International Macroeconomics
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Problem Set 10 – AA-DD Model with Fixed Exchange Rates

Questions

10.1 Consider an open economy maintaining a fixed exchange rate. The price level is initially equal to the foreign price level ($P = P^* = 1$), and the nominal exchange rate is equal to 1. The interest rate is initially equal to the foreign interest rate, i*=0.1. The home money demand is given by $m^D = Y/10i$. The goods market equilibrium is described by the following expression: $Y = 2\left(\bar{A} + TB\right)$, where $TB = 5\left(\frac{eP^*}{P} - 1\right)$.

(a) Considering that $\bar{A} = 50$, and that the full employment output is $Y_f = 100$:

(a1) Find out the expression of the DD curve.
(a2) Find out the (endogenous) money supply as well as the implied AA curve.

(b) Suppose that there is a permanent fiscal expansion, so that $\bar{A} = 52.5$.

(b1) Find the expression for the short-run DD curve.
(b2) Compute the short-run output level and money supply.
(b3) Find the short-run AA curve. Explain why the AA curve has changed.
(b4) Is there external balance? Justify.
(b5) Find the long-run price level and the long-run DD curve.
(b6) Is there internal and/or external balance in the long-run? Justify.
(b7) Find the long-run money supply and the long-run AA curve.
(b8) In the long run, did money and prices evolved proportionally?

(c) Departing from the short-run equilibrium of b), suppose that the central bank decides to devalue the currency from e=1 to e=2.

(c1) Is there internal and/or external balance? Justify.
(c2) Find the endogenous money supply and the corresponding AA curve.
(c3) Represent graphically, comparing with the outcome in a) and with the short-run outcome of b).

10.2 Consider an open economy with sticky prices under a fixed exchange rate regime, with $e = E(e) = 1$. In this economy, money demand is given by $m^D = \frac{Y}{20i}$ and full employment output is $Y_f = 200$. Consider, as well, that $eB_C^* = 20$. The interest rate parity holds instantaneously, the foreign interest rate is equal to $i^* = 20\%$, and, initially, $P = P^* = 1$. The goods market equilibrium is described by the following expression: $Y = 5\ (\bar{A} + TB)$, where $\bar{A} = 38$, $TB = 2 + 5(\theta - 1)$ and $\theta = \frac{eP^*}{P}$.

(a) Assuming that the peg is credible:
  (a1) Derive the DD Curve.
  (a2) Find the level of output, the endogenous money supply and the trade balance.
  (a3) Derive the AA Curve.
  (a4) Represent the initial equilibrium in the AA-DD diagram.

(b) Election season is fast approaching, and the government has a low approval rating. To boost its electoral chances, the ruling party decides to implement a permanent fiscal expansion, such that: $\bar{A}' = 42$. Assume that the central bank keeps the peg.
  (b1) Find the expression of the DD curve in the short run.
  (b2) Find the implied level of output.
  (b3) Find the expression of the AA in the short run.
  (b4) Explain, quantifying, what happens to the central bank balance sheet.
  (b5) Find the long-run price level.
  (b6) Find the long-run expressions of the DD and AA curves.
  (b7) Represent graphically the short and long run equilibriums, departing from (a4).

(c) Returning to (a), assume instead that the government decided to credibly devalue the peg to $e' = 1.8$.
  (c1) Describe graphically the immediate adjustment in the asset approach graphs.
  (c2) Find the implied level of output.
  (c3) Find the implied level of the money supply.
  (c4) Find the formulas for the short run AA and DD curves.
  (c5) Find the long run price level and the corresponding expression for the DD.
  (c6) Find the long run money supply and the corresponding AA curve.
  (c7) Represent graphically the short and long run equilibriums, departing from (a4).

(d) Compare the short run and long run effects of the measures presented in b) and c) in the trade balance. Explain the intuition behind the different results.

10.3 Consider an open economy with sticky prices maintaining a fixed exchange rate. The price level is initially equal to the foreign price level ($P = P^* = 1$), and the nominal exchange rate is equal to 1. The interest rate is initially equal to the foreign interest rate, i*=0.1. The home money demand is given by $m^D = Y/10i$. The goods market equilibrium is described by the following expression: $Y = 2\left(\bar{A} + TB\right)$, where $TB = 5\left(\frac{eP^*}{P} - 1\right)$. Initially, $\bar{A} = 45$, and the full employment output is $Y_f = 100$.

