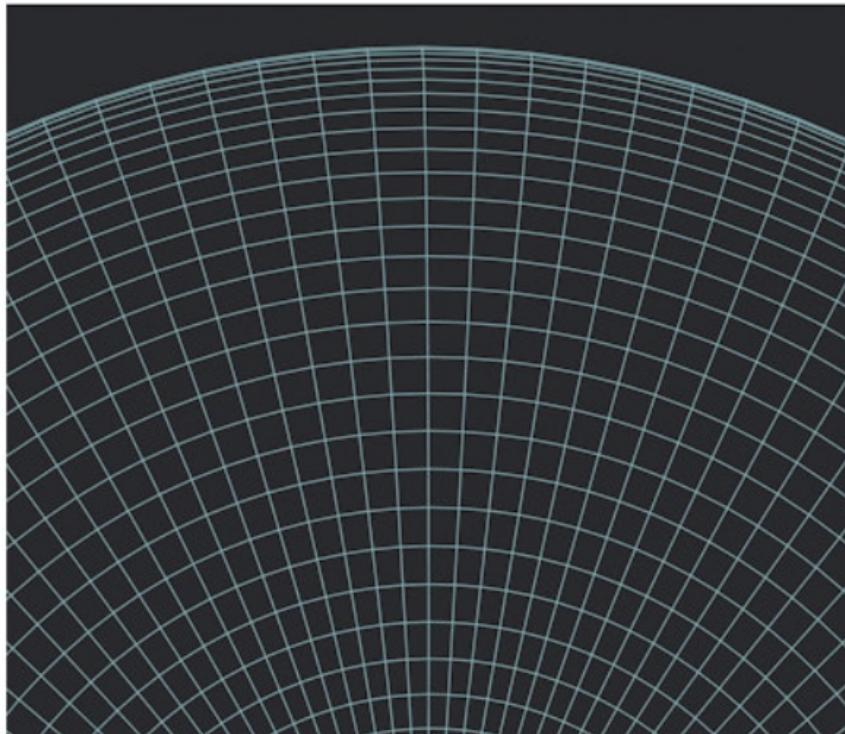

INTERNATIONAL MACROECONOMICS

A MODERN APPROACH

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Chapter 2
Current Account Sustainability

Motivation

A natural question that arises from our description of the recent history of the U.S. external accounts is whether the observed trade and current account deficits are sustainable in the long run. In this chapter, we develop a framework to address this question.

Today, we will ask two questions:

- Can a Country Run a Perpetual Trade Balance Deficit?
- Can a Country Run a Perpetual Current Account Deficit?

Can a Country Run a Perpetual Trade Balance Deficit?

Depends on the initial debt position of the country:

- If it is a **net debtor**, that is, if its net international investment position (NIIP) is negative, then the answer is no. In this case, the country will have to run a trade balance surplus at some point to service its debt.
- If it is a **net creditor** to the rest of the world, that is, if its net international investment position is positive, then it can run a perpetual trade deficit and finance it with the interest generated by its net investments abroad.

Framework

We will analyse this issue more formally, using:

- Two-period Economy
- Infinite-horizon Economy

First, some notation:

- Important notation:
 - TB_t - Trade balance in period t
 - CA_t - Current account in period t
 - B_t - Net international investment position **at the end** of period t .
 - r - Interest rate paid on assets held for one period.

Recall the Accounting Identities from Last Week:

Current Account:

$$CA_t = TB_t + \underbrace{IB_t}_{NII \text{ and } NEC (0)} + \underbrace{NUT_t}_0$$

$$CA_t = TB_t + NII_t$$

Net International Investment (or Net Foreign Assets) Position:

$$NIIP_t = A_t - L_t$$

A_t : Value of foreign assets owned by country's residents

L_t : Value of domestic assets owned by foreign residents

Relationship between the two:

$$\Delta NIIP_t = CA_t + \underbrace{VC_t}_0$$

For simplification, for now, assume:

- $NEC = 0$
- $NUT = 0$
- $VC = 0$

Two-Period Economy Analysis

- It starts period 1 with NIIP of B_0 .
- Let r denote the interest rate.
- Then, the country's net investment income in period 1 is given by

$$\text{Net investment income in period 1} = rB_0$$

- Net Investment Income in period 1 is equal to the return on net foreign assets held by the country's residents between periods 0 and 1.

