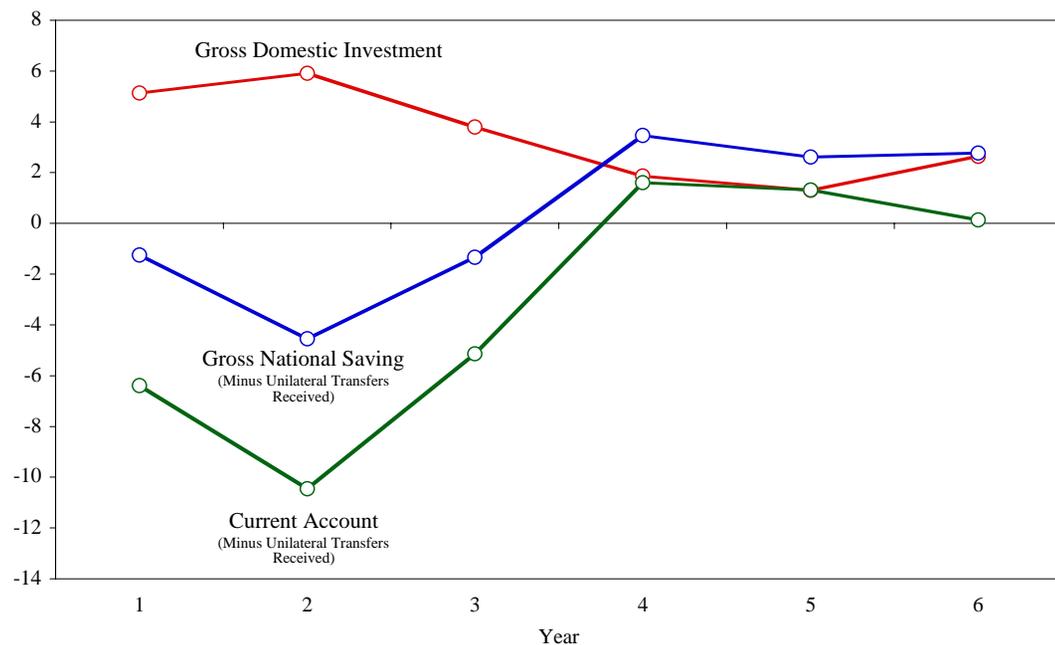


# Chapter 17

The Balance of Payments in the Long  
Run: The Gains from Financial  
Globalization  
(2/12/08)

# Intertemporal Macroeconomics and the Long-Run Budget Constraint

- We here study the benefits of a country being open to the international financial market. This includes benefits of being able to run current account imbalances at times.
- As an example, consider the case of Honduras after it was hit by hurricane Mitch in 1998. See chart below. The country needed large investment expenditure to rebuild. Since it was able to import goods from abroad, it was able to carry out this investment without the need to cut the level of consumption and raise domestic saving. This made the rebuilding process less painful.



# 1. Intertemporal Macroeconomics and the Long-Run Budget Constraint

- The approach we take to address this issue is called “intertemporal macroeconomics”, which looks at how an economy evolves over time.
- The first step is to establish the set of choices available to an economy. This involves a budget constraint over time, called the “intertemporal budget constraint.
- Make the following assumptions
  - ♦ Assume country is a small open economy that can lend or borrow overseas at world real interest rate  $r^*$  (constant).
  - ♦ Assume no unilateral transfers ( $NUT=0$ ), no capital transfers ( $KA=0$ ), and no capital gains on external wealth.
- Subscript for years,  $N$  and  $N-1$ .

# Wealth Dynamics

- Track how a country's wealth ( $W$ ) evolves over time.
- Assume it starts with 0 wealth.
- Change in  $W$  from beginning of year 0 to end of year 0 is just the current account in year 0.
- CA equals trade balance (TB) plus any net interest payments received (NFIA)
- Net interest payments equal interest earned on assets minus interest paid on liabilities
- Iterate  $N$  periods to find external wealth at any point in the future:

# Wealth Dynamics

$$W_0 = TB_0$$

$$W_1 = (1 + r^*)TB_0 + TB_1$$

$$W_2 = (1 + r^*)^2TB_0 + (1 + r^*)TB_1 + TB_2$$

$$W_N = (1 + r^*)^N TB_0 + (1 + r^*)^{N-1} TB_1 + (1 + r^*)^{N-2} TB_2 + \dots \\ + (1 + r^*)TB_{N-1} + TB_N$$

# Wealth Dynamics

- Thus

$$\frac{W_N}{(1+r^*)^N} = TB_0 + \frac{TB_1}{(1+r^*)} + \frac{TB_2}{(1+r^*)^2} + \dots + \frac{TB_N}{(1+r^*)^N}$$

- Each part of this expression is known as a **present value**
  - ◆ Left side = present value of external wealth N periods into the future.
  - ◆ Right side = present value of trade surpluses from year 0 to year N.

