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International Finance (Econ 421)
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Handout #3: The Current Account in Detail

1. Introduction

The CA is an important statistic since it indicates whether a country is a net borrower or lender. However, the CA imbalance alone is not very informative for evaluating the performances of open economies; in order to do that it must be put in context together with other macroeconomic statistics and an economic framework (i.e. model).

The BOP defines the CA as the net value transactions in the external sector. Under our assumptions (see handout 1) this is equal to:

$$\boldsymbol{CA = EX - IM + rB^*_{-1}}$$

This handout provides three other expressions for the CA. Specifically we will show that the CA can be written as:

$$\boldsymbol{CA = Y - C - I - G}$$

$$\boldsymbol{CA = S - I}$$

$$\boldsymbol{CA = B^* - B^*_{-1}}$$

That is, the CA can be expressed as (*a*) the difference between GNP and domestic absorption[1], (*b*) the difference between saving and investment, and (*c*) the change in foreign assets. Although all expressions are, of course, equivalent, each provides its own insight for the interpretation of the CA imbalance. The derivation of each expression is based on NIPA relationships that we have already seen in the first handout.

We will also discuss the interpretation of the CA imbalance in the context of economic analysis. That is, we will try to evaluate under what conditions a CA deficit (i.e. CA<0) is "bad" for the economy, and under what conditions it is "good".

[1] Recall that $C + I + G$ is often called domestic absorption.

2. Different Expressions for the CA

2.1. GNP and Domestic Absorption

Recall that the resource constraint of an open economy is given by:

$$Q = C + I + G + EX - IM$$

Add rB^*_{-1} to both sides and use $Y = Q + rB^*_{-1}$ to get:

$$EX - IM + rB^*_{-1} = Y - C - G - I$$

The left hand side is simply the BOP definition of the CA, therefore:

$$\boldsymbol{CA = Y - C - I - G}$$

Y is the income available to home residents; $C + I + G$ is their total uses of goods and services. Therefore, the CA tells us whether the country uses more or less resources than its income in a given period. If CA>0, it means that the country was a net saver, since it used less resources than the level of its income; while if CA<0 the country is a net borrower.

Typically households like to smooth their consumption over time; that is, to save in good times (high *Y*) and de-save in bad times (low *Y*). The CA can be used as a tool for achieving consumption smoothing. In good times the country may use fewer resources than its GNP (that is $C + I + G < Y$), and hence run a CA surplus; and in bad times run a CA deficit ($C + I + G > Y$). Therefore, CA deficits during recessions (and surpluses during economic booms) can be viewed as a result of optimal behavior, and in that sense considered "good" or "healthy". At the end of this handout we will see a model that conveys exactly this message. Also the appendix at the end of this handout provides evidence for consumption smoothing behavior in the US.

2.2. Saving and Investment

Recall that in handout 1, we have derived the relationship between saving, investment, and the CA. We showed that:

$$\boldsymbol{CA = S - I}$$

This equation suggests that investment projects can be financed using CA deficits. Unlike closed economies, in open economies an increase in investment does not require a parallel increase in savings.[2] When the CA is *negative* the rest of the world is a net investor in the home country; that is, foreigners invest in the home country more than what home residents invest abroad. When the CA is *positive* the country is a net investor abroad.

Rapidly growing countries usually provide profitable investment opportunities. This attracts foreign investors and generates capital inflow. At the same time these countries are likely to experience low savings rates, since residents of the country anticipate higher income in the future (due to the rapid growth). A CA deficit may therefore indicate good economic conditions, if data on investment and growth support this conclusion.

On the other hand, a CA deficit can be generated by "bad" policies that encourage low savings with no increase in investment. This may create a problem for the economy since it implies that the country will have to finance the deficit by reducing consumption in the future.[3]

2.3. Foreign Assets

We already know that the CA indicates whether a country is a net lender or borrower during the period in question. If a country is a net lender it means that it has accumulated financial assets against the rest of the world ($B^* > B^*_{-1}$); while if it is a net borrower then the country has accumulated liabilities, or in other words de-cumulated assets ($B^* < B^*_{-1}$). It is therefore not surprising to find that the CA can be expressed as the change in the stock of foreign assets ($B^* - B^*_{-1}$).