(a) Assuming that the peg is credible:
(a1) Find the short-run DD curve.
(a2) Find the endogenous money supply and the short-run AA curve.
(a3) Is there internal and/or external balance? Justify.

(b) In the absence of government actions or changes in expectations, how will the economy evolve along time? Find:
(b1) The long run price level.
(b2) The long run level of output.
(b3) The long run trade balance.
(b4) The long run money supply.
(b5) The long run AA and DD curves. Represent graphically, comparing with a).

(c) In alternative, suppose that authorities wanted to drive immediately the economy to full employment through a devaluation.
(c1) How much should the new exchange rate be?
(c2) What would happen to the money supply?
(c3) Describe the equilibrium using the AA-DD diagram, departing from a).

(d) Suppose that agents believe the government will devalue the currency as found in c), but the government intends to keep the peg.
(d1) Find out the money supply and the interest rate that must hold for the peg to be maintained.
(d2) Knowing that agents (households, firms, banks, government) in this economy were highly leveraged, would the government be able to credibly commit with the peg, after the change in expectations?
(d3) Explain how this model can illustrate a case with multiple equilibria.

10.4 Consider the open economy of Byeschmidt which has sticky prices and a money demand of $m^D = \frac{Y}{10i}$. The central bank of Byeschmidt follows a fixed exchange rate regime, such that $e = E(e) = 1$ and, initially, $B_{CB} = 20$. The interest rate parity holds instantaneously, the foreign interest rate is equal to $i^* = 0{,}1$, and, initially, $P = 2$. Consider, as well, that the goods market equilibrium is described by the following expression: $Y = 2\,(\bar{A} + TB)$, where $\bar{A} = 45$ and $TB = 5\left(\frac{e}{P} - 1\right)$. Finally, the full employment of output is given by $Y^f = 100$.

(a) Assuming that the peg is credible:
(a1) Derive the DD Curve.
(a2) Is there internal balance and/or external balance? Justify.
(a3) Draw the central bank balance sheet.
(a4) Derive the AA curve.

(b) The authorities of Byeschmidt are known for not doing anything to change the economic performance of the country. Therefore, assuming that the peg is kept and that no further policy actions are taken:
(b1) Find the long-run price level and derive the long-run DD curve.
(b2) Find the money supply, showing the changes in the central bank balance sheet.
(b3) Derive the long-run AA curve.
(b4) Represent both the initial and the long-run equilibrium in the AA-DD diagram.
(b5) Characterize this equilibrium in terms of internal and external balance.

(c) Suppose now, departing from a, that agents start believing that the central bank will perform a one-time currency devaluation to bring the economy to full employment in the short run. If the central bank performs such policy action:
(c1) Find the new value for the peg.
(c2) Find the money supply, showing the changes in the central bank balance sheet.
(c3) Derive the AA and DD the curves.
(c4) Represent both the initial equilibrium and the equilibrium after the policy in the AA-DD diagram, explaining why the AA and/or the DD curves change.
(c5) What are the impacts of this policy in terms of trade balance? Is there an improvement, comparing with the case in (b)? Justify.

(d) Departing from a, consider that $E(e) = \alpha\bar{e} + (1 - \alpha)e_0$, with $\bar{e} = 1$, and $e_0 = 4$. Initially, 10% of the agents in the economy believe that the central bank is going to devalue the currency, even though the central bank is not planning to do so.
(d1) Find the new expected exchange rate, the nominal interest rate and the money supply.
(d2) Represent graphically the adjustment in the money market and in the foreign exchange market, presenting the values for M, M/P, i and e.

(e) Suppose now, departing from d, that the central bank's credibility decreases. As a result, 25% of the agents in Byeschmidt now believe that the central bank is going to devalue the currency, even though the central bank is still not planning to do so.
(e1) Find the new expected exchange rate and nominal interest rate.
(e2) Draw the central bank balance sheet, comparing with the case in (d2).
(e3) Does the peg break in any of the cases (d2 and d4)? Justify.
(e4) Based on this exercise, explain the reasoning underlying the second generation of speculative attack models.