Chapter 6: Open Economy Macroeconomics

Exercises — Exercises

Q1 Differentiate between balance of trade and current account balance.

Balance of trade (BOT) is the difference between the value of exports and imports of goods alone in a given period. Exports are credit items and imports are debit items. It is in surplus if exports exceed imports and in deficit if imports exceed exports.
Current account balance is wider. It adds net invisibles to the trade balance. Invisibles cover services (factor and non-factor income) and transfer payments such as gifts, remittances and grants. So current account balance = balance of trade + net invisibles.
A country can therefore have a trade deficit and still a smaller current account deficit, or even a surplus, if its net invisibles are large and positive. In Table 6.1, the trade balance is -90 and net invisibles are +52, giving a current account balance of -38.

Q2 What are official reserve transactions? Explain their importance in the balance of payments.

Official reserve transactions are the purchases and sales of foreign exchange by the central bank (the monetary authority) from or into its reserves to bridge the gap in the balance of payments. When there is a deficit, the reserve bank sells foreign exchange (an official reserve sale); when there is a surplus, it accumulates reserves.
Importance: a fall (rise) in official reserves measures the overall BoP deficit (surplus). The monetary authorities are the ultimate financiers of any deficit, or the recipients of any surplus. Since these transactions are made only to fill the BoP gap, they are accommodating (below the line) items, while all other transactions are autonomous. They matter most under fixed exchange rates, where the government must hold and use reserves to defend the rate.

Q3 Distinguish between the nominal exchange rate and the real exchange rate. If you were to decide whether to buy domestic goods or foreign goods, which rate would be more relevant? Explain.

The nominal exchange rate is the price of one currency in terms of another, for example Rs 50 per dollar. The real exchange rate is the relative price of foreign goods in terms of domestic goods: it equals the nominal rate multiplied by the foreign price level divided by the domestic price level.
To decide between domestic and foreign goods, the real exchange rate is more relevant. The nominal rate only converts currency units and ignores what each currency can actually buy. The real rate compares the prices of goods in the two countries after conversion. A higher real exchange rate makes foreign goods relatively more expensive, so buyers shift towards domestic goods and imports fall. A lower one makes foreign goods relatively cheaper.

Q4 Suppose it takes 1.25 yen to buy a rupee, and the price level in Japan is 3 and the price level in India is 1.2. Calculate the real exchange rate between India and Japan (the price of Japanese goods in terms of Indian goods). (Hint: First find out the nominal exchange rate as a price of yen in rupees).

SOLUTION

1.25 yen = Rs 1, so the nominal exchange rate (price of one yen in rupees) e = 1 / 1.25 = Rs 0.8 per yen.
Real exchange rate = e x (price level in Japan) / (price level in India).
Real exchange rate = 0.8 x 3 / 1.2 = 2.4 / 1.2 = 2.
The real exchange rate between India and Japan is 2 (Japanese goods cost twice as much as Indian goods).

Q5 Explain the automatic mechanism by which BoP equilibrium was achieved under the gold standard.

Under the gold standard each country fixed the value of its currency in gold and let gold flow freely between countries. A country with a BoP deficit lost gold to surplus countries. Its money supply then shrank, domestic prices and incomes fell, and its goods became cheaper for foreigners. Exports rose and imports fell, which removed the deficit. In the surplus country, gold inflow raised the money supply and prices, which cut exports and raised imports. Thus adjustment in prices and trade restored BoP equilibrium automatically, with no government intervention.

Q6 How is the exchange rate determined under a flexible exchange rate regime?

Under a flexible (floating) exchange rate regime the rate is set by market forces of demand and supply of foreign exchange, with no central bank intervention in a completely flexible system. The equilibrium exchange rate is where the demand curve for foreign exchange cuts the supply curve. Demand comes from imports of goods and services, gifts sent abroad and purchases of foreign financial assets. Supply comes from exports, transfers received and foreigners buying domestic assets. If demand rises, for example because Indians travel abroad more, the demand curve shifts right and the exchange rate rises, say from Rs 50 to Rs 70 per dollar. This is depreciation of the rupee. A rise in the value of the rupee is appreciation. Speculation, income and interest rate differentials also move the rate.

Q7 Differentiate between devaluation and depreciation.

Depreciation is a fall in the value of the domestic currency in terms of foreign currency caused by market forces of demand and supply under a flexible exchange rate system. The price of foreign currency in rupees rises, for example from Rs 50 to Rs 70 per dollar, without any government decision.
Devaluation is a deliberate action by the government in a fixed exchange rate system, raising the official exchange rate and thereby making the domestic currency cheaper, usually to encourage exports.
So depreciation is market-determined and occurs in a flexible regime, while devaluation is government-determined and occurs in a fixed regime. The opposite of devaluation is revaluation, where the government lowers the exchange rate.

