IMEP 2014 Lectures 7 and 8

Capital Flows to LDCs and the Current Account

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Outline of today's lectures

Lecture 7

- Why doesn't capital flow to poor countries?
- Lucas' explanations and other explanations
- Case study and policy implications

Lecture 8

- Introducing the current account
- The current account in a two-period model
- Addding government consumption to the model

Lecture 7

Why doesn't capital flow from rich to poor countries?

Key reading: Lucas (1990), *American Economic Review* 80(2)

Lucas – why doesn't capital flow to poor countries?

- Lucas (1990) starts from the observation that we define 'rich' and 'poor' based on output per person
- He considers a simple model with a rich country and poor country. Both have a production function $Y = AK^{\beta}L^{1-\beta}$, where A is technology, K is physical capital, and L is the number of workers.
- This production function has constant returns to scale. Lucas assumes both countries have the same technology (ie same A).
- Output per worker is

$$\frac{Y}{L} = A\left(\frac{K}{L}\right)^{\beta} \qquad \text{or} \qquad y = Ax^{\beta}$$

where $y = Y/L$ and $x = K/L$ is the capital-labour ratio

Lucas – why doesn't capital flow to poor countries?

- Since technology is identical across countries, differences in output per worker must be due to differing levels of capital per worker
- But if capital is mobile, we should expect capital per worker to be equal in the rich and poor country
- **Intuition:** if capital per worker is lower in the poor country, the rich should invest there as the marginal product of capital is higher
- This process will only stop when the marginal product of capital, $r = \beta A x^{\beta-1}$, is the same in both countries – ie when both have the **same capital-labour ratio**
- But this is not what we see when we compare the G7 & Third World!

Lucas – why doesn't capital flow to poor countries?

- To demonstrate this clearly, Lucas takes the US as the rich country and India as the poor country
- Data suggest that around 1990, output per worker in the US was 15 times as high as in India, or $y^{US} = 15y^{INDIA}$
- Since $x = (y/A)^{1/\beta}$, the marginal product of capital can be written in terms of output per worker as

$$r = \beta A^{\frac{1}{\beta}} y^{\frac{\beta-1}{\beta}}$$

- For $\beta = 0.4$, the model predicts

$$\frac{r^{INDIA}}{r^{US}} = \frac{\beta A^{\frac{1}{\beta}} (y^{INDIA})^{\frac{\beta-1}{\beta}}}{\beta A^{\frac{1}{\beta}} (y^{US})^{\frac{\beta-1}{\beta}}} = \left(\frac{y^{INDIA}}{y^{US}}\right)^{\frac{\beta-1}{\beta}} = 15^{1.5} = 58!$$

Lucas – why doesn't capital flow to poor countries?

- This implies that if the return on capital in the US is 5%, then the return in India is almost 300%!
- Clearly there is something very wrong with the model and its assumptions. Lucas' next step is to ask what.
- He sketches out 3 explanations for the **'Lucas paradox'**:
  1. Differences in the level or quality of human capital
  2. External benefits of human capital
  3. Capital market imperfections
- Let's consider each explanation...

Explanation 1: Differences in human capital

- Effective labour input per person is unlikely to be equal across rich and poor countries as assumed above
- In fact, Kreuger estimated that one US worker is 'worth' 5 Indian workers (Lucas p. 93)
- Now let $y = Y/L^e$, where L^e is *effective labour*. It is still the case that $y^{US} = 15y^{INDIA}$, which implies that

$$\frac{r^{INDIA}}{r^{US}} = \left(\frac{(Y/L^e)}{15(Y/5L^e)} \right)^{\frac{\beta-1}{\beta}} = 3^{1.5} = 5.2$$

- This is a big improvement on 58, but a factor of 5 is still too high. Differences in HK are therefore important but not the whole story.