This relationship can also be seen directly from the BOP accounting definitions. Recall that the capital and financial accounts measure the change in assets (with a minus sign, that is $B^*_{-1} - B^*$), and since the CA and capital and financial accounts must sum up to zero, it follows that the CA equals to the change in foreign assets.

We can also derive this relationship from the budget constraint of the economy:

$$C + I + G + B^* = Q + (1 + r)B^*_{-1}$$

[2] Recall that in closed economies $S = I$.
[3] Assuming the country does not default on its debt.

The left hand side is total expenditures: consumption, investment, government purchases, and foreign assets. The right hand side is total resources: output and revenues from assets carried from the previous period. Now substitute $Y = Q + rB^*_{-1}$, and $CA = Y - C - I - G$ into the budget constraint and get:

$$\boldsymbol{CA = B^* - B^*_{-1}}$$

This equation indicates that in order to run a CA deficit the country must reduce its stock of financial assets. Note that if the country is already in debt ($B^*_{-1} < 0$), CA deficits increase debt. As a result, running deficits may raise the concern that the country might find it difficult to repay its debt. It should be noted that this is a real life problem and many countries have defaulted on their foreign debt (recent examples include Russia in August 1998, Ecuador in August 1999, and Argentina in December 2001).

The possibility of default emphasizes the importance of evaluating the implications of CA imbalances together with other macroeconomic statistics. The CA imbalance alone gives only a partial, and not very informative, indication of the state of the economy.

3. A Case Study: The Asian Crisis

In the second half of 1997 many of the rapidly developing economies of East Asia went through a financial crisis as they were suddenly denied access to borrowing in the world financial markets. Although there is a dispute about the cause of the crisis, it is clear that a sudden reversal in capital flows was most damaging to the economies of the region.

Before the crisis hit, East Asian economies had attracted foreign investment, resulting in capital inflow (i.e. CA deficit). High investment led to rapid growth. This is reflected in the figures below. Figure 1 depicts the CA-GDP ratio for Korea, Malaysia, and Thailand; they all ran a CA deficit in the years prior to the crisis. Figure 2 presents the investment-GDP ratio. Investment accounted for roughly 40% of GDP, around twice as much as its share in the G7 countries.[4] Figure 3 shows the growth rate of output per capita. The massive investment was easily translated into consistently high growth rates of over 5% (the comparable figure for the G7 countries is around 2%).

[4] The G7 countries is the group of the seven leading industrial economies. They include Canada, France, Germany, Italy, Japan, the UK, and the US.

Some of the explanations for the crisis place the blame on the CA deficits. Running deficits for many years implies that these countries have accumulated foreign debt (recall that $CA = B^* - B^*_{-1}$). As a result, concerns were raised regarding the ability of the East Asian economies to repay their debt. In 1997 these concerns were translated into action, as investors stopped financing investment projects in the region. The result was an immediate reversal of capital flow, from capital inflow to "capital flight". This is clearly indicated in Figure 1, as the CA deficit turned into a surplus after 1997. The capital outflow left a very noticeable mark on the investment-GDP ratio as the investment share fell drastically after the crisis (see Figure 2). Finally, lower investment resulted in lower growth. The immediate impact of the crisis was devastating: GDP per capita fell by roughly 10% in 1998 (see Figure 3). At this stage, even if the initial concerns regarding the ability to repay were unjustified, the sharp fall in output only reinforced them. It should be noted that at the end none of these countries defaulted on their foreign debt.

To summarize, CA deficits were the fuel of East Asia's rapid growth. Shutting down access to foreign borrowing forced the region to run CA surpluses which led to a fall in investment and growth.

