

UNIT 2 – SUPPLEMENT 1d:
FUNDAMENTAL IDENTITIES OF MACROECONOMICS

The following symbols are used:

- Y = real national output
- C = real consumption by households
- I = real gross investment by firms
- G = real government purchases
- Ex = real gross exports
- Im = real gross imports
- X_n = real net exports = (exports – imports)
- S = real savings by households
- NT = real net tax revenues for government
- GBD = real government budget deficit = G – NT
- TD = real trade deficit = (imports – exports) = –X_n

FUNDAMENTAL IDENTITIES OF MACROECONOMICS

- (1) $Y = C + I + G + X_n$
- (2) $Y = C + S + NT$
- (3) $I = S - GBD + TD$

The third identity is derived from the first two by substituting one formula into the other and by using the following two definitions:

- (4) $GBD = G - NT$
- (5) $TD = Im - Ex = -X_n$

When the capital Greek letter delta, which looks like a small triangle (Δ), is written in front of an economic variable, say Z, the two together are interpreted as "the change in the value of Z." Given this, equations (1) through (3) can be rewritten as:

- (6) $\Delta Y = \Delta C + \Delta I + \Delta G + \Delta X_n$
- (7) $\Delta Y = \Delta C + \Delta S + \Delta NT$
- (8) $\Delta I = \Delta S - \Delta GBD + \Delta TD$

One of the most common ways to use these identities is to answer numerical questions of the sort: "Suppose that real savings is expected to decrease by \$20 billion, the real government budget deficit is expected to increase by \$50 billion, and the real trade deficit is expected to decrease by \$10 billion. By how much is real gross investment likely to change?"

Use the following version of identity (8) to answer this question:

$$\begin{aligned}(8) \quad \Delta I &= \Delta S - \Delta GBD + \Delta TD \\ \Delta I &= (-20) - (+50) + (-10) \\ \Delta I &= -80\end{aligned}$$

Perhaps the most important implication of these three identities can be seen by looking at equation (3) carefully:

$$(3) \quad I = S - GBD + TD$$

Imagine first that the government does not borrow funds, so $GBD = 0$, and that all trade with the rest of the world is balanced, with exports = imports, so $TD = 0$. Then, this third identity can be rewritten as:

$$(9) \quad I = S$$

This says that investment, I , equals savings, S .

Investment is when businesses acquire new capital so that they can expand or modernize. Saving is when individuals and households take some of their income and save it for the future by putting into a bank account or mutual fund or bonds or something similar.

This identity now says the total amount of funds available for businesses to buy capital with is determined by the amount that people and families save. If your businesses is in a country with a low rate of savings, it will be relatively difficult and expensive to borrow the funds for expansion or modernization. If your businesses is in a country with a high rate of savings, like Japan, it will be relatively easy and inexpensive to borrow the funds for expansion or modernization.

Now, let's bring government back into the story. Suppose the government does choose to spend more than it has by borrowing from the public (this is common in the U.S.). This means that some of the individuals who want to save will lend their funds to the government, by purchasing Treasury Bills or Savings Bonds, rather than by lending it to businesses. So, for every dollar the government borrows from the public, there is one less dollar available for businesses to borrow. This is what the third identity says:

$$(9) \quad I = S - GBD$$

The government budget deficit, GBD , is just a measure of how much the government is borrowing from the public. This government borrowing competes with business borrowing. The larger the GBD , the fewer the funds available for the business sector.

Now, let's bring international trade back into the story. Suppose that individuals and families within your economy purchase many goods that have been produced abroad. These are called imports. Suppose that individuals and families in other parts of the world are less eager to buy U.S. made goods. These are called exports. Then our country will have a trade deficit (TD). How do we Americans pay for all of those imports? We do not pay by shipping equally valuable goods and services back. We pay the foreign companies with U.S. dollars. They have the option to turn around and spend these U.S. dollars on U.S. made goods. However, in recent years most of these foreign-owned dollars have been used to buy U.S. Treasury Bills. In other words, these foreign business are lending some of their funds to the U.S. government. This provides an additional source of funds for the U.S. economy and for the U.S. government. This is what the third identity says:

$$(3) \quad I = S - GBD + TD$$

Notice that the trade deficit is added to the identity while the GBD is subtracted. While government borrowing pulls funds away from the business sector, the trade deficit makes more funds available.