

*14.02 Introduction to Macroeconomics*

PROBLEM SET #8

Solutions

1. Uncertain. From the equilibrium condition, Domestic production=World demand for domestically produced goods, we get the following expression:  $NX = (S - I) + (T - G)$ . Note that this equilibrium relationship does not imply any causality from government balance to external balance or vice versa. It is simply a condition that must be met in goods market equilibrium. If the Federal government had run a government surplus ( $T - G$ ) greater than 0, the US trade balance could only have been in deficit ( $NX$  less than 0) if  $S - I$  is very very negative (by an amount which exceeds in absolute value the government surplus). This may be the case if autonomous consumption increases by a lot; this elicits a fall in private saving (recall  $S = Y - T - C$ ). In the 1980s we did witness a large consumption increase, due in part to lower tax rates and higher autonomous consumption.

2. For a given level of the foreign interest rate and long run nominal exchange rate, the relationship between the domestic interest rate and nominal contemporaneous exchange rate is negative. This is because an increase in the domestic interest rate makes domestic bonds more attractive, relative to foreign bonds. Investors reweight their portfolios towards domestic bonds, and sell foreign bonds for liquidity. In the process, demand for domestic currency is driven up, relative to demand for foreign currency, and the value of the domestic currency appreciates.

3. An increase in taxes leads to a decline in consumption. This is graphically represented by a leftward or downward shift of the IS curve. Equilibrium interest rate and output both fall. The nominal exchange rate depreciates. Net exports unambiguously increase, due to the fall in output (which decreases import demand) and the depreciation of the nominal exchange rate. Consumption unambiguously falls, due to a decline in disposable income arising from a fall in  $Y$  and an increase in  $T$ . The change in investment demand is uncertain since both income and the interest rate fall. We assume the short run in Chapter 13 so the real exchange rate is equivalent to the nominal exchange rate.

4. A fall in the money supply leads to a leftward or upward shift of the LM curve. The new equilibrium is at a higher interest rate and lower output. The exchange rate appreciates. The impact on net exports is ambiguous, since a decline in domestic output decreases import demand, and therefore increases net exports, yet the appreciation of the exchange rate makes domestic goods more expensive, relative to foreign goods, and thus decreases net exports. Consumption and investment demand both unambiguously fall, due to the decrease in  $Y$  and increase in  $i$ . We assume the short run in Chapter 13 so the real exchange rate is equivalent to the nominal exchange rate.

5. A decrease in the foreign interest rate leads to an appreciation of the nominal exchange rate, given a fixed domestic interest rate. In the  $(i, E)$  diagram, this translates to a leftward or downward shift of the interest parity curve. The appreciation of  $E$  due to a decrease in  $i^*$  (given  $i$ ) leads to a decrease in net exports; in the IS-LM framework, this translates graphically into a decrease in output at all levels of the interest rate (a leftward or downward shift of the IS curve). At the new equilibrium, both the domestic interest rate and domestic income are lower. At this new equilibrium, the decline in  $i$  leads to a depreciation in the exchange rate. The net change in the exchange rate (the initial appreciation due to an increase in  $i^*$  and the following depreciation due to a decrease in  $i$ ) is ambiguous. At the new equilibrium, consumption falls and the change in investment is ambiguous due to lower  $Y$  and lower  $i$ .

6. Following Blanchard, Chapter 13, we assume that the long-run expected exchange rate is fixed at  $Ebar$ . Assume initial equilibrium is where  $Y = Y_n$ . An increase in  $T$  leads to a decline in consumption. This decline is graphically depicted by a leftward or downward shift of the AD curve in  $(P, Y)$  space. In the short run,  $P$  is lower and so is  $Y$ . In IS/LM space the increase in  $T$  leads to a leftward or downward shift of the IS curve. A decline in  $P$  leads to a small rightward or downward shift of the LM curve. Thus in the short run,  $i$  is lower, as is output. Thus in the short run,  $E$  depreciates, and the real exchange rate  $(EP^*/P)$  also depreciates unambiguously. OMIT LONG RUN

7. In a fixed exchange rate regime, monetary policy must accommodate any change to fiscal policy. Thus in a fixed exchange rate regime, because of monetary policy accommodation, the impact of fiscal policy on output is even greater. A decline in taxes elicits an automatic contraction of the money supply in order to maintain interest rate parity. Thus at the new equilibrium  $i = i^*$  (as before) and output is lower than at the initial equilibrium. The decline in output in this case is greater than in question 3 because monetary accommodation (a fall in the money supply) prevents reverse crowding out of investment.

8. At the initial equilibrium,  $i = i^*$ . A devaluation means that the government unexpectedly announces that it will alter the fixed level of exchange between its domestic currency and foreign currency ( $Ebar$  is increased unexpectedly). In  $(i, E)$  space this translates graphically as a rightward or upward shift of the interest parity curve. The devaluation leads to an increase in net exports (assuming no J-curve effect, and simple Marshall-Lerner conditions hold). This graphically translates to a rightward shift of the IS curve. In order to maintain this new level of exchange rate, the government must accommodate the increase in demand for domestic production (due to the devaluation), which exerts a downward impact on the exchange rate. The government therefore must increase in the money supply continually until the IS curve is no longer affected by increases in net exports due to the devaluation. At the final equilibrium  $i = i^*$  and output is at a higher level. Consumption and investment both

unambiguously increase. The total impact on net exports is ambiguous. The initial devaluation leads to an initial increase in net exports, while the eventual increase in equilibrium income leads to a decrease in net exports.