Explanation 2: External benefits of human capital

- It is often argued that human capital is a **positive externality**
- **Example:** an increase in the quality of my co-workers raises my productivity, even if my human capital remains constant
- To account for this external effect, or 'spillover', Lucas asks us to think about a modified production function

$$y = Ax^{\beta}h^{\gamma} = \widetilde{A}x^{\beta}, \qquad \text{where } \widetilde{A} = Ah^{\gamma}$$

- Here y and x are output and capital per *effective worker* as in Exp 1, and h is human capital per worker
- **Intrepretation:** an increase in human capital of 1% raises the economy's level of productivity by γ%

Explanation 2: External benefits of human capital

- The marginal product of capital is now

$$r = \beta A x^{\beta-1} h^{\gamma}$$

- Since $x = (y/Ah^{\gamma})^{1/\beta}$, the marginal product of capital can be written in terms of output per effective worker as

$$r = \beta A^{1/\beta} y^{(\beta-1)/\beta} h^{\gamma/\beta}$$

- Lucas estimates that $\gamma = 0.36$, and if Krueger's estimates are correct, then $h_{INDIA}^{\gamma/\beta} = \frac{1}{5} h_{US}^{\gamma/\beta}$
- So we now find that

$$\frac{r^{INDIA}}{r^{US}} = \left(\frac{(Y/L^e)}{15(Y/5L^e)} \right)^{\frac{\beta-1}{\beta}} \times \frac{h_{US}^{\gamma/\beta}}{5h_{US}^{\gamma/\beta}} = 3^{1.5} \times 5^{-1} = 1.04$$

Explanation 2: External benefits of human capital

- We now have a ratio close to 1, so problem solved, right?
- In one sense 'yes' – Lucas shows that combining Exp 1 and 2 goes a long way to explaining why capital does not flow to poor countries
- Human capital is therefore likely to be an important factor limiting capital flows to poor countries
- But in another sense, the answer is 'no' – the assumption in Exp 2 that the external benefits of HK are limited to a single country is troublesome, and there is one other explanation to consider
- Let's see what Explanation 3 has to offer...

Explanation 3: Capital market imperfections

- The model above assumes that effective mechanisms exist to enforce international borrowing agreements, so that capital will flow to where the return is highest
- If such mechanisms do not exist – or are highly imperfect – then capital might not flow to poor countries because the return does not justify the additional risk
- That is, the lenders (rich countries) might be concerned that the borrowers (poor countries) will default on their debt
- Lucas calls this the 'political risk' explanation for capital flows

Explanation 3: Capital market imperfections

- Lucas does not hold that perfect enforcement exists in practice, but he does argue that political risk is weaker than explanations 1 or 2
- The reasoning he gives is that up until 1945, much of the Third World was part of the British Empire, making contracts largely enforceable and trustworthy
- Yet capital flows were still lower than we would expect – see Lecture 6
- **Does Lucas have a good point here?**

Alternative explanations

- Lucas plays down the importance of capital market imperfections, but the recent sovereign debt crisis suggests that enforceability of international contracts is a significant concern for lenders
- There are several other possible explanations in the empirical literature
- These include:
  1. Other 'missing' factors of production – eg land or entrepreneurship
  2. Risks of investing in countries with corrupt institutions or unstable governments
- In a leading empirical study, Alfaro et al. (2008) find that **institutional quality** is the main factor behind the Lucas paradox

Alternative explanations

- Alfaro et al. measure institutional quality using an index scaled from 1 to 10 which considers several influences such as government stability, law and order, and corruption
- Their results suggest that improving the quality of Turkish institutions to the UK level would increase foreign investment by 60% (p. 347)
- They therefore emphasise the importance of law, regulation, and institutional reform as policy levers in developing countries
- The results of Alfaro et al. are consistent with capital market imperfections being an important factor, since historical defaults go hand-in-hand with low institutional quality (p. 350)

Case study: Primark in Bangladesh

- On 24 April 2013 the Rana Plaza factory building in Dhaka collapsed, killing more than 1,000 people
- The workers had complained about cracks in the walls, but they were told to return to work by factory owners
- Primark workers made garments in the factory, so Primark lost a source of income and their reputation took a hit
- This is an interesting example because it shows how weak laws and regulations can be a source of risk for investors
- Investors will take into account economic risks as well as the possibility of damage to their reputation when considering whether to invest in developing countries

The Lucas Paradox: policy implications

- Lucas (1990) convincingly argues that human capital is an important factor behind the lack of capital flows to poor countries
- But other factors are also relevant, such as capital market imperfections and other risks associated with investment in developing countries
- **Policy implications**

  To attract capital flows to aid development, LDCs should focus on

  1. Improving institutions and reducing risks to investors
  2. Improving human capital – eg by education and on-the-job training

