International Economics II

Large Open Economies and International Transmission of Shocks

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Outline

1. A Two-Country Economy

2. Country Size and the International Transmission Mechanism

3. The Global Saving Glut Hypothesis

Motivation

- Thus far we have been studying models of small open economies, which take the interest rate as given, and specifically as the world interest rate, r^*.

- A defining feature of a small open economy is that even if the country borrows or lends a large sum relative to its output in international financial markets, it will not affect the world interest rate.

- However, in the case of large open economies, such as the U.S. or the Eurozone as a whole, what happens to these economies have an impact on the world interest rate.

- What does this imply about the equilibrium world interest rate and CA adjustment?

Outline

A Two-Country Economy

▶ We now have one more variable to solve for: the interest rate, r.

▶ Other than this, we can set up country preferences and budget constraints for the home country and the "rest of the world," denoted by ROW , and go through the maximization problems as in the SOE model.

▶ The one additional constraint that we need to solve for r is that world demand equals world supply, or alternatively, the sum of current accounts at the equilibrium interest rate equals 0:

$$CA(\underset{+}{r}) + CA^{ROW}(\underset{+}{r}) = 0. \tag{1}$$

Equilibrium in a Large Open Economy
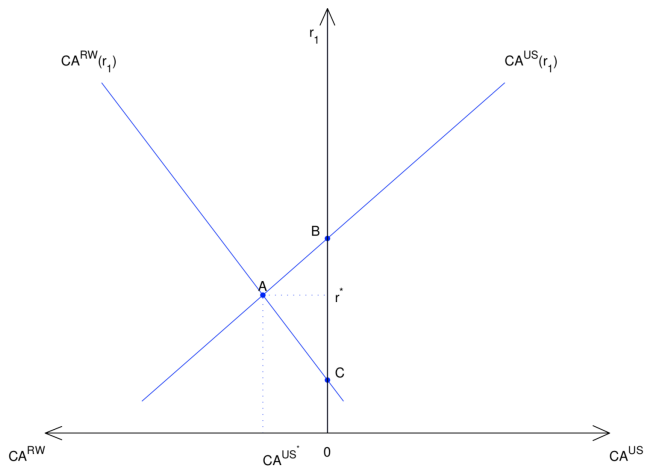
Current Account Analysis: Examples

Let's work through current account adjustments given:

1. An increase in savings in the ROW

2. A temporary output shock in the domestic economy, $Q_1 \uparrow$

3. A future productivity shock in the ROW, $A_2 \uparrow$

4. An investment surge in the domestic economy

In answering these question, try to think about what is happening to the interest rate relative to an adjustment in a closed economy.

Microfoundations of the Two-Country Model

- Now we will dig deeper and derive the equilibrium levels of the current account and the world interest rate starting from the decisions of individual households.

- 2 countries (home and rest of the world) and 2 periods.

- To simplify the analysis, both countries will be an endowment economy (no investment in physical capital).

- Also, assume they start with no initial assets or debts $B_0 = 0$.

Preferences

▶ Countries are fully symmetrical and the lifetime utility functions in the home country and the rest of the world are identical:

$$U = \ln C_1 + \ln C_2 \qquad (2)$$

and

$$U^{ROW} = \ln C_1^{ROW} + \ln C_2^{ROW} \qquad (3)$$

where C_t and C_t^{ROW}, for $t = 1, 2$ denote consumption in period 1 and 2 in home and the rest of the world.

Budget Constraints

- Households in home start period 1 with no initial assets or debts ($B_0 = 0$). Their budget constraint in period 1 and 2:

$$C_1 + B_1 = Q_1, \tag{4}$$
$$C_2 + B_2 = Q_2 + (1 + r_1)B_1. \tag{5}$$

- Which combined with the transversality condition (e.g $B_2 = 0$), leads to the intertemporal budget constraint

$$C_1 + \frac{C_2}{1 + r_1} = Q_1 + \frac{Q_2}{1 + r_1} \tag{6}$$

where we can rewrite:

$$C_2 = (1 + r_1)(Q_1 - C_1) + Q_2 \tag{7}$$

Optimal Consumption Choice

- Substituting C_2 in our utility function, the problem of the household in home reduces to maximizing:

$$\ln C_1 + \ln[(1 + r_1)(Q_1 - C_1) + Q_2]. \tag{8}$$

- Taking the FOC wrt to C_1 and equating to zero, we find the solution:

$$C_1 = \frac{1}{2} \left(Q_1 + \frac{Q_2}{1 + r_1} \right) \tag{9}$$

- Consumption in period 1 is increasing in both endowments as both make the household richer. Also, an increase in the interest rate makes saving more attractive and discourages present consumption.