Q8 Would the central bank need to intervene in a managed floating system? Explain why.

Yes. A managed floating (dirty floating) system is a mixture of a flexible system (the float part) and a fixed rate system (the managed part). The exchange rate is mainly market-determined, but the central bank buys and sells foreign currencies whenever it feels the exchange rate movements need to be moderated.
The purpose of intervention is to smooth out sharp fluctuations and keep the exchange rate near a desired range. Therefore official reserve transactions are not equal to zero under this system. If the central bank did not intervene at all, it would be a pure flexible system.

Q9 Are the concepts of demand for domestic goods and domestic demand for goods the same?

No, they are different in an open economy. Domestic demand for goods is total spending by residents, C + I + G, and it includes the part spent on imported goods. Demand for domestic goods is the demand for goods produced at home, whether by residents or foreigners.
Demand for domestic goods = C + I + G + X - M. Exports (X) are added because foreigners demand our goods, and imports (M) are subtracted because that part of domestic demand falls on foreign goods and does not raise domestic output. In a closed economy the two are the same, as there are no exports or imports.

Q10 What is the marginal propensity to import when M = 60 + 0.06Y? What is the relationship between the marginal propensity to import and the aggregate demand function?

Comparing M = 60 + 0.06Y with M = M(bar) + mY, the marginal propensity to import is m = 0.06. It means that out of every extra rupee of income, 6 paise are spent on imports. Autonomous imports are 60.
Relationship with aggregate demand: imports are a leakage from domestic demand. Aggregate demand for domestic goods is C + I + G + X - M, so a higher m lowers the slope of the aggregate demand function, as the term (c - m)Y shows. The curve becomes flatter, and the autonomous expenditure multiplier 1/(1 - c + m) becomes smaller.

Q11 Why is the open economy autonomous expenditure multiplier smaller than the closed economy one?

The closed economy multiplier is 1/(1 - c), while the open economy multiplier is 1/(1 - c + m), where m is the marginal propensity to import. Since m > 0, the denominator is larger and the multiplier is smaller.
Reason: when autonomous expenditure changes, income rises and induces extra consumption. In an open economy part of that induced consumption is spent on foreign goods, not domestic goods. So the induced effect on demand for domestic goods and income is smaller. The increase in imports per unit of income is an additional leakage from the circular flow of domestic income at each round of the multiplier process, which reduces the multiplier. For example, with c = 0.8 and m = 0.3 the multiplier falls from 5 to 2.

Q12 Calculate the open economy multiplier with proportional taxes, T = tY, instead of lump-sum taxes as assumed in the text.

SOLUTION

Equilibrium condition: Y = C + I + G + X - M, with C = C(bar) + c(Y - T), T = tY and M = M(bar) + mY.
Y = C(bar) + c(Y - tY) + I + G + X - M(bar) - mY.
Y = A + c(1 - t)Y - mY, where A = C(bar) + I + G + X - M(bar) is autonomous expenditure.
Y - c(1 - t)Y + mY = A, so [1 - c(1 - t) + m]Y = A.
Y = A / [1 - c(1 - t) + m].
Open economy multiplier with proportional taxes = 1 / [1 - c(1 - t) + m].

Q13 Suppose C = 40 + 0.8YD, T = 50, I = 60, G = 40, X = 90, M = 50 + 0.05Y. (a) Find equilibrium income. (b) Find the net export balance at equilibrium income. (c) What happens to equilibrium income and the net export balance when the government purchases increase from 40 to 50?

SOLUTION

(a) Y = C + I + G + X - M, with YD = Y - T = Y - 50.
Y = 40 + 0.8(Y - 50) + 60 + 40 + 90 - (50 + 0.05Y)
Y = 40 - 40 + 0.8Y + 60 + 40 + 90 - 50 - 0.05Y = 140 + 0.75Y
0.25Y = 140, so Y = 140 / 0.25 = 560.
(b) M = 50 + 0.05 x 560 = 50 + 28 = 78. Net exports NX = X - M = 90 - 78 = 12 (a trade surplus).
(c) With G = 50, autonomous spending rises by 10. Multiplier = 1 / (1 - 0.8 + 0.05) = 1 / 0.25 = 4.
Change in Y = 4 x 10 = 40, so new Y = 600. Check: Y = 150 + 0.75Y gives Y = 600.
New M = 50 + 0.05 x 600 = 80, so NX = 90 - 80 = 10.
Result: (a) Y = 560; (b) NX = 12; (c) income rises to 600 and net exports fall from 12 to 10.