We assume that the income balance is equal to net investment income and that net unilateral transfers and valuation changes are zero. Then:

$$\begin{aligned} CA_1 &= TB_1 + NII_1 \\ &= TB_1 + rB_0 \end{aligned}$$

The change in the NIIP is equal to the current account as we assume that valuation changes are zero:

$$B_1 - B_0 = CA_1.$$

Combining the two to eliminate CA_1 leads to the equation for the country's NIIP at the end of period 1

$$B_1 = (1 + r)B_0 + TB_1 \tag{1}$$

A similar expression must hold in period 2

$$B_2 = (1 + r)B_1 + TB_2 \quad (2)$$

At the end of period 2, the country cannot hold assets or debts because no one will be alive in period 3 to collect (the world ends in period 2). This means that

$$B_2 = 0 \quad (3)$$

The Sustainability Condition

Combining equations (1), (2), and (3) yields

$$(1 + r)B_0 = -TB_1 - \frac{TB_2}{(1 + r)} \quad (4)$$

which states that initial NIIP including interest, $(1 + r)B_0$, equals the present discounted value of trade deficits.

It is clear from this expression that:

- If the country starts out as a net debtor, $B_0 < 0$, then it must run a trade balance surplus at some point.
- However, if the country starts out as a net creditor, $B_0 > 0$, then it can afford running trade deficits in both periods.

This result does not hold only for the two-period economies, but for economies lasting any number of periods, including an infinite number of periods. We will show this later.

Since the United States is a net debtor, the present analysis implies that it will have to revert its trade balance deficits at some point in the future.

Can a Country Run a Perpetual Current Account Deficit?

The answer to this question, again, depends on the country's initial international investment position.

- If NIIP is positive, then the answer is yes.
- If NIIP is negative, then the answer is no.

To see this, recall that the change in the NIIP is the current account (assuming valuation changes are zero):

$$B_1 - B_0 = CA_1$$

Similarly, in period 2 we have

$$B_2 - B_1 = CA_2$$

Combining these two expressions to eliminate B_1 and recalling that $B_2 = 0$, we obtain

$$B_0 = -CA_1 - CA_2$$

which implies that the country can run current account deficits in both periods only if the initial NIIP is positive. This result holds for economies lasting any finite number of periods.

However, later we will show that this **might not be the case in the infinite horizon case**. We will show this below.

Infinite Horizon Economies

Can a country run a perpetual trade balance deficit?

- Move from the two-period economy and assume that the economy starts in period 1 and lasts forever.
- For simplicity, assume that the interest rate is constant over time.
- Let's start with perpetual trade balance question.
- Net foreign asset position at the end of period 1 will be given by

$$B_1 = (1 + r)B_0 + TB_1$$

- Solve for B_0 and obtain:

$$B_0 = \frac{B_1}{1+r} - \frac{TB_1}{1+r} \quad (5)$$

Now shift this expression one period forward to obtain

$$B_1 = \frac{B_2}{1+r} - \frac{TB_2}{1+r}.$$

Use this formula to eliminate B_1 from equation (5), which yields

$$B_0 = \frac{B_2}{(1+r)^2} - \frac{TB_1}{1+r} - \frac{TB_2}{(1+r)^2}.$$

- Shifting (5) two periods forward yields

$$B_2 = \frac{B_3}{1+r} - \frac{TB_3}{1+r}.$$

Combining this expression with the one right above it, we obtain

$$B_0 = \frac{B_3}{(1+r)^3} - \frac{TB_1}{1+r} - \frac{TB_2}{(1+r)^2} - \frac{TB_3}{(1+r)^3}.$$