THE END

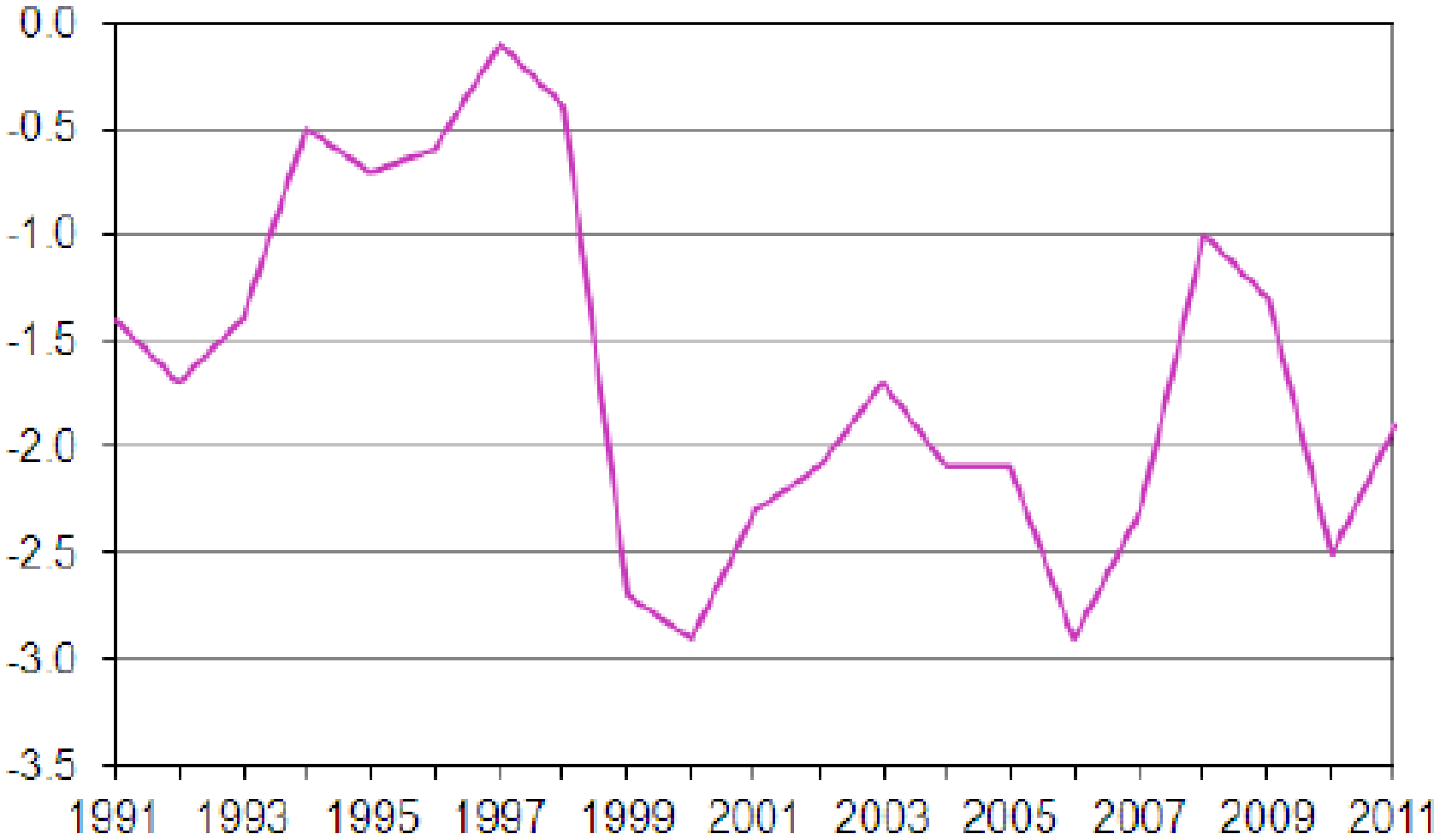
Lecture 8 – The Current Account and Consumption

Key reading: Obstfeld and Rogoff, Ch 1.1 to 1.1.6

Introducing the current account

- An open economy can borrow resources from the rest of the world or lend resources abroad
- This exchange in resources is measured by the current account
- The current account is one part of the Balance of Payments (BoP), which records a country's transactions with the rest of the world
- The other part is the capital account, but BoP $= 0$, which implies that current account $+$ capital account $= 0$
- So, **capital account balance $=$ $-$current account balance**

UK current account 1991-2011 (% of GDP)



Source: Pink Book 2012, Office for National Statistics (ONS) website

A two-period model of the current account

- Models always begin with simplifying assumptions:

