the country must use both instruments.

- (d) *Under a flexible exchange rate system fiscal policy is more potent than under fixed exchange rates.*

**brief answer** False. Under fixed exchange rates monetary policy is potent, but fiscal policy is relatively impotent – it can only affect the value of the exchange rate. If capital is mobile, then interest rates must approximate foreign rates (except during the adjustment period), and thus we can solve for prices (or output if the model is Keynesian) using the money market equilibrium condition. Fiscal policy does not appear. If there is a fiscal expansion this would cause rates to rise, but this would cause an incipient capital inflow and the resulting appreciation of the currency would reduce competitiveness, offsetting any expansionary effect from fiscal policy.

- (e) *The fact that exchange rates overshoot indicates that investors must be irrational. Such behavior is simply not consistent with rational market behavior.*

**brief answer** False. Overshooting occurs because investors are rational. Consider a monetary expansion. Rational investors know that the money supply has risen *and* that in the new equilibrium  $e$  will be higher along with the price level. Thus they expect domestic currency to lose value. If this is the case, they would not be willing to hold the increased stock of money. The only way they would be willing to hold a higher level of real money balances is if the return were higher than foreign currency. This can only occur if the currency falls today by more than it will in the long-run. They expected depreciation of  $e$  provides a capital gain that makes them willing to hold more of it. But as the price level rises to its new equilibrium value the real money supply contracts back, so real money demand must fall, so the amount of expected depreciation of  $e$  must fall.

3. *In spite of the flaws of the pre-1914 gold standard, exchange rates crises were rare for major European powers, the U.S., and Japan. In contrast, such changes became quite frequent in the interwar period. Can you think of reasons for this contrast? Explain.*

**brief answer** Changes in parities reflected both initial misalignments and balance of payments crises. Attempts to return to the parities of the prewar period after the war ignored the changes in underlying economic fundamentals that the war caused. This made some exchange rates less than fully credible and encouraged balance of payments crises. Central bank commitments to the gold parities were also less than fully credible after the wartime suspension of the gold standard and as a result of the increasing concern of governments with internal economic conditions.

4. *Oil prices have recently reached \$60 a barrel. Suppose you are a member of the monetary policy committee of a small open economy, dependent on oil imports, which also wants to maintain a currency peg to the dollar.*

- (a) *Describe the pressures that the currency would face due to the increase in oil prices? (Hint: think about the effects of the higher oil prices on the domestic price level as well as the current account). How would the central bank have to respond in order to maintain the currency peg? Will this response by the central bank increase or decrease foreign reserves?*

**brief answer** An increase in the price of imports worsens the trade balance and the current account. Remember that countries that have current account deficits are borrowing from abroad. A reasonable assumption then is that whenever a country borrows from abroad it is expected to repay. Thus, we believe CA surpluses are necessary in the future. If the markets believe this story also and they either expect currency depreciation in the future in order to create the needed CA surpluses or they simply get worried about the country's ability to generate exports and thus CA surpluses, there will be a pressure on the currency to depreciate. The central bank has to sell foreign reserves (this increases demand for the domestic currency and lowers demand for foreign currency) in order to prevent the currency from depreciation. This action lowers the money supply.

- (b) *Describe the impact of the Central Bank actions on the money supply, output, and domestic interest rates. If the economy is in a mild recession or below potential output, describe the dilemma that policymakers face.*

**brief answer** The money supply falls, thus interest rates increase. This will have a contractionary effect on output – it is equivalent to the LM curve shifting to the left. Also, the exchange rate indeed appreciates (in real terms) as a result of this intervention. If the economy is in recession or below potential output the foreign exchange intervention would further deteriorate the situation in the economy. So, the central bank is faced with a choice between defending the peg and stabilizing the economy.

- (c) *Suppose the central bank decides to sterilize its foreign-exchange intervention. Answer questions a. and b. once more. This time, will the central bank's domestic assets increase or decrease?*

**brief answer** The central bank can sterilize the intervention by buying domestic bonds to offset the fall in the money supply. In this situation neither output nor interest would be affected.

- (d) *Many Asian central banks peg their currencies to the dollar and hold US treasury bills as foreign assets. Supposing these central banks have to undertake the intervention in part a., discuss what effect this intervention could have on the US economy. Highlight the effect (if any) on US deficits, exchange rate and interest rate.*

**brief answer** If Asian central banks sell their foreign reserves (or stop buying them), difficulties would arise in financing of the US CA deficit. The excess supply of US IOU's would be larger, this would cause their price to fall and US interest rates to rise. This should imply a correction of the CA deficit, higher interest rates in US (to attract foreign central banks and other foreign investors into buying US assets) or depreciation of the dollar.

5. *Consider a small open economy with a fixed exchange rate and perfect capital mobility. The economy is at full employment and in external equilibrium.*

- (a) *Now suppose that, all of a sudden, foreign investors become scared about this country. Foreign investors now require a premium to continue to invest in the country – hence, capital inflows of any size now require a higher interest rate than before. Use an IS-LM diagram to show what happens to income and domestic interest rates in this economy.*

**brief answer** If before we had  $i = i^*$ , now we have  $i = i^* + \rho$ , where  $\rho$  is the risk premium. Presumably the size of the premium depends on the size of capital inflows. So the  $BB$  curve, that indicates balance of payments equilibrium shifts upwards and increases in slope.<sup>2</sup> Consider figure 3 where we start in full equilibrium at point  $A$ . The loss of foreign investor sentiment shifts the  $BB$  curve to  $BB'$ . At point  $A$  we are now in external deficit: the interest rate is clearly too low to keep foreign investors happy. To keep the exchange rate fixed, the CB must sell reserves. This causes the money supply to shrink and the  $LM$  curve shifts to the left until we reach point  $B$ , the new equilibrium. Clearly  $i$  is now higher and  $Y$  is lower than before.