# Wealth Dynamics

- Assume:

$$\frac{W_N}{(1+r^*)^N} \rightarrow 0 \quad \text{as} \quad N \rightarrow \infty$$

- EXAMPLE for intuition:
  - ◆ You borrow \$100,000 from bank at interest rate of 10% annually.
  - ◆ Suppose you pay neither interest nor principal but ask the bank to rollover interest and principal each year. In year 1, the overdue interest is \$10,000, and the debt grows to \$110,000. In year 2, the overdue interest is \$11,000, and debt grows by 10% again to \$121,000. This goes on, ad infinitum.
  - ◆ This is not sustainable, since the debt explodes: each year it grows by a factor equal to the gross rate of interest, which is 1.1 (> 1).
  - ◆ Refer to this rollover scheme as pyramid scheme or “Ponzi game.”
  - ◆ We this idea to borrowing (TB<0) from abroad, or lending abroad (TB>0), ruling out exploding debts or assets.

# Long-Run Budget Constraint

## LRBC AND THE TRADE BALANCE

- Hence, if left hand side tends to zero, so must the right hand side.
- We require:

$$TB_0 + \frac{TB_1}{(1+r^*)} + \frac{TB_2}{(1+r^*)^2} + \frac{TB_3}{(1+r^*)^3} + \frac{TB_4}{(1+r^*)^4} + \dots = 0$$

- This is the **long-run budget constraint (LRBC)** for a country with zero initial wealth.
  - ◆ Expression is a weighted sum of future trade balances.
  - ◆ Clearly a country cannot run trade deficits forever or trade surpluses forever, without seeing its wealth explode on one direction or another.
  - ◆ For a country to abide by this constraint, it must ensure that its **future trade deficits and surpluses “cancel out” on average.**

# Long-Run Budget Constraint

## LRBC AND GNE VERSUS GDP

- By definition

$$TB = GDP - (C + I + G) = GDP - GNE$$

- So we may write the LRBC as

$$\underbrace{GDP_0 + \frac{GDP_1}{(1+r^*)} + \frac{GDP_2}{(1+r^*)^2} + \dots}_{\text{present value of GDP}} = \underbrace{GNE_0 + \frac{GNE_1}{(1+r^*)} + \frac{GNE_2}{(1+r^*)^2} + \dots}_{\text{present value of GNE}}$$

=  
 present value of the country's resources = present value of the country's spending

- An intuitive way to see that this indeed is a budget constraint:
  - ◆ LRBC says that in the long run, in present value terms, a country's expenditures (GNE) must equal its production (GDP).
  - ◆ Thus, the LRBC describes how the economy must "live within its means" over the long run.

# Long-Run Budget Constraint

## SUMMING UP

- The key lessons can be summed up by looking at two constraints:
  - ◆ 1. In a closed economy, by definition, the trade balance must equal zero in each and every period.
  - ◆ 2. In an open economy, the LRBC only requires that the present value of the trade balance must equal zero. It can run a trade balance of 0 each period if it wants, or it can run deficits in some years balanced by surpluses in other years.
- Since the open economy is subject to a less restrictive constraint than the open economy, it should be able to do better.

# Understanding present values

- To understand the long run budget constraint one must understand present values.
  - ◆ Suppose you are paid 100 every year forever starting next year (year 1). Suppose the interest rate is 5%.
  - ◆ The present value of this sequence is:

$$\frac{100}{(1+0.05)} + \frac{100}{(1+0.05)^2} + \frac{100}{(1+0.05)^3} + \dots = \left(\frac{1}{0.05}\right)100 = 2000$$

- This example can be interpreted as a stream of interest payments on a perpetual loan. If the amount loaned by the creditor is 2000 in year 0, and this principal amount is outstanding forever, then the interest that must be paid each year is 5% of 2000, or 100.

