

Basic macroeconomic accounting

The three-sector division

An economy can be divided into three sectors: (i) the domestic private sector (households, firms, and banks); (ii) the domestic government sector (local, regional, and national governments); and (iii) the foreign sector (the private and the government sectors of the rest of the world).

- **Flows between sectors.** Over a given period of time, income flows and spending flows run within each sector and between sectors.
- **Surplus.** A sector runs, or has, a surplus over a given period if the sector's spending flow is smaller than the sector's income flow over the period.
- **Deficit.** A sector runs, or has, a deficit over a given period if the sector's spending flow is larger than the sector's income flow over the period.
- **Balance.** A sector is balanced over a given period if its spending flow is equal to its income flow over the period.

Financial asset

A financial asset (a financial claim) is the expression of a promise to pay money (or another financial asset). A financial asset is basically an IOU: an instrument by means of which someone acknowledges a debt.

- **Buyers of financial assets.** The purchaser of a financial asset: (i) accumulates financial wealth (UOMe); (ii) is saving; (iii) acts as a lender of money; and (iv) becomes a creditor.
- **Issuers of financial assets.** The issuer of a financial asset: (i) creates a liability (IOU); (ii) is dissaving; (iii) acts as a borrower of money; and (iv) becomes a debtor.

Net financial wealth

The net financial wealth of an economic agent (household, firm, government...) is the difference between the agent's financial wealth (the value of all the financial assets the agent has purchased) and the agent's financial liabilities (the value of all the financial assets the agent has issued).

- **A sector's financial wealth.** A sector's net financial wealth is the sum of the net financial wealth of all the economic agents in the sector.
- **Surplus and financial wealth.** If a sector runs a surplus, then, in net terms, the sector generates a saving flow. This saving flow accumulates to a stock that takes the form of a net accumulation of financial assets, that is, an increase in the sector's net financial wealth. When a sector has a positive net financial wealth some agent in the sector has a claim on some other agent from another sector; for instance, a household owns a government bond issued by the government.
- **Deficit and financial wealth.** If a sector runs a deficit, then the sector reduces its net financial wealth: the sector generates a dissaving flow. When a deficit occurs, the sector sells previously accumulated financial assets or creates (issues) new financial assets. A sector finances its deficit by decumulating financial assets.

- **Balance of a sector.** The balance of a sector is the sector's net financial wealth. The balance is positive (or is in surplus) if the net financial wealth is positive (value of financial assets larger than value of liabilities). The balance is negative (or is in deficit) if the net financial wealth is negative.
- **Flows and stocks.** Flows determine whether a deficit or a surplus occur. Stocks represent accumulation or decumulation of debts.
- **Basic principle of accounting.** For each financial asset there is an equivalent financial liability. Someone's liability is somebody else's financial asset.

**Sectoral
basic
identity**

The three-sector basic identity states that the sum of the balances of all sectors is zero:

$$\text{Domestic Private Balance} + \text{Domestic Government Balance} + \text{Foreign Balance} \equiv 0.$$

- **An impossibility.** The sectoral identity (or macroeconomic balance equation) implies that the sector or sectors running a deficit must be offset by some sector running a surplus. In particular, for one sector to accumulate net financial wealth, it is necessary that some other sector increases its indebtedness. Consequently, it is impossible for the three sectors to simultaneously run a surplus.
- **Many economies.** All flows in the identity are monetary (variables are nominal) and expressed in the same currency. If each economy is characterized by a unique currency, then for each economy there is a corresponding identity. It may be necessary to handle several balance equations if some agent issues financial assets denominated in one currency and accumulates wealth in another one (or runs a deficit in one currency and a surplus in a different one).
- **No foreign sector case.** If there is no foreign sector, the identity is reduced to

$$\text{Domestic Private Balance} + \text{Domestic Government Balance} \equiv 0.$$

In this case, imagine that the domestic private sector would like to have a positive net financial wealth. This means that, in the aggregate, firms and households save, that is, they accumulate financial assets in net terms. Then the government sector is in deficit. Expressed equivalently, if the government sector does not run a deficit, then it is not possible for the private sector to save.