- (b) *Given that the economy was initially at full employment, the monetary authorities might seek to offset the effect on income that you derived in part (a). What can they do? Explain. Why might this be problematic?*

**brief answer** To offset the effect the authorities need to sterilize. They would have to conduct open market operations and purchase domestic securities to prevent the monetary base from shrinking. This would keep the economy at point  $A$  and full employment. The problem, however, is that the country keeps losing foreign exchange and the supplies of this are limited. Eventually they will run out and the currency will collapse.

- (c) *Suppose instead that this economy had a flexible exchange rate prior to the loss of confidence. What would be the impact on income and the exchange rate of the sudden change in capital flows? Explain.*

**brief answer** If the exchange rate were flexible the capital outflow would cause the exchange rate to appreciate and the economy would become more competitive. Moreover, the higher interest rate is only compatible with money market equilibrium at

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<sup>2</sup>Note the analysis here is the mirror image of what happens when capital markets are liberalized, see section 4.1 (page 32-33, for example) of the lecture on income determination.

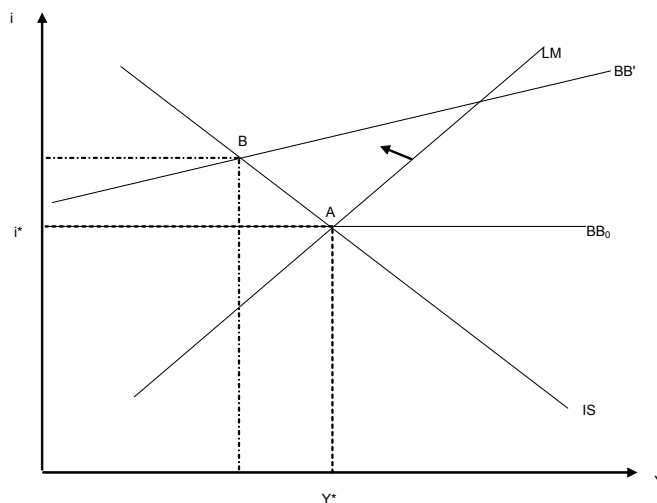


Figure 3: Decrease in Foreign Investor Sentiment

a higher level of income. Recall that money market equilibrium can be written as  $i^* = \frac{1}{h} \left( kY - \frac{M^s}{P} \right)$ , but now it is  $i^* + \rho = \frac{1}{h} \left( kY - \frac{M^s}{P} \right)$ . As the LHS has risen the RHS must rise to keep the money market in equilibrium. So output must rise to raise money demand. This means that the  $LL$  curve shifts to  $LL_1$  in figure 4 and the new equilibrium is at point  $e_1$ .

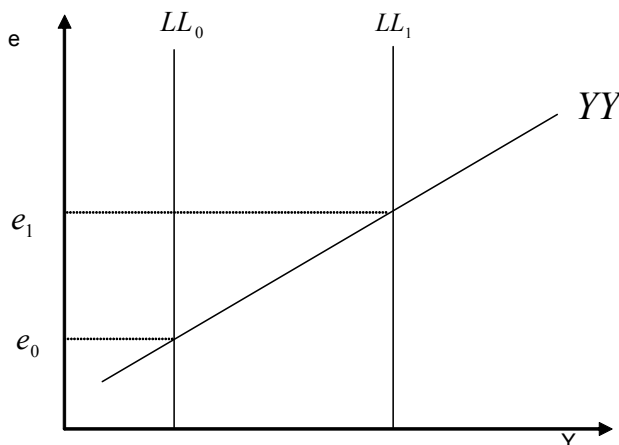


Figure 4: Loss of Confidence Under Flexible Exchange Rates

- (d) *Can the result you describe in part (c) be considered a surprising impact of a loss of confidence? Explain. What needs to be added to the standard model to obtain a more realistic result?*

**brief answer** It seems weird that a loss of confidence in the economy raises output. We might expect that bad things would happen instead. The easiest way to remedy this is to add currency mismatch. A large foreign debt denominated in foreign currency implies that the debt burden will now increase dramatically. As the exchange rate is flexible no collapse is possible. What is likely is an inflationary spiral. If the banking

system collapses investment will collapse –  $YY$  shifts upwards and the exchange rate rises further. Import prices are rising dramatically, and the higher  $Y$  translated into higher prices. But the higher  $e$  means an even higher burden of debt. What is clear is that once there is mismatch the consequences of an increase in  $e$  are not all rosy.

6. *What is original sin? What does it have to do with financial crises?*

**brief answer** Original sin is the inability of a country to borrow abroad in its own currency. This leads to currency mismatch. How this effects financial crises is explained at length in section 4 of the lecture on crises.