Figure 1: CA-GDP Ratio

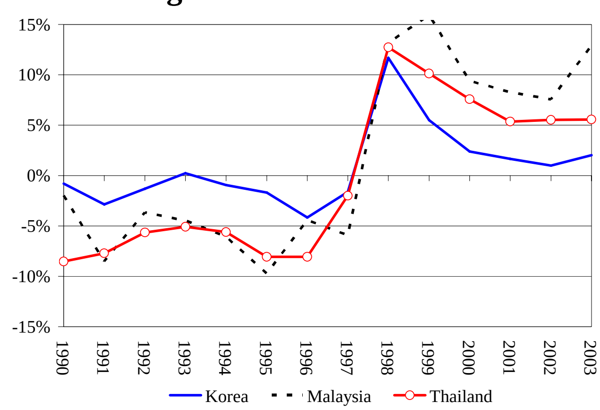


Figure 2: Investment-GDP Ratio

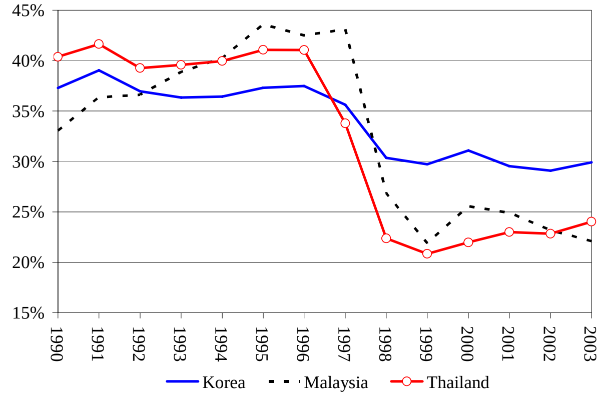
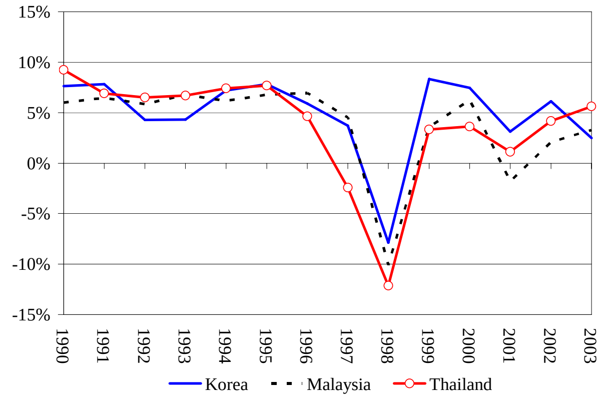


Figure 3: GDP Per-Capita Growth Rate



Source: International Financial Statistics

4. A Model: Intertemporal Consumption Smoothing and the CA

So far we have only discussed definitions. We tried to give them some economic content by "chatting" about their implications. We now turn to a more formal and precise discussion by analyzing a simple model that will allow us to understand the intertemporal role of CA imbalances.

Any model is just a set of assumptions; therefore, before we formally write down the model it is useful to specify explicitly its main assumptions:

- Small open economy: the economy takes world prices, and specifically the world interest rate, as given and cannot affect them.
- Perfect integration in the world financial markets: the economy can borrow and lend as much as it likes as long as its budget constraint is satisfied.

- Endowment economy: the economy is endowed with output in each period, Y_1 in period 1 and Y_2 in period 2. There is no production.
- There are no firms or government, only utility-maximizing households.
- Representative agent: even though there are many households in the economy their aggregate behavior can be described using a single agent.
- The economy operates for only two periods.
- The economy starts period 1 with no assets or debt.

We are now ready to write down the model more formally. The representative household chooses consumption, C_1 and C_2, so as to maximize lifetime utility:

$$U(C_1) + \beta U(C_2)$$

The function $U(C)$ is monotonically increasing and concave, that is $U_C > 0$ and $U_{CC} < 0$, where U_C and U_{CC} are the first and second derivatives respectively.

β is the *subjective discount factor*. The assumption $\beta < 1$ represents impatience; that is, a unit of consumption in period 1 provides more utility than consumption of the same unit in period 2. We will assume that β is related to the real interest rate, r, through:

$$\beta = \frac{1}{1+r}$$

This assumption simply equates the subjective discount factor to the *market discount factor*, $1/(1+r)$. This is similar to an equilibrium condition that equates marginal rate of substitution to some relative price.