## 2. Gains from Consumption Smoothing

- First of the gains from globalization: consumption smoothing.
- We assume
  - ◆ Output takes the form of an endowment  $Q$ , (owned by a representative household and sold through a representative firm.) This output may be subject to shocks.
  - ◆ Consumers prefer to have no fluctuations in consumption: that is, if possible, they would prefer to set their consumption level  $C$  at a constant value.
  - ◆ This assumption is motivated by the idea that households are averse to risk, in particular to risk in the flow of consumption.
  - ◆ For now—we assume there are no other sources of demand, so investment  $I$  and government spending  $G$  are both equal to zero.
- Under these assumptions,  $GDP = Q$ ,  $GNE = C$ , and trade balance =  $Q$  minus  $C$ .

# Closed versus Open, No Shocks

**Table 17-1**

**A Closed or Open Economy with No Shocks** Output equals consumption. Trade balance is zero. Consumption is smooth.

|     |   | Period |     |     |     |     |     |     | Present Value |
|-----|---|--------|-----|-----|-----|-----|-----|-----|---------------|
|     |   | 0      | 1   | 2   | 3   | 4   | 5   | ... |               |
| GDP | Q | 100    | 100 | 100 | 100 | 100 | 100 | ... | 2100          |
| GNE | C | 100    | 100 | 100 | 100 | 100 | 100 | ... | 2100          |
| TB  |   | 0      | 0   | 0   | 0   | 0   | 0   | ... | 0             |

# Closed, Shocks

**Table 17-2**

**A Closed Economy with Temporary Shocks** Output equals consumption. Trade balance is zero. Consumption is volatile.

|     |   | Period |     |     |     |     |     |     | Present Value |
|-----|---|--------|-----|-----|-----|-----|-----|-----|---------------|
|     |   | 0      | 1   | 2   | 3   | 4   | 5   | ... |               |
| GDP | Q | 79     | 100 | 100 | 100 | 100 | 100 | ... | 2079          |
| GNE | C | 79     | 100 | 100 | 100 | 100 | 100 | ... | 2079          |
| TB  |   | 0      | 0   | 0   | 0   | 0   | 0   | ... | 0             |

