SØK 2009 International Macroeconomics
Teacher: Simone Valente
Winter term exam: 12 December 2012

With Solutions

Question 1: Asset Approach to Exchange Rate Determination

Consider the foreign exchange market in isolation from the rest of the economy. The current spot exchange rate between dollars (\$) and euro (€) is expressed in direct terms, and denoted by $E_{\$/€}$ (dollars per euro). Nominal interest rates on dollar and euro deposits are respectively denoted by $R_\$$ and $R_€$. Answer the following questions.

(1.a) What is the expected interest rate on euro in terms of dollars (denoted by $\tilde{R}_€$)? Write the condition for Uncovered Interest Parity.

Answer
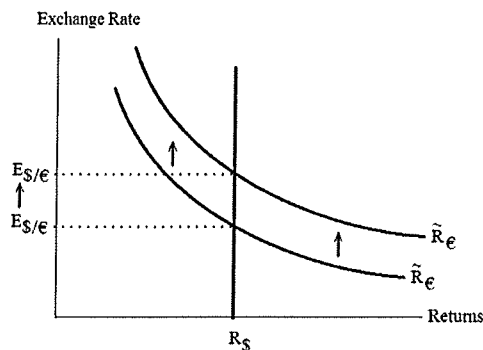
$$\tilde{R}_€ = R_€ + \frac{E^e_{\$/€} - E_{\$/€}}{E_{\$/€}}$$

$$\text{UIP} \quad : \quad R_\$ = \tilde{R}_€$$

(1.b) Suppose that the equilibrium spot exchange rate $E^\star_{\$/€}$ is determined by Uncovered Interest Parity and consider an exogenous shock: the nominal interest rate on euro deposits $R_€$ increases. Assume that the shock does not affect expectations. Is the new equilibrium characterized by an appreciation or a depreciation of the dollar? Describe the effects of the shock in a diagram and verbally explain the economic mechanism: how do market forces drive the spot exchange rate from the initial equilibrium to the new equilibrium level?
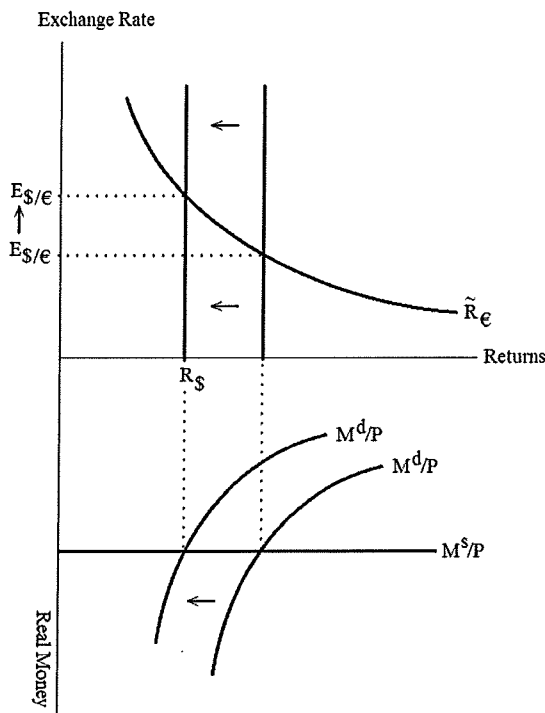
Answer

1

The shock induces dollar depreciation. When the shock hits the market, agents buy euro deposits due to higher expected return, which implies reduced demand for dollars and therefore depreciation.

Question 2: Exchange Rate and the Money Market

Consider the same model for the determination of the dollar/euro exchange rate as in Question 1, extended to include the domestic money market of the US. The US money demand is represented by the liquidity-preference theory. Focus exclusively on the short-run, assuming fixed price levels and fixed expectations.

(2.a) What is the effect of a reduction in US real income Y_{US} on the equilibrium US interest rate $R^{\star}_{\$}$ and on the equilibrium exchange rate $E^{\star}_{\$/€}$? Describe the effects of the shock in a diagram.