In period 1 the household uses its endowment, Y_1, for consumption, C_1, and for buying foreign assets, B^*; therefore, period 1 budget constraint is given by:

$$C_1 + B^* = Y_1$$

Note that B^* may be either positive or negative.

In period 2 the household receives (or pays) interest on its financial assets. It then finances consumption, C_2, using endowment, Y_2, and the foreign assets, $(1+r)B^*$:

$$C_2 = Y_2 + (1+r)B^*$$

We can combine the two periodic budget constraints (a.k.a. *flow* constraints) by substituting for B^* and rearranging. This results in the *lifetime budget constraint*:

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

Which simply states that the present value of consumption cannot exceed the present value of income.

The maximization problem can now be written as:

$$\underset{c_1, c_2}{Max} \quad U(C_1) + \beta U(C_2)$$

$$s.t. \quad C_1 + \frac{C_2}{1+r} = Y_1 + \frac{Y_2}{1+r}$$

The Lagrangian is given by:

$$L = U(C_1) + \beta U(C_2) + \lambda \left\{ Y_1 + \frac{Y_2}{1+r} - C_1 - \frac{C_2}{1+r} \right\}$$

First order conditions (FOC) with respect to C_1 and C_2 are:

$$U_{C_1} = \lambda \qquad \text{and} \qquad \beta U_{C_2} = \frac{\lambda}{1+r}$$

Where U_{C_1} and U_{C_2} are the marginal utilities of C_1 and C_2 respectively. Substituting for λ we get:

$$U_{C_1} = \beta(1+r)U_{C_2}$$

This equation is called the Euler equation. The Euler equation equates the marginal cost of saving one additional unit of the good today to the marginal benefit of eating the proceeds tomorrow. The left hand side is the marginal cost; when the household saves an additional unit it loses the marginal utility, U_{C_1}. The right hand side is the marginal benefit. Saving one unit in period 1 gives the household 1 + r units in period 2. The marginal utility from each unit consumed is βU_{C_2}, but since the household receives 1 + r units the marginal benefit is $\beta(1+r)U_{C_2}$ as suggested by the Euler equation.

Recall our assumption on the relationship between β and r. It implies that $\beta(1+r) = 1$. As a result the Euler equation boils down to $U_{C_1} = U_{C_2}$, which suggests:

$$C_1 = C_2$$

That is, consumption is perfectly smoothed over time. To solve for consumption, we substitute $C_1 = C_2 = C$ into the lifetime budget constraint and get:

$$C = \frac{1+r}{2+r}\left\{Y_1 + \frac{Y_2}{1+r}\right\}$$

Notice that in this model the CA is given by:

$$CA_1 = Y_1 - C_1 = B^* \qquad \text{and} \qquad CA_2 = Y_2 - C_2 + rB^* = -B^*$$

Substitute the solution for consumption and get:

$$CA_1 = \frac{Y_1 - Y_2}{2+r} \qquad \text{and} \qquad CA_2 = \frac{Y_2 - Y_1}{2+r}$$

This confirms our initial intuition. If $Y_2 > Y_1$ then the economy borrows from the rest of the world in the first period and repays in the second ($CA_1 < 0$ and $CA_2 > 0$). That is, the country *optimally* runs a CA deficit in bad times and has a surplus in good times.

Appendix: Consumption Smoothing in the US

The graph below depicts the cyclical component of personal consumption and GDP in the US during the post world war period (1947-2004).