- We can find the optimal C_2 by plugging C_1 in the intertemporal budget constraint.

The Current Account Schedule

- The current account of home in period 1 is given by:

$$CA_1 = B_1 - \underbrace{B_0}_{=0} \tag{10}$$

- Alternatively, we can use the national accounting and use (9) to get rid of C_1:

$$CA_1 = Q_1 - C_1 \tag{11}$$

$$CA_1 = \frac{1}{2}\left(Q_1 - \frac{Q_2}{1+r_1}\right) \tag{12}$$

- Note that households in ROW behave just like in home, so consumption and CA in the RoW is:

$$C_1^{ROW} = \frac{1}{2}\left(Q_1^{ROW} + \frac{Q_2^{ROW}}{1+r_1}\right) \tag{13}$$

$$CA_1^{ROW} = \frac{1}{2}\left(Q_1^{ROW} - \frac{Q_2^{ROW}}{1+r_1}\right) \tag{14}$$

The Equilibrium World Interest Rate

- The world interest rate, r^*, is the interest rate that guarantees that the world current account is zero:

$$CA(r^*) + CA^{ROW}(r^*) = 0. \tag{15}$$

- Hence, using the CA of Home and ROW in period 1:

$$r^* = \frac{Q_2 + Q_2^{ROW}}{Q_1 + Q_1^{ROW}} - 1 \tag{16}$$

- If the world endowment in $t = 2$, $Q_2 + Q_2^{ROW}$ increases relative to the the world endowment in period 1, households would like to borrow against future income, to smooth consumption over time.
- But this is impossible: the world as a whole cannot borrow. So the interest rate must go up to ensure zero worldwide borrowing.
- In this economy, the world interest rate, r^*, depends upon world endowments.

The Equilibrium Current Account

- To obtain the equilibrium CA of Home, use equation (16) to eliminate r_1 from equation (12):

$$CA_1 = \frac{1}{2} \frac{Q_1^{ROW} Q_2^{ROW}}{Q_2 + Q_2^{ROW}} \left(\frac{Q_1}{Q_1^{ROW}} - \frac{Q_2}{Q_2^{ROW}} \right) \qquad (17)$$

- Home will run a surplus if its endowment is relatively more abundant than that of the ROW in period 1 relative to period 2:

$$\frac{Q_1}{Q_1^{ROW}} > \frac{Q_2}{Q_2^{ROW}} \qquad (18)$$

- Intuitively, home saves if Q_1 is higher than Q_2 relative to the ROW, and borrow if Q_2 is higher than Q_1 relative to the ROW.

International Transmission of Country-Specific Shocks

Increases in Q_1 and in Q_2 have similar effects on Home consumption, but different effects on ROW consumption and the world interest rate:

1. If Q_1 increases:

$$Q_1 \uparrow \Rightarrow \begin{cases} \downarrow r^* & \text{from } CA + CA^{ROW} = 0 \\ \uparrow C_1 & \text{from } \uparrow Q_1 \text{ plus } \downarrow r^* \\ \uparrow C_1^{ROW} & \text{from } \downarrow r^* \end{cases} \tag{19}$$

2. If Q_2 increases:

$$Q_2 \uparrow \Rightarrow \begin{cases} \uparrow r^* & \text{from } CA + CA^{ROW} = 0 \\ \uparrow C_1 & \text{from } \uparrow Q_2 \text{ minus } \uparrow r^* \\ \downarrow C_1^{ROW} & \text{from } \uparrow r^* \end{cases} \tag{20}$$

The effect of shocks transmit through the world interest rate.

Outline

Motivation

- What constitutes large and small economies?

- How would the international transmission of domestic shocks be affected by the size of the country?

- Let's formalize the intuition thinking as if countries had different population size.

- How would the determination of the world interest rate change if countries had different population sizes?