- **Balanced sector government.** If the government sector is balanced, the identity becomes

$$\text{Domestic Private Balance} + \text{Foreign Balance} \equiv 0.$$

Hence, the private sector cannot save (or accumulate net financial wealth) unless the foreign sector runs a deficit. The foreign sector runs a deficit when its spending is higher than its income. As a result, thanks to the spending excess by foreigners on the domestic economy (the rest of the world imports more than exports) that the domestic private sector can accumulate net financial wealth.

- **Twin deficits.** Assume that the domestic private sector is balanced: spending equals income. Then, if the government sector is in deficit, it must be that the foreign sector is in surplus. This surplus means that the spending of the rest of the world is smaller than its income, which occurs when the domestic economy imports more than exports. In sum, a government deficit must be accompanied by a trade deficit.

- **Foreign sector represented by the balance of payments.** If the balance of payments (current account) represents the foreign sector, the balance identity expresses the following result:

$$\text{Private Deficit} \equiv \text{Public Surplus} + \text{Balance of Payments Deficit.}$$

▶ In Wynne Godley's interpretation, public deficits and balance of payments surpluses create income and financial assets for the private sector. A public deficit is financed by issuing financial assets; by buying those assets, the private sector increases its net financial wealth. A balance of payments (current account) surplus means that the private sector is financing the rest of the world, which is a source of income for the private sector.

▶ Analogously, public surpluses and balance of payments deficits withdraw income from the private sector and destroy financial assets held by the private sector. Hence, the private sector decumulates financial wealth (runs a deficit) if the public sector has a surplus or the balance of payments is in deficit.

- **Wynne Godley (1926-2010).** Orthodox economists did not predict nor anticipate the Great Recession that started in 2007-08. They claimed in their defense that no one saw it coming. But some did. Wynne Godley was a heterodox economist that, using models based on the sectoral identity, issued warnings that the unprecedented US expansion of the 1990s was doomed. See Wynne Godley and Alex Izurieta (2002): "The case for a severe recession," Challenge 45(2), 27-51 and Wynne Godley and L. Randall Wray (2000): "Is Goldilocks Doomed?," Journal of Economic Issues 34(1), 201-206. In the latter, by just resorting to the sectoral identity, the authors observe that "... public sector surpluses and international current account deficits require domestic private sector deficits. Once this is understood, it will become clear that Goldilocks is doomed."

- **Goldilocks economy.** In the fairy tale 'Goldilocks and the three bears', the little girl Goldilocks tastes a porridge bowl that turns out to be boiling hot and another one being too cold. A Goldilocks economy (like the US economy in the 1990s) is one neither 'too hot' (experiencing inflation) nor 'too hold' (suffering from unemployment). Godley and Wray noticed that, at the time, relative to GDP, private sector deficit was five times larger than anything achieved previously and was being sustained for longer than in the past. They were analyzing projections indicating that, from 1999 to 2009, the economy's expansion would continue and raise the government surplus in the presence of a growing foreign deficit. The balance identity implies that the private deficit should worsen to unsustainable levels. GDP will stop growing once private spending no longer increases faster than private income. As soon as this occurs, public surplus will turn into a deficit and private deficit into a surplus. This is exactly what happened.

Identities do not express causal relationships

Causality relationships cannot be derived from the sectoral identity. For instance, in the no-foreign-sector case above, there is a priori no way of telling whether it was the government deficit that caused the net accumulation of financial wealth by the private sector or the private accumulation that caused the government deficit. Similarly, in the twin deficits case, by simply considering the sectoral identity, one cannot tell which of the two deficits (government deficit and trade deficit) caused the other.

- **Causation at the individual level.** At least in the private sector, causation for individuals is very likely to run from income to expenditure. If some household (or firm) plans to run a deficit by spending above its income level, then it can issue financial assets to finance the difference between expenditure and income. Some other agent that chooses to save will purchase the financial assets, thereby accumulating as financial wealth the liability generated by the agent that runs the deficit. Thus, the decision to spend in excess gives rise to financial wealth: deficits create financial wealth.