1. Small open economy that consumes 1 good and lasts 2 periods
2. Economy can borrow and lend at constant world interest rate $r > 0$
3. Output in periods 1, 2 is given by known endowments Y_1 and Y_2
4. Identical individuals and population of 1: 'representative consumer'
5. Utility from future consumption is discounted due to time preference

A two-period model of the current account

- Representative consumer maximises lifetime utility:

$$U = u(C_1) + \beta u(C_2), \qquad \text{where } 0 < \beta < 1$$

- We assume that consumers prefer more to less and want 'smooth' consumption – ie $u'(C) > 0$ and $u''(C) < 0$

- The lifetime budget constraint is:

$$C_1 + \frac{C_2}{1+r} = Y_1 + \frac{Y_2}{1+r}$$

Solving the two-period model

- Solving the budget constraint for C_2 gives

$$C_2 = Y_2 + (1+r)(Y_1 - C_1)$$

- Substituting for C_2 in lifetime utility:

$$\max_{C_1} \quad u(C_1) + \beta u\left(\overbrace{Y_2 + (1+r)(Y_1 - C_1)}^{C_2} \right)$$

- The first-order condition for this problem is

$$u'(C_1) = \beta(1+r)u'(C_2)$$

- This is the intertemporal **Euler equation**

- The **Appendix** explains in detail how you can derive this equation

The Euler equation

- The Euler equation implies that the consumer can not gain by shifting consumption between period 1 and period 2. It is a dynamic case of **marginal benefit = marginal cost.**
- $u'(C_1)$ = extra utility from consuming one more unit in period 1
- $\beta(1+r)u'(C_2)$ = discounted loss in future utility from consuming that additional unit in period 1, given that it could have been saved for period 2 and earnt $1+r$
- Since $u''(C) < 0$, the Euler equation will imply 'consumption smoothing' – ie similar C_1 and C_2 preferred over extreme values
- **Exercise:** Find the Euler equation when $U = \ln(C_1) + \beta \ln(C_2)$

The Euler equation

- Typically, we cannot solve the 2-period model without choosing functional forms for $u(C_1)$ and $u(C_2)$. But there is one important exception – when $\beta = 1/(1+r)$.
- In this case, the Euler equation becomes $u'(C_1) = u'(C_2)$, which implies that $C_1 = C_2$ – **perfect consumption smoothing**
- Consumption in both periods is $\bar{C} = \frac{(1+r)Y_1 + Y_2}{2+r}$
- This result comes from the budget constraint by setting $C_1 = C_2 = \bar{C}$
- Note that consumption can be smoothed, even if output is not! If $Y_1 < Y_2$, the country borrows $\bar{C} - Y_1$ in period 1 and repays $(1+r)(\bar{C} - Y_1)$ in period 2

The current account in the two-period model

- The current account balance is the change in a country's net foreign asset position (ie net claims of ownership) over a given period of time
- As an undergraduate you may have been taught that

$$\textbf{current account balance} = \textbf{net exports}$$

- This 'net trade' view of the current account is equivalent
- **Intuition:** a country with negative net exports must run down its stock of foreign assets to pay for imports from abroad

The current account in the two-period model

- Let B_{t+1} = net foreign assets at the end of period t. The current account balance over period t is: $CA_t = B_{t+1} - B_t$.
- For our simple model

$$CA_t = B_{t+1} - B_t = Y_t + r_t B_t - C_t$$

- In the 2-period model $t = 1, 2$ with initial condition $B_1 = 0$ and terminal condition $B_3 = 0$
- **Initial condition:** home economy starts with a 'clean slate' – ie zero net foreign assets
- **Terminal condition:** economy will repay any debt to foreigners and claim any foreign assets it is owed

The current account in the two-period model

- Since $B_1 = 0$, we have $CA_1 = Y_1 - C_1 \ = B_2$
- And since $B_3 = 0$ and $C_2 = Y_2 - (1+r)(C_1 - Y_1)$:

$$\begin{aligned} CA_2 &= Y_2 + rB_2 - C_2 \\ &= Y_2 + r(Y_1 - C_1) - C_2 \\ &= -(Y_1 - C_1) = -B_2 \end{aligned}$$

- Hence the intial and terminal condition imply that $CA_1 + CA_2 = 0$
- In general Y_1 and C_1 won't be equal, so the current account will be in surplus one period and deficit the other
- **Is this a bad thing?**