Repeating this iterative procedure T times results in the relationship

$$B_0 = \frac{B_T}{(1+r)^T} - \frac{TB_1}{1+r} - \frac{TB_2}{(1+r)^2} - \cdots - \frac{TB_T}{(1+r)^T}. \quad (7)$$

In an infinite horizon economy, the no-Ponzi-game constraint becomes

$$\lim_{T \rightarrow \infty} \frac{B_T}{(1+r)^T} \geq 0. \quad (8)$$

No-Ponzi-Game Constraint: Interpretation

- **Lower bound - debt can't explode:** $\lim_{T \rightarrow \infty} \frac{B_T}{(1+r)^T} \geq 0$
 - Debt cannot grow at rate $\geq r$ (Ponzi scheme)
- **Upper bound - credit can't explode:** $\lim_{T \rightarrow \infty} \frac{B_T}{(1+r)^T} \leq 0$
 - Credit cannot grow at rate $\geq r$
- **Together \Rightarrow Transversality condition:**

$$\lim_{T \rightarrow \infty} \frac{B_T}{(1+r)^T} = 0 \tag{9}$$

Implications of transversality condition

- Using (9) in equation (7) as $T \rightarrow \infty$:

$$B_0 = \frac{TB_1}{1+r} - \frac{TB_2}{(1+r)^2} - \dots = - \sum_{t=1}^{\infty} \frac{TB_t}{(1+r)^t}.$$

- **Interpretation:** Initial net foreign assets = PV of future trade deficits

- **Key result:** If $B_0 < 0$ (net debtor):

Country *must* run trade surpluses at some point

- **Conclusion:** Net debtors cannot run perpetual trade balance deficits (finite or infinite horizon)

Infinite Horizon Economies

Can a net debtor run perpetual current account deficits?

- **Setup:** Country is net debtor ($B_0 < 0$)
- **Debt-servicing policy:** Pay fraction $\alpha \in (0, 1)$ of interest obligations via trade surplus

$$TB_t = -\alpha r B_{t-1} \quad (10)$$

- When $B_{t-1} < 0$ and $r > 0 \Rightarrow TB_t > 0$ (trade surplus)

Dynamics of net foreign assets

- Evolution equation: $B_t = (1 + r)B_{t-1} + TB_t$
- Substituting policy (10):

$$B_t = (1 + r - \alpha r)B_{t-1} \quad (11)$$

- **Result:** Because $B_0 < 0$ and $(1 + r - \alpha r) > 0$ then $B_t < 0$ for all $t \geq 0$ (forever in debt)

Current account implications

- Current account: $CA_t = rB_{t-1} + TB_t$
- Using policy (10):

$$CA_t = r(1 - \alpha)B_{t-1}$$

- Since $r(1 - \alpha) > 0$ and $B_{t-1} < 0$ for all $t > 1$:

$CA_t < 0 \quad \Rightarrow \quad \text{Perpetual current account deficits}$

Is this sustainable? Check transversality condition

- Need: $\lim_{T \rightarrow \infty} \frac{B_T}{(1+r)^T} = 0$

- From $B_t = (1 + r - \alpha r)^t B_0$:

$$\frac{B_t}{(1+r)^t} = \left[\frac{1 + r(1 - \alpha)}{1 + r} \right]^t B_0$$

- Since $1 + r(1 - \alpha) < 1 + r$, the ratio < 1
- **Result:** $\frac{B_T}{(1+r)^T} \rightarrow 0$ as $T \rightarrow \infty$
- Transversality condition satisfied and therefore in an infinite horizon economy current account deficits are sustainable even if economy starts as net debtor!

But remember that it is financed from the trade balance...