- **Causation at the aggregate level.** For the economy as a whole it does not seem possible to decide to have more income, but it is to choose to spend more. Any additional spending is necessarily received as additional income by someone. By the sectoral identity, aggregate spending equals aggregate income. That is why the heterodox view tends to support the view that:

- (i) income causes spending at the individual level; but
- (ii) spending cause income at the aggregate level.

The savings identity

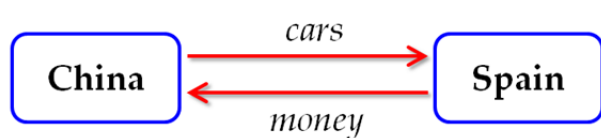
The sectoral identity takes into account all the monetary flows in an economy. An apparently close approximation can be obtained by considering the flows associated with GDP. The savings identity states that

$$(\text{Net}) \text{ Private Savings} + \text{Government (or Public) Savings} + \text{Foreign Savings} \equiv 0$$

where:

- (i) Net Private Savings = Private Savings – Investment = **S – I**;
- (ii) Government Savings = Taxes – Government Purchases – Transfer payments = **T – G – TR**;
- (iii) Foreign Savings = Imports – Exports = **IM – EX**.

- **Why IM – EX represents foreign savings.** Imagine that China exports only cars to Spain and that China imports nothing from Spain, as depicted below. China runs a trade surplus with Spain and Spain a trade deficit with China. China delivers goods and receives in exchange money. Thus,



China is saving and has lending capacity: has money (in general, financial assets) to lend. Trade surplus (see below for a definition) implies lending capacity. Trade deficit implies financial need.

Expenditure categories

National income accounting assigns the value of each good produced to one of four categories (all of them nominal or all of them real variables) according to the type of agent that has received the good.

- **Consumption expenditures or, for short, consumption C.** Consumption C is the value of the purchases of new goods (durable and non-durable) and services by households (no matter in which economy the goods have been produced).

- **Gross private domestic investment or investment I.** Investment I consists of the value of:

- (i) fixed investment (on new factories, office buildings, and machinery to produce goods);
- (ii) residential investment (spending by households or firms on new homes); and
- (iii) changes in the firms' inventories (goods that have been produced but not sold yet).

- **Government consumption and gross investment or government purchases G .** Government purchases G is spending by all levels of government (local, regional, national) on newly produced goods and services. Includes consumption (salaries to civil servants) and investment spendings (university buildings, new submarines).
- **Transfer payments TR .** Transfer payments TR are payments by the government without receiving anything in return. Typical transfer payments are Social Security payments to retired and disabled people and unemployment insurance to unemployed people. Transfer payments are excluded from government purchases.
- **Exports EX .** Exports EX are the value of the exports of goods and services.
- **Imports IM .** Imports IM are the value of the imports of goods and services.
- **Net exports NX .** Net exports NX are defined as exports minus imports: $NX = EX - IM$. The difference “exports minus imports” is also known as trade balance.
- **Trade surplus and trade deficit.** A trade surplus occurs when exports are greater than imports, so net exports are positive: $NX > 0$. A trade deficit occurs when imports are greater than exports, which means that $NX < 0$. When exports equal imports, the trade deficit (or surplus) is zero.

Fundamental macro-economic identity

The fundamental macroeconomic identity asserts that GDP Y is

$$Y \equiv C + I + G + EX - IM$$

ex-post aggregate supply of output = GDP

ex-post aggregate demand for output

where imports IM are subtracted because they have been included already in C , I , or G . The identity just tells who makes use of the total production $Y + IM$ available in the economy: households, firms, government, or foreigners (so $Y + IM \equiv C + I + G + EX$).

• **Example.** Suppose that a new car is available in the economy. If the car has been produced within the economy, the value of the car is included in Y ; if the car has been produced abroad, then its value is added to IM . On the other hand, who gets the car determines in which category in the set $\{C, I, G, EX\}$ the value of the car must be placed.