Answer

(2.b) Explain verbally the economic mechanism that drives the money market to the new equilibrium level of the US interest rate: how does the US money market absorb the gap between demand and supply of dollars after the shock on US real income?

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Answer. The reduction in income creates excess money supply, and therefore excess demand for bonds – which drives up the price of bonds and, consequently, reduces the interest rate on bonds until the equilibrium between money demand and money supply is restored.

Question 3: Fisher Effect and PPP

Denote by $E_{\$/€}$ the exchange rate (dollars per euro), by P_{US} the price level in US, by P_E the price level in the Euro zone, and by π_{US} and π_E the respective inflation rates. Suppose that Absolute Purchasing Power Parity (PPP) holds at each point in time, and that the equilibrium spot exchange rate $E_{\$/€}$ is determined by Uncovered Interest Parity.

Derive the equilibrium condition of the foreign exchange market as an equation that links the expected real interest rates of US and Euro zone. Is the assumption of Absolute PPP strictly necessary to obtain this equation?

Answer. Absolute PPP requires

$$E_{\$/€} = P_{US}/P_E$$

consequently, the expected rate of dollar depreciation is (approximately)

$$\frac{E_{\$/€,t+1} - E_{\$/€,t}}{E_{\$/€,t}} = \pi_{US} - \pi_E. \qquad (*)$$

Substituting equation (*) in uncovered interest parity, we obtain the Fisher equation for real interest parity

$$R_\$ - \pi_{US} = R_€ - \pi_E$$

Assuming Absolute PPP is not strictly necessary. What is necessary is the Relative PPP holds, that is, equation (*).

Question 4: Aggregate Demand and Exchange Rates in the short run

Consider a generic open economy. The symultaneous equilibrium in the goods' market and in the asset market is represented by the $DD-AA$ curves. In equilibrium, real output equals $Y = Y_1$ and the exchange rate is $E = E_1$. Focus exclusively on the short-run, assuming fixed price levels and fixed expectations.

(4.a) What is the short-run effect of a temporary fiscal expansion (i.e., a reduction in taxes or an increase in public spending, all else equal) on real output, on the exchange rate? What is the implicit effect of this shock on the interest rate in the money market?

Answer. A temporary fiscal expansion increases real output and induces appreciation. The interest rate increases as a consequence of higher money demand.

E

DD

DD

E_1

AA

Y_1

Y
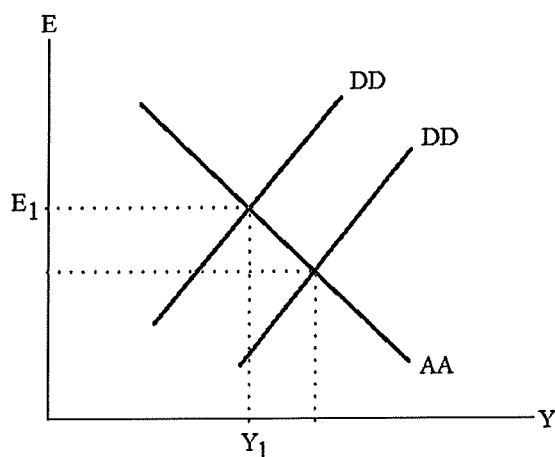
(4.b) Suppose that, observing the fiscal expansion, the Central Bank wishes to keep the exchange rate at its initial level E_1. What kind of open-market operation should the Central Bank undertake on the foreign exchange market? If this open-market operation is implemented, what happens to official reserves and to real output in the new equilibrium?

Answer. The Central Bank should contrast appreciation by purchasing foreign assets, which induces a monetary expansion. As a consequence, official reserves of foreign assets increase and output increases further.