- Assume that Home is populated by N identical households and the ROW by N^{ROW} identical households.

Country Size and The Current Account

- The home country CA is given by $CA_1 = N(B_1 - B_0)$, where B_t is the bond holdings of an individual household at time t.

- Hence, by combining with the budget constraint of the HH in period 1 and $B_0 = 0$:

$$CA_1 = N(Q_1 - C_1) \Rightarrow \quad CA_1 = \frac{N}{2}\left(Q_1 - \frac{Q_2}{1 + r_1}\right), \quad (21)$$

where we substitute for the optimal consumption C_1.

- By the same reasoning, the current account of the ROW is:

$$CA_1^{ROW} = \frac{N^{ROW}}{2}\left(Q_1^{ROW} - \frac{Q_2^{ROW}}{1 + r_1}\right). \quad (22)$$

Country Size and The World Interest Rate

- Using the fact: $CA_1(r^*) + CA_1^{ROW}(r^*) = 0$, we can solve for r^*:

$$r^* = \frac{NQ_2 + N^{ROW}Q_2^{ROW}}{NQ_1 + N^{ROW}Q_1^{ROW}} - 1. \qquad (23)$$

- Let $\alpha \equiv \frac{N}{N+N^{ROW}}$ denote the share of Home population in the world population. Then:

$$r^* = \frac{\alpha Q_2 + (1-\alpha)Q_2^{ROW}}{\alpha Q_1 + (1-\alpha)Q_1^{ROW}} - 1. \qquad (24)$$

- This expression shows that the larger is Home economy (the larger is α) the more important Home endowment shocks will be for the determination of the world interest rate.

How Large Economies Affect Small Economies

- Suppose Home is a small economy, that is, consider the limiting case in which α is infinitesimally small. Then:

$$r^* = \frac{Q_2^{ROW}}{Q_1^{ROW}} - 1. \qquad (25)$$

- The world interest rate is exclusively determined by ROW.

- This justifies our assumption that the small economy takes the world interest rate, r^*, as given.

- Large countries affect small countries through the interest rate:
 - Changes in the ROW endowments affect the world interest rate, which in turn affects the small economy.

Outline

Explaining Large Current Account Imbalances

▶ As we saw in our first set of lectures, the last few decades as witnessed "global imbalances", whereby some countries (namely the U.S.!) have been running huge CA deficits, financed by borrowing from other countries in the world.

▶ Between 1996 and 2006, the U.S. current account deficit increased from 1.5% of GDP to about 6% (from $ 200bn to $ 800bn).

▶ Ben Bernanke, former head of the Fed put forth one possible explanation for this situation while still a Fed Governor in an influential lecture:
⇒ The Global Saving Glut Hypothesis!

The U.S. Current Account Balance: 1960-2012
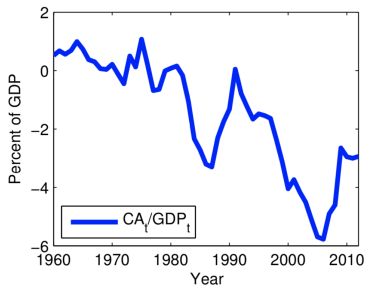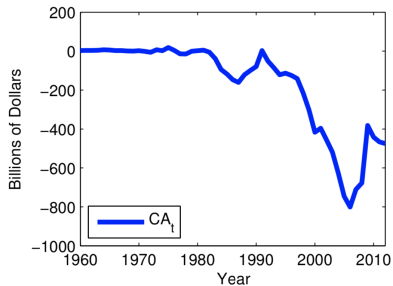
Data Source: Bureau of Economic Analysis.

Competing Explanations

Bernanke put forth two competing explanations:

1. Hypothesis 1: "Made in the U.S.A." The CA deterioration primarily reflects developments inside the United States and is independent of developments in other parts of the world.