The two-period model diagram (O&R Fig. 1.1)

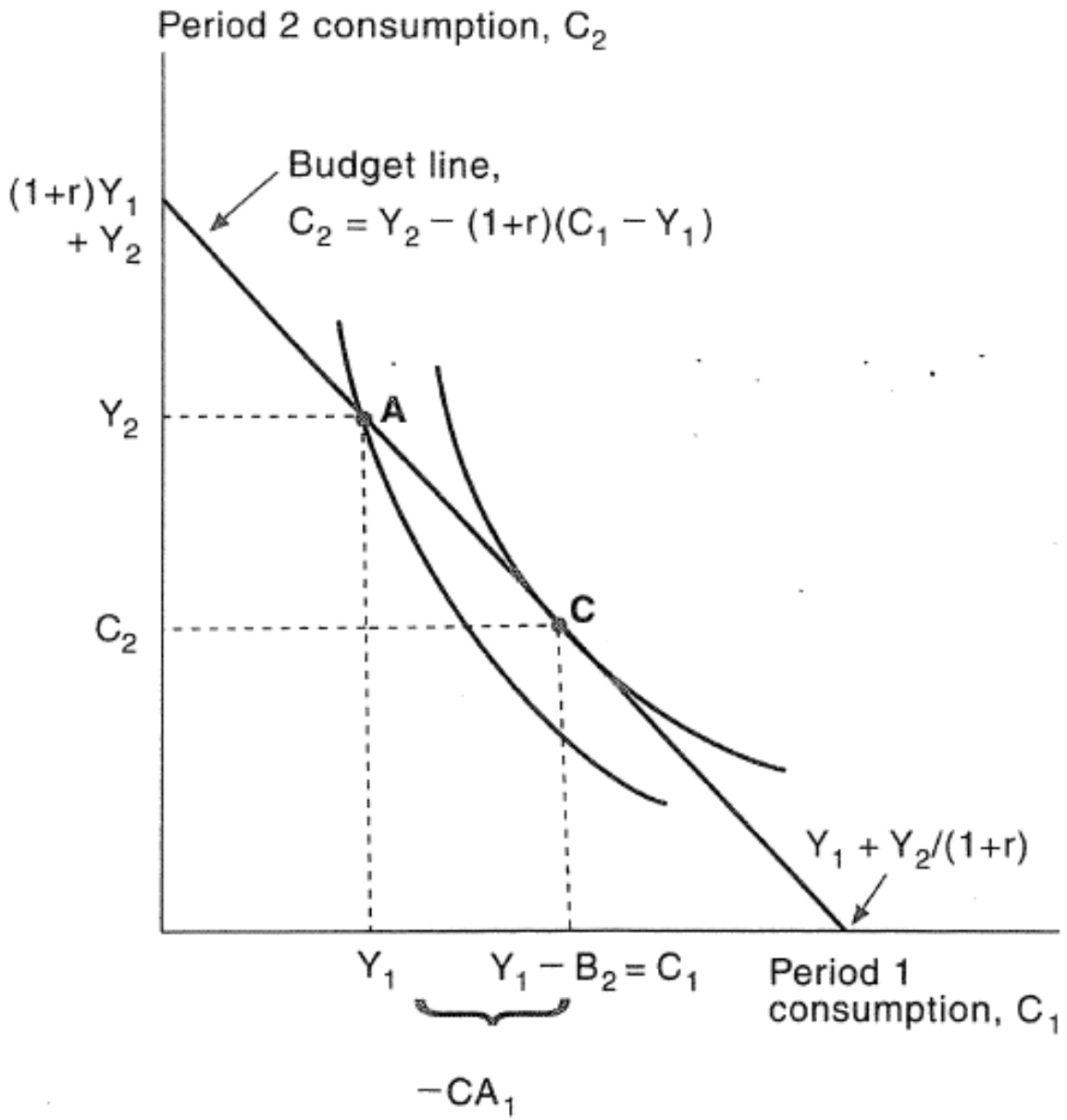


Diagram analysis

- Diagram shows the case where the domestic interest rate exceeds r
- Point A is 'autarky' – ie when economy closed to trade. Optimal consumption is at point C – highest possible indifference curve.
- At point C there is a first period current account deficit, and a second period current account surplus
- Current account imbalances are NOT detrimental – utility is higher at point C due to **consumption smoothing**
- **Lesson:** countries gain from trade if international contracts respected
- **Exercise:** draw a diagram for the case where $r^A < r$