- If a household purchases the car, its value appears in C .
- If a firm buys the car to use it in production activities (a leasing car company, for instance), then the value of the car is in I .
- If some public organization gets the car, then its value is included in G .
- If someone from another economy obtains the car, then its value counts as EX .
- If the car is produced domestically and no one purchases it, then its value is residually assigned to I : the firm that produced the car is attributed involuntary investment.

Government budget

Designating by T the taxes paid by households and firms to the government, the government budget is $GB \equiv G + TR - T$ and equals the government’s spending on goods and services plus transfer payments minus the government’s tax receipts.

- **Budget surplus and deficit.** A budget deficit occurs if $GB > 0$: that is, spending is larger than receipts. A budget surplus occurs if $GB < 0$. The government budget is balanced if $GB = 0$.
- **Public (or government) savings.** Public savings is $-GB$ or, equivalently, $T - G - TR$.
- **Public (or government) debt.** Public debt is the accumulation of past deficits.

Income identity

The income accounting identity establishes how income is used and asserts that

$$Y \equiv C + S + (T - TR).$$

- **How aggregate income can be used.** Interpreting GDP Y as aggregate income (GDP as net incomes earned by the factors of production), then the income identity states that income can be used to consume, to save, and to pay taxes (taxes net of transfers).
- **Disposable income.** Disposable income Y_d is defined as $Y_d \equiv Y - T + TR$. By combining this and identity $Y \equiv C + S + (T - TR)$, it follows that $Y_d \equiv C + S$.

The savings identity again

The savings accounting identity can now be expressed as

$$S \equiv I + (G + TR - T) + NX.$$

- **Obtaining the savings identity.** By the fundamental identity, $Y - C \equiv I + G + NX$. By the income identity, $Y - C \equiv S + T - TR$. Combining the two yields $I + G + NX \equiv S + T - TR$. Rearranging,

$$\underbrace{S}_{\text{private saving}} \equiv \underbrace{I}_{\text{investment}} + \underbrace{(G + TR - T)}_{\text{government budget deficit}} + \underbrace{NX}_{\text{trade balance}}.$$

The above identity tells that there are three ways of disposing of the savings of an economy. Each part of savings can go to firms to finance investment, to the government to finance a budget deficit, or to foreigners, when they buy more from the economy than the economy buys from them (the economy runs a trade surplus, so the rest of the world runs a trade deficit with the economy).

The investment identity

Solving for I in the savings identity, the investment accounting identity below obtains. The investment identity states that investment is financed by private saving S , public saving $T - G - TR$, or foreign saving $-NX$.

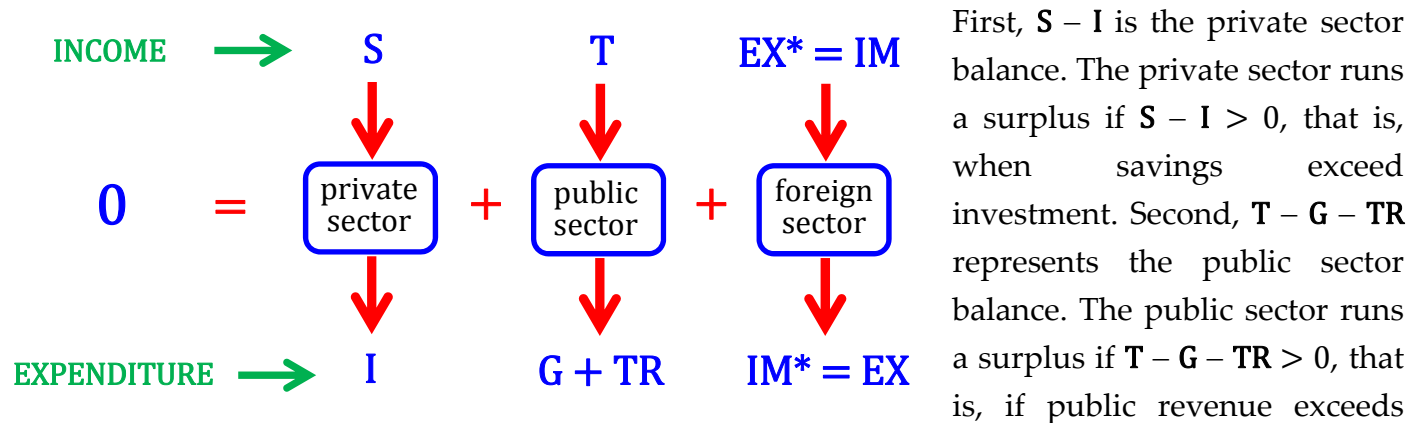
$$\underbrace{I}_{\text{investment}} \equiv \underbrace{S}_{\text{private saving}} + \underbrace{(T - G - TR)}_{\text{government saving}} + \underbrace{(-NX)}_{\text{foreign saving}}.$$