2. Hypothesis 2: "Global Saving Glut." The CA deterioration was due to external factors, that is, due to developments in the rest of the world (and hence not under U.S. control).
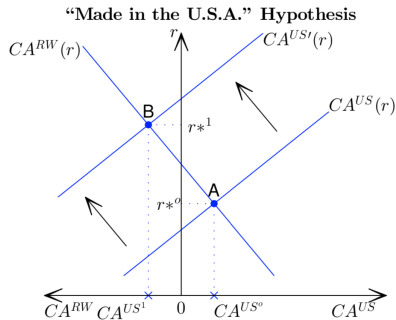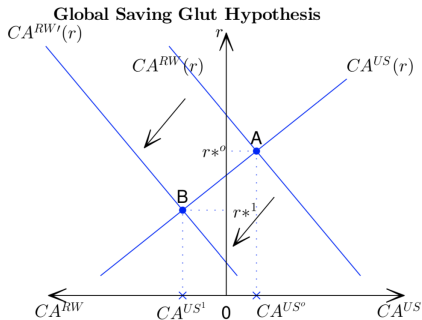
Made in the U.S.A.

- It maintains that the large U.S. current account deficits were due to economic developments inside the United States.

- The U.S. decided to save less and invest more $\Rightarrow$ U.S. current account schedule shifts up and to the left.

- Financial innovation in the United States (subprime mortgages, mortgage-back securities, etc.) induced low private savings rates and over-investment in residential housing.
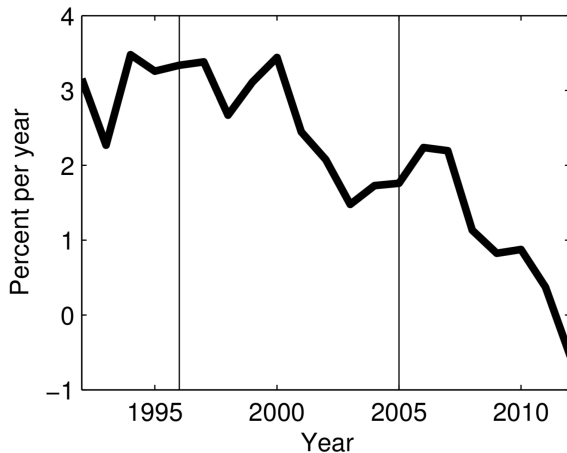
Global Saving Glut

▶ It maintains that the deterioration in the U.S. current account deficit was caused by external factors.

▶ Over the past decade there was a significant increase in the global supply of savings – a global saving glut ⇒ current account schedule of the rest of the world shifts down and left.

1. Emerging markets are accumulating foreign reserves to prepare for future crises and avoid the experience of the 1990s.

2. Export-led growth (brought about via exchange rate manipulation – undervalued currency).

3. Foreign (developed) countries are saving more in preparation for an aging population.

▶ Other possible explanations? E.g., Caballero et al. (2008) and difference in financial development. Or, Wei and Zhang (2011) "sex ratio" explanation for high household savings in China.

U.S. Current Account Deterioration: Global Saving Glut or "Made in the U.S.A?"

Global Saving Glut Hypothesis

"Made in the U.S.A." Hypothesis

- ▶ Tricky since both imply that the U.S. current account deteriorates.
- ▶ ... but they have different implications for the world real interest rate!

The World Real Interest Rate: 1994–2012

Global Saving Glut or "Made in the U.S.A?"

- The large current account deterioration in the United States was associated with a significant fall in the interest rate, giving credence to the global saving glut hypothesis.

- With the onset of the financial crisis in 2007, the U.S. CA had a sharp reversal: the deficit shrunk from 6% of GDP in 2006 to less than 3% in 2009.

- Under the global saving glut hypothesis, the reversal in the CA deficit would be due to a decline in savings in the rest of the world.

- The V-shaped U.S. CA balance observed around the financial crisis should have been accompanied by a V-shaped pattern of the interest rate.

- However, the figure shows that the interest rate does not display such a pattern.

- The bursting of a bubble in the U.S. housing market led to an increase in saving and a fall in investment. This cause an improvement in the CA and a fall in the interest rate.

Taking Stock

- ▶ We analyzed the determination of the current account in a world with large open economies.

- ▶ The world interest rate responds to factors affecting savings and investment in large economies.

- ▶ The transmission of international shocks depends on the relative size of the economies.

- ▶ Theory and data suggest that the large increase in U.S. CA deficits until 2007 was driven by an increase in the global supply of savings.

- ▶ But the sharp reduction of U.S. CA deficits in the aftermath was most likely caused by an increase in U.S. savings and a reduction in U.S. investment after the bursting of the housing bubble.