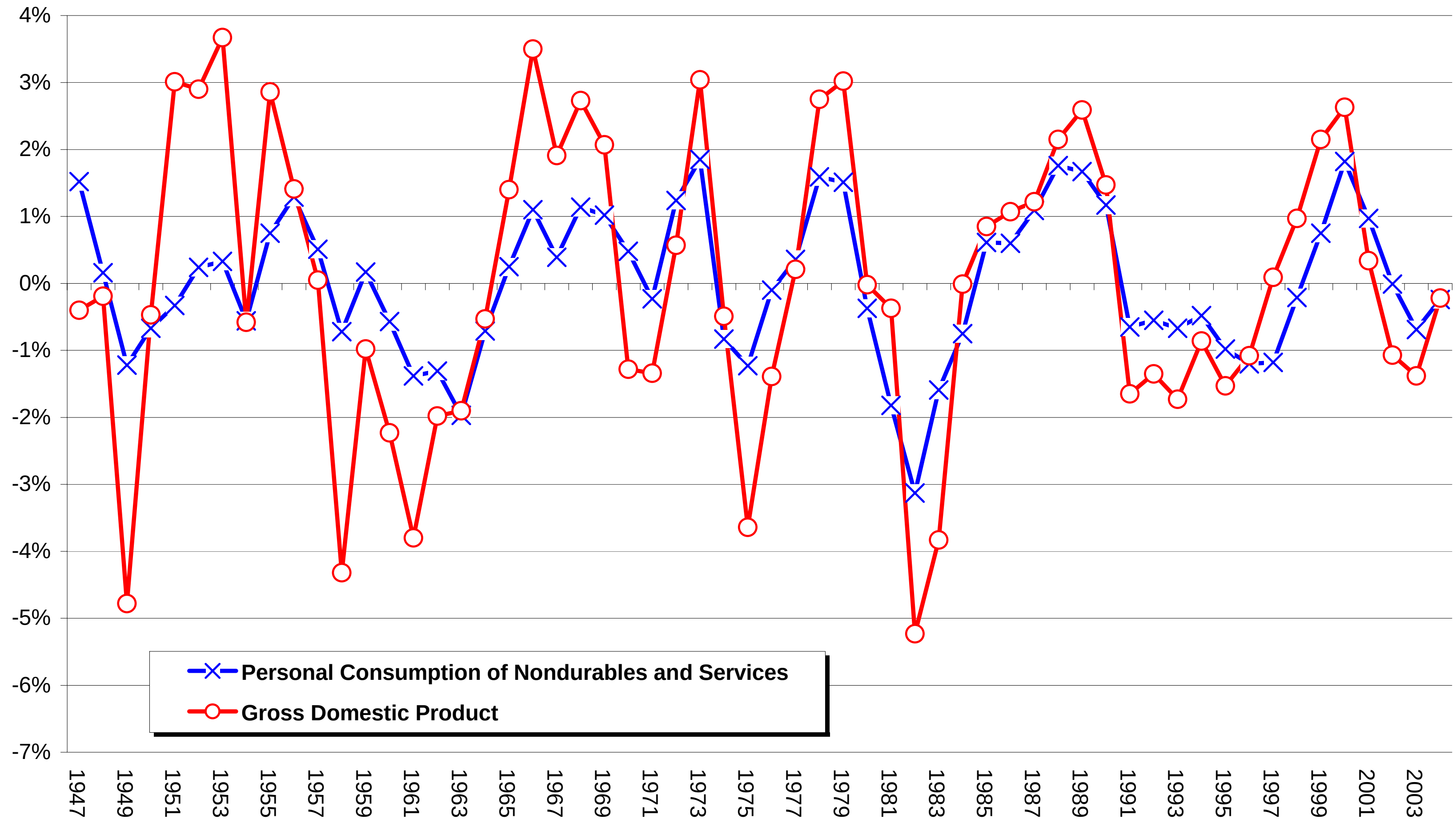
The consumption series includes consumption of nondurable goods and services. It does not include durable goods (cars, TVs, refrigerators, etc.) because we consume the services these goods provide, not the goods themselves. Furthermore, durables may last for years, and therefore their purchase may be viewed as investment.

By "cyclical component" of a series we mean it's deviation of the long run trend.[5] We express the deviations in *percents*; this way we get unit-free quantities so we can compare the cyclical behavior of different series.

The main feature in the graph is that consumption is smoother than GDP. In the sample period, the standard deviation of the cyclical component of consumption is 1.1% while the standard deviation of GDP is 2.2%. That is, under this measure of volatility, GDP is twice as volatile as consumption.

5 There are numerous methods for calculating trends, in this case it was calculated using a procedure called Hodrick-Prescott Filter (often called HP filter).

The Cyclical Components of Consumption and GDP in the US*



* Data source: U.S. Department of Commerce, Bureau of Economic Analysis