- **Twin deficits again.** Suppose investment equals savings: $I = S$. By the savings identity, the government budget deficit $G + TR - T$ equals the trade balance NX . This means that if the government runs a budget deficit, then it must be financed by foreigners: if $I = S$, then $G + TR - T > 0$ implies $NX > 0$. In sum, government and trade deficits simultaneously occur. As a result, the government spends more without having to increase taxes, and households and firms buy from abroad more goods than they sell. Are all of them living beyond their possibilities?

• **Identities vs theories again.** Identities do not establish causal connections between variables. To establish causal connections a theory is needed (a theory being a set of causal relationships). Identities are not theories but mere descriptions of what is necessarily true: identities are tautologies. Theories, on the other hand, may be false. The attempt to infer causality from identities exemplifies the *cum hoc* fallacy. For example, it cannot be concluded from $S - I \equiv (G + TR - T) + NX$ and a rise in $(G + TR - T)$ that NX falls: may be NX declines because $S - I$ diminishes.

• **The balance identity again.** A GDP-based version of the balance identity (depicted below) can be obtained by moving I to the right-hand side of the investment identity:

$$(S - I) + (T - G - TR) + (-NX) \equiv 0.$$



First, $S - I$ is the private sector balance. The private sector runs a surplus if $S - I > 0$, that is, when savings exceed investment. Second, $T - G - TR$ represents the public sector balance. The public sector runs a surplus if $T - G - TR > 0$, that is, if public revenue exceeds

public spending. And third $-NX$ captures the foreign sector balance. The foreign sector runs a surplus if $-NX > 0$, that is, if $-(EX - IM) > 0$ or, equivalently, if $IM > EX$. This situation means that $EX^* > IM^*$, where the asterisk ascribes the variable to the rest of the world. Since $EX^* > IM^*$ implies that the rest of the world has lending capacity, it follows that $-NX > 0$ is equivalent to the revenue of the rest of the world being larger than the spending of the rest of the world. For this reason, $-NX > 0$ describes a foreign sector surplus and that the rest of the world have positive savings.

• **Net borrowing.** A sector runs a deficit when it has an excess of expenditure over income. To finance the deficit, net borrowing is needed; that is, the sector must increase liabilities more than it increases financial assets. The expression below formulates again the savings identity. Each difference within parentheses measures the net borrowing of the corresponding sector.

$$(Private\ Expenditure - Private\ Income) + (Government\ Expenditure - Government\ Income) + (Inflows\ from\ the\ rest\ of\ the\ world - Outflows\ to\ the\ rest\ of\ the\ world) = 0$$

• **Impact on economic activity.** Each difference within parentheses above can also be viewed as the sector's contribution to aggregate demand. A positive difference implies a demand expansion, whereas a negative difference implies a demand contraction. Economic activity is therefore held down by any sector whose difference expenditure–income is negative. Expansions of investment, public spending, or exports contribute to push up economic activity.

• **Net lending.** By changing its sign, net borrowing is transformed into net lending (which means net acquisition of financial assets). A sector generates net lending when the sector's income exceeds the sector's expenditure. Foreign net borrowing (the rest of the world's inflows minus outflows) is the reverse of domestic net lending. The US economy for decades has been an example of foreign net lending compensating domestic private and public net borrowing.