E

DD

DD

E_1

AA

AA

Y_1

Y
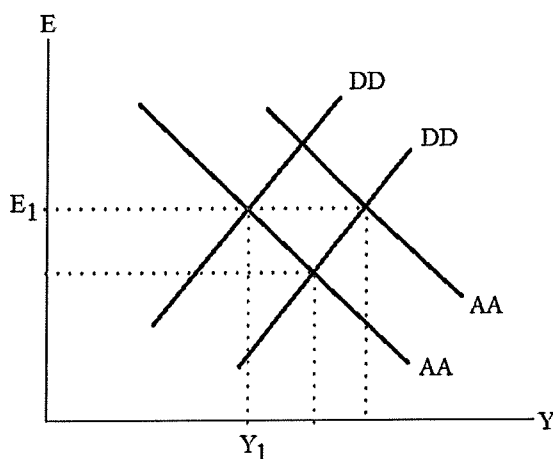
Question 5: International Monetary Systems

(5.a) "Theory". What is the N-th Currency Problem generated by Reserve Currency Systems? Explain the general mechanism by means of an example in which the Central Bank of the country issuing the Reserve Currency modifies the money supply.

Answer. In a Reserve Currency System, there are $N-1$ countries pegging their currency to the N-th currency. The system is deeply asymmetric: the central bank issuing the N-th currency may pursue independent monetary policy (e.g., for domestic purposes) whereas the remaining $N-1$ central banks are forced to adjust their monetary policies to keep their exchange rate fixed. If the Reserve Center expands (/contracts) money supply, all other countries must expand (/contract) money supply to keep exchange rates fixed. This may lead to conflicts as some countries may require the opposite monetary policy for domestic reasons – e.g., fighting domestic inflation (/unemployment).

(5.b) "Practice". Mention at least one historical event in which the N-th Currency Problem played a role in determining the collapse of a fixed exchange-rate mechanism.

Answer. One event was the Collapse of the Bretton Woods, which was working like a reserve currency system after the mid-1960s. Countries used dollars as official reserve currency, the monetary expansions in the US forced other countries to accumulate dollar reserves and import undesired inflation from US. Another event was the 1992 crisis of the EMS, which was working like a reserve currency system based on the Deutsch Mark. After Gemany's reunification, the Bundesbank enacted monetary restrictions to fight domestic inflation, inducing recessive policies in UK, Italy, Portugal that eventually led to the collapse of fixed parities.

Question 6: Crisis and Developing Countries

(6.a) What is a balance-of-payment crisis?

Answer. A BOP crisis is a sudden reduction in official reserves triggered by huge market sales of the domestic currency pushing towards depreciation. Under fixed exchange rates, speculative attacks that induce a BOP crisis may ultimately force the central bank to devalue the currency.

(6.b) What is a foreign-debt default crisis?

Answer. A foreign-debt default crisis is a situation in which domestic residents / domestic public sector cannot repay the loans conceded by foreign residents. It may be induced by high interest rates or even by self-fulfilling expectations

concerning the solvency of the country, which push up interest rates via risk premia.

(6.c) Consider the hypothetical situation in which a developing country (e.g., Senegal) has a positive stock of foreign debt and keeps a fixed nominal exchange rate against a major currency (e.g., Senegal's Franc is pegged to the Euro). Suppose that the developing country is subject to the so-called "original sin". Show how a balance-of-payment crisis inducing devaluation in the developing country may lead to a foreign-debt default crisis as a result of the "original sin".

Answer. The original sin is the situation in which a developing country borrows from foreign countries with debt denominated in some foreign / major currency. A balance of payment crisis that induces devaluation implies that, for domestic borrowers, the real value of foreign debt suddenly increases because more units of the domestic currency are now needed to purchase the major currency in which (interest and/or principal on) foreign debt must be repaid. This effect may lead to a foreign-debt default crisis induced by the devaluation (induced by the BOP crisis...). Another possibility is that the original sin itself induces the initial BOP crisis because domestic borrowers keep on demanding the foreign currency ro repay debt, which leads to excess supply of domestic currency and therefore pushes towards devaluation.