Q14 In the above example, if exports change to X = 100, find the change in equilibrium income and the net export balance.

SOLUTION

Take the original data with G = 40 and X rising from 90 to 100.
Y = 40 + 0.8(Y - 50) + 60 + 40 + 100 - (50 + 0.05Y) = 150 + 0.75Y
0.25Y = 150, so Y = 600.
Change in income = 600 - 560 = 40 (check: multiplier 4 x change in X of 10 = 40).
M = 50 + 0.05 x 600 = 80. Net exports NX = 100 - 80 = 20.
Change in net exports = 20 - 12 = +8.
Result: equilibrium income rises by 40 to 600, and the net export balance rises from 12 to 20.

Q15 Suppose the exchange rate between the Rupee and the dollar was Rs. 30 = $1 in the year 2010. Suppose the prices have doubled in India over 20 years while they have remained fixed in USA. What, according to the purchasing power parity theory will be the exchange rate between dollar and rupee in the year 2030.

SOLUTION

PPP: the exchange rate adjusts to reflect differences in price levels, so a product costs the same in both countries.
Indian price level doubles (x 2) while the US price level stays unchanged (x 1).
A good priced at Rs 30 in India in 2010 (equal to $1 in the US) now costs Rs 60 in India, while it still costs $1 in the US.
So $1 must be worth Rs 60.
New exchange rate = 30 x 2 = Rs 60 per dollar in 2030 (the rupee has depreciated).

Q16 If inflation is higher in country A than in Country B, and the exchange rate between the two countries is fixed, what is likely to happen to the trade balance between the two countries?

With a fixed exchange rate, higher inflation in country A makes its goods relatively more expensive compared with goods of country B, because the exchange rate cannot adjust to offset the price difference. Its real exchange rate moves against it.
Foreigners will buy fewer goods from A, so A's exports fall. Residents of A find B's goods cheaper and import more. As a result, A's trade balance worsens and may move into deficit, while B's trade balance improves and moves towards surplus. Under a flexible exchange rate, A's currency would depreciate and tend to correct this, but under a fixed rate it cannot.

Q17 Should a current account deficit be a cause for alarm? Explain.

Not necessarily. A current account deficit means the country spends more on foreign goods, services and transfers than it earns, so it is a borrower from the rest of the world. It must be financed by a capital account surplus, that is, by net capital inflows, by borrowing abroad or selling assets, or by using up foreign exchange reserves.
If the deficit is financed by productive investment inflows such as FDI, and if the borrowed funds raise future output and exports, it need not be harmful. It becomes a worry when it is large and persistent, when reserves are inadequate, or when it relies on short-term, volatile capital, since the country may be unable to repay or maintain its exchange rate. The cause and the way of financing the deficit therefore decide whether to be alarmed.

Q18 Suppose C = 100 + 0.75YD, I = 500, G = 750, taxes are 20 per cent of income, X = 150, M = 100 + 0.2Y. Calculate equilibrium income, the budget deficit or surplus and the trade deficit or surplus.

SOLUTION

Taxes T = 0.2Y, so YD = Y - 0.2Y = 0.8Y and C = 100 + 0.75 x 0.8Y = 100 + 0.6Y.
Y = C + I + G + X - M = 100 + 0.6Y + 500 + 750 + 150 - (100 + 0.2Y)
Y = 1400 + 0.4Y
0.6Y = 1400, so Y = 1400 / 0.6 = 2333.33 (approx.)
Tax revenue T = 0.2 x 2333.33 = 466.67. Budget balance = T - G = 466.67 - 750 = -283.33, a budget deficit of about 283.33.
Imports M = 100 + 0.2 x 2333.33 = 100 + 466.67 = 566.67. Net exports = X - M = 150 - 566.67 = -416.67, a trade deficit of about 416.67.
Result: equilibrium income = 2333.33; budget deficit = 283.33; trade deficit = 416.67.

Q19 Discuss some of the exchange rate arrangements that countries have entered into to bring about stability in their external accounts.

Countries use three main arrangements.
1. Fixed exchange rate: the government fixes the rate at a particular level and the central bank buys or sells foreign exchange to maintain it, using its reserves. It gives stability but needs large reserves and is prone to speculative attacks, as before the collapse of the Bretton Woods system. Earlier, currencies were also made convertible at a fixed price into gold.
2. Flexible (floating) exchange rate: the rate is set by demand and supply in the foreign exchange market. Movements in the rate automatically correct BoP surpluses and deficits, and countries keep independence in monetary policy without needing large reserves.
3. Managed floating (dirty floating): a mixture of the two; the rate is market-determined but central banks intervene to moderate movements. The world has moved to this system without any formal international agreement.