

Supervision 7 International Financial System

Problems

1. Consider the following two-country, two-period endowment economy. The representative household in the Home country maximizes lifetime utility

$$U = \ln C_1 + \beta \ln C_2$$

where C_t denotes Home consumption in period t , with $\beta \in (0, 1)$. The representative household in the Foreign country, indicated by an asterisk, has the same preferences over $\{C_1^*, C_2^*\}$. There is a single tradable good, where $\{Y_1, Y_2\}$ and $\{Y_1^*, Y_2^*\}$ denote the Home and Foreign endowments in the two periods. Home and Foreign households can freely trade in an international bond B with world gross real interest rate R . Home and Foreign households do not have any initial assets.

- (a) Derive the level of Home consumption C_1 and Home savings S_1 in the first period for a given level of R .
- (b) Solve for the equilibrium world real interest rate R .
- (c) Show that the world real interest rate R lies in between the autarky real interest rates in the two countries. Explain whether the country with the autarky real interest rate below the world real interest rate will run a current account deficit or surplus in period 1.
- (d) Explain the effect of an increase in the growth rate of Foreign output on Home's welfare.

2. Consider a small open economy that exists for two periods and is populated by many identical agents that maximize their lifetime utility

$$U = \ln C_1 + \beta \ln C_2$$

where C_t denotes domestic consumption in period t , with $\beta \in (0, 1)$. At time 1, the agents are endowed with an exogenous amount Y_1 of output. They can invest their savings either in foreign bonds B_1 , which yield the world gross real interest rate $1 + r$, or in domestic projects i_1 , which yield output Y_2 in period 2 with decreasing returns:

$$Y_2 = Ai_1^\alpha$$

where A and α are positive parameters, with $0 < \alpha < 1$. Investment in projects i_1 requires a specialised imported input with a price of p units of output, so it costs pi_1 units of output (i.e. consumption). Assume that initial net foreign wealth is zero, so $B_0 = 0$.

- (a) Derive the intertemporal production possibilities frontier (IPPF) of available consumption bundles under financial autarky. Graphically show the IPPF, comment on its properties, and explain how it is affected by a decline in the price p of the imported input.
- (b) Write down the budget constraints of the country in the two periods and the optimization problem of the representative agent. Derive the first order conditions characterizing the optimal consumption and investment decisions.
- (c) Define and derive the real interest rate r^{FA} under financial autarky. Explain how it depends on A and on p .
- (d) Suppose that preferences and technology are such that $1 + r^{FA} > 1 + r$. Explain whether the current account is going to be positive or negative.
- (e) Derive the consumption and investment plans when the agents can trade in the international bond. Explain how consumption, investment and the current account are affected by a decline in the price p of the imported input.
3. Consider two economies, Home and Foreign, each populated with a continuum of identical agents who live for two periods and maximize expected lifetime utility

$$U^{(*)} = \ln C_1^{(*)} + E \left[\ln C_2^{(*)} \right]$$

where C_t denotes Home consumption in period t , and Foreign variables are indicated by an asterisk (*). The budget constraints with free trade are

$$\begin{aligned} C_1^{(*)} &= Y_1^{(*)} - B^{(*)} \\ C_2^{(*)} &= Y_2^{(*)} + RB^{(*)} \end{aligned}$$

where Y_t denotes (tradeable) output in period t , B denotes holdings of the internationally traded bond at the end of the first period and R its gross real interest rate. Assume that output in period 1 is the same in both countries so that $Y_1 = Y_1^* = 8$. In period two, the countries have different growth prospects such that

$$\begin{aligned} Y_2 &= \begin{cases} Y_{2H} = 12 & \text{with probability } 0.6 \\ Y_{2L} = 8 & \text{with probability } 0.4 \end{cases} \\ Y_2^* &= \begin{cases} Y_{2H}^* = 18 & \text{with probability } 0.6 \\ Y_{2L}^* = 6 & \text{with probability } 0.4 \end{cases} \end{aligned}$$

So, expected output is higher in Foreign, but the macroeconomic uncertainty it faces is also higher.

- (a) Derive the real interest rates under financial autarky R_{FA} and R_{FA}^* in Home and in Foreign. Explain what factors determine the level of $R_{FA}^{(*)}$.
- (b) For a given international real interest rate R , explain under what condition Home/Foreign would run a current account deficit.

- (c) Assume the world economy consists of the two countries, Home and Foreign. Determine the level of the world equilibrium real interest rate R^W and explain whether Home/Foreign runs a current account surplus/deficit.
- (d) Now suppose that a revision of Foreign growth prospects changes Y_2^* to

$$Y_2^* = \begin{cases} Y_{2H}^* = 20 & \text{with probability } 0.6 \\ Y_{2L}^* = 3 & \text{with probability } 0.4 \end{cases}$$

Compute Foreign's autarky interest rate R_{FA}^* for this case. Explain qualitatively how this affects the world equilibrium real interest rate R^W , and the current account balances of Home and Foreign.

Main readings

- Krugman, Obstfeld and Melitz (2018), *International Economics: Theory and Policy*, pp. 169-172, 176-178 (appendix chapter 6), 529-530 (appendix 1 chapter 17), and chapter 19.
- Pilbeam (2006), *International Finance*, chapter 2, 4.
- Williamson (2013), *Macroeconomics*, chapter 15.

Supplementary references

- Blanchard (2007), "Current Account Deficits in Rich Countries", *IMF Staff Papers* 54(2), pp. 191-219.
- Blanchard and Giavazzi (2002), "Current Account Deficits in the Euro Area: The End of the Feldstein-Horioka Puzzle?", *Brookings Papers on Economic Activity* 33(2), pp. 147-86.
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- International Monetary Fund (2011), "Separated at Birth? The Twin Budget and Trade Balances", *World Economic Outlook: Slowing Growth, Rising Risks*, Chapter 4, September, pp. 135-160 (<http://www.imf.org/external/pubs/ft/weo/2011/02/pdf/c4.pdf>)
- Obstfeld (2011), "The International Monetary System: Living with Asymmetry", NBER Working Paper 17641.
- Obstfeld and Taylor (2004), *Global Capital Markets: Integration, Crisis and Growth*.
- Schmitt-Grohé, Uribe and Woodford (2015), *International Macroeconomics*, chapter 1-7 [<http://www.columbia.edu/~mu2166/UIM/im.pdf>]