The autarky interest rate

- The interest rate that will prevail if the economy is barred from international borrowing and lending
- Given by the *closed economy* Euler equation:

$$\frac{\beta u'(Y_2)}{u'(Y_1)} = \frac{1}{(1+r^A)}$$

  where $\frac{1}{(1+r^A)}$ is the 'autarky price' of future consumption
- If $r^A > r$ the autarky price of future consumption is below the world price. CA deficit in period 1, CA surplus in period 2.
- Consistent with comparative advantage – import goods that have a high autarky price and export goods with a low autarky price

The autarky interest rate

- If $r^A = r$, the autarky allocation is the same as the trade allocation
- In this case there no gains from trade – why?
- Starting from $r^A = r$, suppose β rises making home agents more patient. The Euler equation tells us that r^A falls below r.
- This results in a CA surplus in period 1, and a CA deficit in period 2
- **What happens if (i) Y_1 rises, or (ii) Y_2 rises**?

Adding government consumption

- Suppose government consumption G is funded by equal taxes – ie government runs a 'balanced budget'
- The lifetime budget constraint is now

$$C_1 + \frac{C_2}{1+r} = Y_1 - G_1 + \frac{Y_2 - G_2}{1+r}$$

- And the current account equation is

$$CA_t = B_{t+1} - B_t = Y_t + r_t B_t - C_t - G_t$$

- The Euler equation is unchanged, but assume $\beta = 1/(1+r)$
- Consumption is constant at

$$\bar{C} = \frac{(1+r)(Y_1 - G_1) + Y_2 - G_2}{2+r}$$

Government consumption: case I

- Suppose government consumption and GDP are constant: $G_1 = G_2 = \bar{G}$ and $Y_1 = Y_2 = \bar{Y}$
- With $\beta = 1/(1+r)$, optimal consumption is $\bar{C} = \bar{Y} - \bar{G}$
- Consumption is lower by $\bar{G}$ due to the reduction in disposable income
- The current account is balanced, like when $Y_1 = Y_2 = \bar{Y}$ and $G = 0$
- So in this case, government consumption has no implications for current account balance

Government consumption: case II

- Now make the additional assumption of goverment consumption only in period 1: $G_1 = \bar{G}, \;\; G_2 = 0$
- Consumption is equal to $\bar{C} = \bar{Y} - \frac{(1+r)G_1}{2+r}$
- The current account is in deficit in period 1 and surplus in period 2:

$$CA_1 = \bar{Y} - \bar{C} - G_1 = -\frac{G_1}{2+r} \quad \text{and} \quad CA_2 = \frac{G_1}{2+r}$$

- **Lesson:** government consumption affects current account balance only if it 'tilts' the path of private net income

Next time...

- In Lecture 9 we will introduce investment into the 2-period model of the current account
- Then, in Lecture 10, we will take our first look at exchange rates
- In particular, we will look at purchasing power parity (PPP) and the PPP puzzle

Appendix: Deriving the Euler equation

- The problem we need to solve is

$$\max_{C_1} \quad u(C_1) + \beta u(C_2) \qquad \text{s.t.} \qquad C_2 = Y_2 + (1+r)(Y_1 - C_1)$$

- So we need to take the derivative w.r.t. C_1 and set it equal to zero

$$\overbrace{\frac{\partial u(C_1)}{\partial C_1}}^{u'(C_1)} + \beta \frac{\partial u(C_2)}{\partial C_1} = 0 \qquad (1)$$

- The trick is to use the **chain rule.** Since $\frac{\partial C_2}{\partial C_2} = 1$,

$$\frac{\partial u(C_2)}{\partial C_1} = \frac{\partial u(C_2)}{\partial C_1} \times \frac{\partial C_2}{\partial C_2} = \frac{\partial u(C_2)}{\partial C_2} \times \frac{\partial C_2}{\partial C_1} = u'(C_2) \times \frac{\partial C_2}{\partial C_1}$$

- And $\frac{\partial C_2}{\partial C_1} = -(1+r)$, so Eq.(1) implies that

$$u'(C_1) = \beta(1+r)u'(C_2)$$

References

- Alfaro , L., Kalemli-Ozcan, S. and V. Volosovych 2008. Why doesn't capital flow from rich to poor countries? An empirical investigation. *Review of Economics and Statistics* 90(2), pp. 347-68.
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