- Trade balance: $TB_t = -\alpha r[1 + r(1 - \alpha)]^{t-1} B_0$
- Grows unboundedly at rate $r(1 - \alpha) > 0$
- Since $TB_t = GDP_t - A_t$: (we will show this below)

GDP must grow at rate $\geq r(1 - \alpha)$

- **Conclusion:** Perpetual CA deficits possible for net debtors *only if* economy grows fast enough to generate required trade surpluses

Taking stock so far...

We have looked at a simple two-period model and an infinite-horizon model to answer two initial questions we had:

- Can a country run perpetual trade balance deficits?
- Can a country run perpetual current account deficits?

In what follows we will prepare ourselves for Chapter 3 and try to relate Current account to the relevant macroeconomic aggregates.

Current Account and Macroeconomic Aggregates

It is useful to connect current account to macroeconomic aggregates. In particular, let us look at:

- National savings.
- Investment.
- Gross domestic product.
- Domestic absorption.

The Current Account: Gap between Saving and Investment

In any period, say period t , saving, investment, and the current account are linked by the identity

$$CA_t = S_t - I_t$$

This expression is intuitive. The country's saving in excess of what is needed to finance domestic investment must be allocated to purchases of foreign assets—where else could those resources go? But the change in the net foreign asset position is precisely the current account.

How can we derive this identity formally?

Recall from Macro 1: A country's **aggregate supply of goods and services** in any given period t is the sum of gross domestic product, denoted Q_t , and imports, denoted IM_t .

The **aggregate demand for goods and services** is the sum of private consumption, C_t , government consumption, G_t , investment, I_t , and exports, X_t :

$$Q_t + IM_t = C_t + G_t + I_t + X_t$$

Now add net investment income, rB_{t-1} , to both sides of the previous expression and recall that the trade balance is the difference between imports and exports, or

$$TB_t = X_t - IM_t$$

to get

$$Q_t + rB_{t-1} = C_t + G_t + I_t + TB_t + rB_{t-1}$$

The sum of GDP and net investment income is known as national income (or gross national income, GNP), denoted Y_t .

$$\text{national income, } GNP_t = Q_t + rB_{t-1}$$

Also, recall from earlier that the sum of net investment income and the trade balance is the current account,

$$CA_t = rB_{t-1} + TB_t$$

Thus, we can write

$$Y_t = C_t + G_t + I_t + CA_t \quad (6)$$

Finally, the difference between national income and private and public consumption is national saving, or

$$S_t = Y_t - C_t - G_t$$

Combining this expression with (5), we get the expression we were looking for

$$CA_t = S_t - I_t$$

which says that the current account is the gap between saving and investment.

The Current Account as the Gap between National Income and Domestic Absorption

Domestic absorption is defined as the sum of private consumption, government consumption, and investment. Letting A_t denote domestic absorption, we have

$$A_t = C_t + G_t + I_t$$

Combining this expression with (5), we can express the current account as

$$CA_t = Y_t - A_t$$

which states that the current account is the gap between national income and the domestic absorption of goods and services.

Summing Up

- A country that is a net external debtor cannot run a perpetual trade balance deficit.
- A country that is a net external debtor cannot run a perpetual deficit in the current account. This result applies to economies that last for any finite number of periods.
- For infinite horizon economies, perpetual current account deficits are possible even if the country is an external debtor, if the economy is growing and dedicates a growing amount of resources to pay interest on its external debt.

- The current account can be expressed as the:
 - gap between saving and investment, $CA_t = S_t - I_t$,
 - gap between national income and domestic absorption:
$$CA_t = Y_t - A_t$$
 - change in the country's net foreign asset position:
$$CA_t = B_t - B_{t-1}$$
 - sum of net investment income and the trade balance:
$$CA_t = rB_{t-1} + TB_t$$

All four expressions are identities that must hold at any time in any country.

The Road Ahead

- All four of the above expressions for the current account are accounting identities. They **do not provide any explanation, or theory, of the determinants of the current account.**
- To understand what determines the current account we need a model, that is, a story of the economic behavior of households, firms, governments, and foreign residents. This will be our next focus.