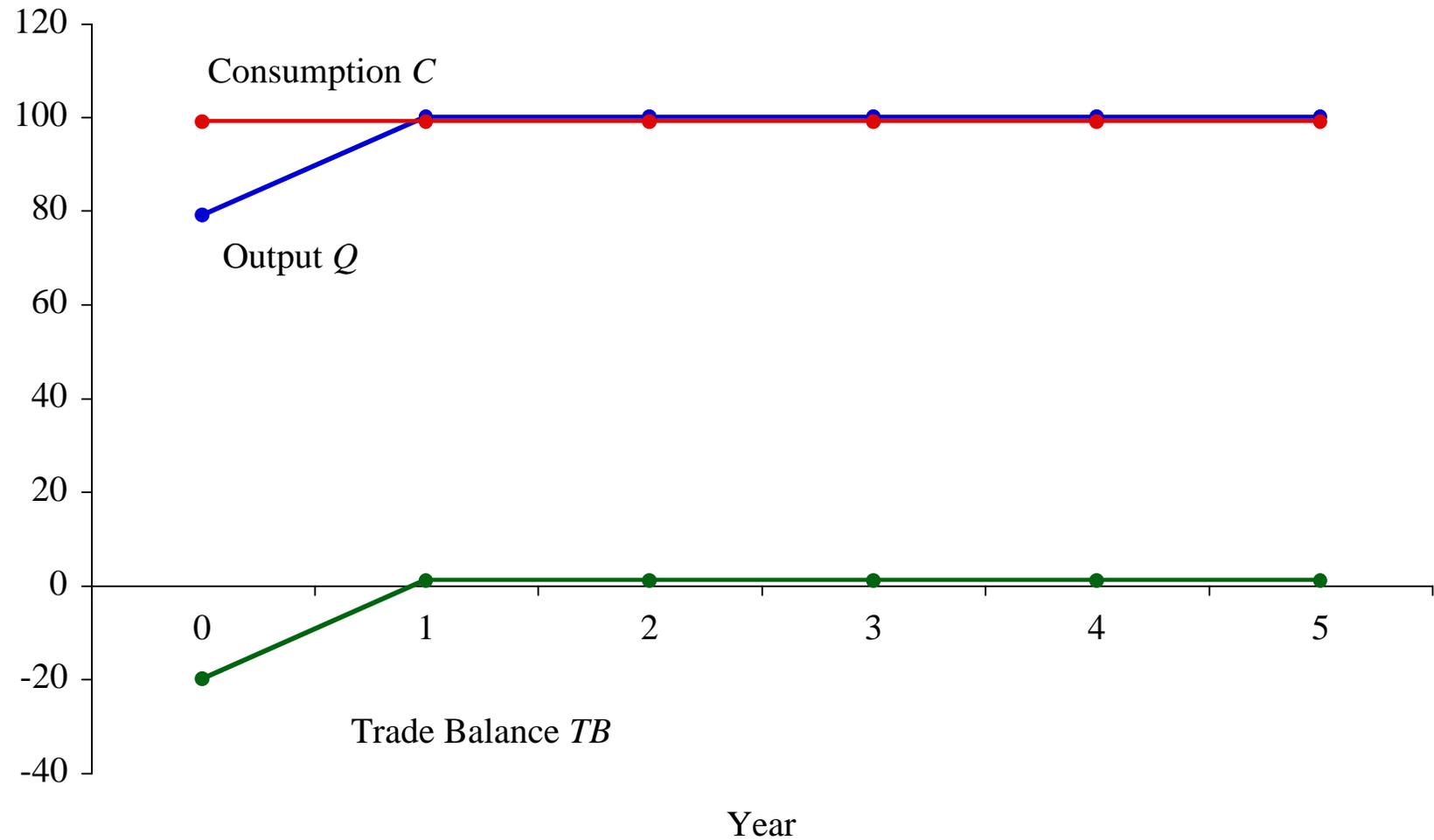
# Open, Shocks

**Table 17-3**

**An Open Economy with Temporary Shocks** A trade deficit is run when output is temporarily low. Consumption is smooth.

|      |   | Period |     |     |     |     |     |     | Present Value |
|------|---|--------|-----|-----|-----|-----|-----|-----|---------------|
|      |   | 0      | 1   | 2   | 3   | 4   | 5   | ... |               |
| GDP  | Q | 79     | 100 | 100 | 100 | 100 | 100 | ... | 2079          |
| GNE  | C | 99     | 99  | 99  | 99  | 99  | 99  | ... | 2079          |
| TB   |   | -20    | +1  | +1  | +1  | +1  | +1  | ... | 0             |
| NFIA |   | 0      | -1  | -1  | -1  | -1  | -1  | ... |               |
| CA   |   | -20    | 0   | 0   | 0   | 0   | 0   | ... |               |
| W    |   | -20    | -20 | -20 | -20 | -20 | -20 | ... |               |

# Open, Shocks



# Gains from Consumption Smoothing

- BOTTOM LINE:
  - ◆ When output fluctuates a closed economy cannot smooth consumption, but an open one can.
- A general case (temporary shock):
  - ◆ Suppose output falls by  $\Delta Q$  this period
  - ◆ Optimal response is to cut consumption by a smaller amount  $\Delta C$  in this period and all future periods
  - ◆ What is  $\Delta C$ ? Must satisfy LRBC, where present value of C cut equals pres value of Q cut:

$$\Delta C = \frac{r^*}{1 + r^*} \Delta Q$$

# Gains from Consumption Smoothing

- permanent shock:

In the case of a permanent shock, the consumer has to cut consumption by  $\Delta C = \Delta Q$  in all years to meet LRBC and keep consumption smooth.

- ◆ Conclude: consumers can smooth out temporary shocks, but they must adjust to permanent shocks.
- ◆ This makes sense. If your income drops by 50% just this month, you might borrow; if it is going to drop by 50% in every month, maybe you need to cut your spending.

- Summary:

- ◆ In or a closed economy consumption equals output in every period, so output fluctuations immediately generate consumption fluctuations.
- ◆ An open economy can smooth its consumption path by running a trade deficit in bad times (and a trade surplus in good times).

# Gains from Consumption Smoothing

This lesson applies for many temporary shocks:

- Natural disaster lowers output
- Wars temporarily raise government claim to output. Can borrow to finance war and maintain smooth consumption. Implies  $TB < 0$ .
- Historically wars have been funded by external borrowing, once this became possible: US civil War, WW1 and WWII