- **Interpretations of the balance identity.** Rearranging the savings identity,

$$S - I \equiv (G + TR - T) + NX$$

private surplus \equiv public deficit + trade surplus

and rearranging the investment identity,

$$I - S \equiv (T - G - TR) - NX$$

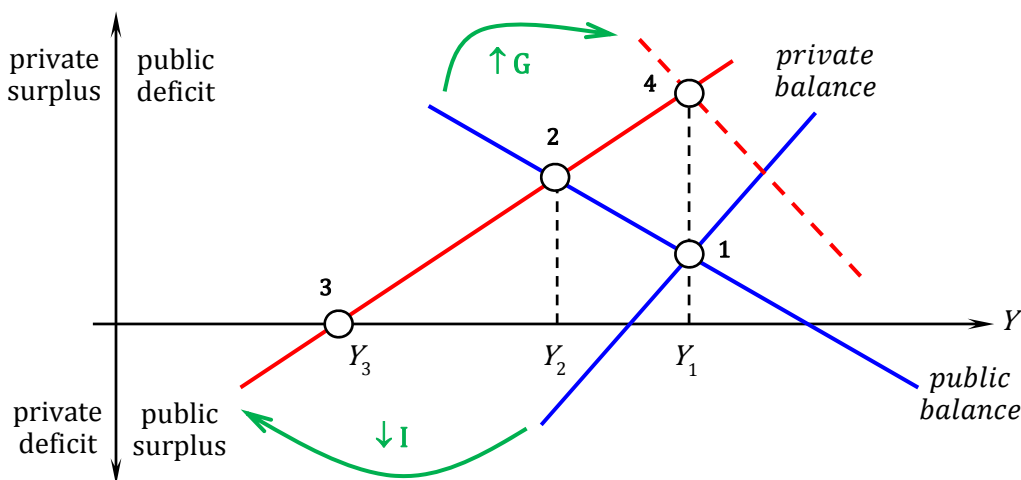
private deficit \equiv public surplus + trade deficit.

A simple model of the world economy

When all economies are aggregated into a world economy, all the current accounts cancel out, as every current account deficit is offset by some current account surplus. This implies that, for the world economy, there is no foreign sector. Therefore, for the world economy, $S - I \equiv G + TR - T$.

- **Savings a function of GDP.** Suppose I is constant (with value \bar{I}) and that $S = s \cdot Y$ is proportional to GDP Y , where the saving rate s is a number between zero and one. Hence, the private balance $S - I = s \cdot Y - \bar{I}$ is an increasing function of GDP; see the figure below.

- **Taxes a function of GDP.** Suppose $G + TR$ is constant (with value $\bar{G} + \bar{TR}$) and that $T = t \cdot Y$ is proportional to GDP, where the tax rate t is a number between zero and one. This makes the public balance $G + TR - T = \bar{G} + \bar{TR} - t \cdot Y$ a decreasing function of GDP; see the figure below.



- **Analysis.** It follows from $S - I \equiv G + TR - T$ that $s \cdot Y - \bar{I} = \bar{G} + \bar{TR} - t \cdot Y$. Solving for Y , GDP is $Y = (\bar{G} + \bar{TR} + \bar{I}) / (s + t)$.

This shows that GDP depends positively on investment, transfers and public spending, and negatively on the saving and tax rates.

- **Responses to negative shocks.** The initial state of the economy is given by point 1. The economy experiences a reduction in investment I , which shifts the private balance line to the left. The new state of the economy corresponds to point 2, where GDP Y_2 is smaller than the initial value Y_1 .

- The orthodox response to the shock is to adopt austerity measures that aim at attaining a balanced government budget, which, by the savings identity, is equivalent to a balanced private sector. Hence, the orthodox recommendation leads the economy to point 3 (the austerity measures must shift the public balance line down to the left to reach point 3).
- The heterodox response is to neutralize the negative effect on GDP of the reduction in I by increasing G (and/or TR). This prescription shifts the public balance line up to the right, moving the economy to point 4, whose associated GDP is the same as the initial value Y_1 .