# Macroeconomic Accounts

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Facts and theories meet in analysis. The combination of the two is essential if economics is to progress, since it is neither a pure subject, like mathematics, of which one does not ask that the theories should be applicable to actual phenomena, nor is it a collection of facts, like the objects on a junk heap, of which one does not ask how they are related.

Richard Stone[1]

## 2.1 Overview

Every science has its own special language; not necessarily to exclude non-experts, but to make discussion more meaningful and precise. In this chapter we will start by learning the language of macroeconomics. We first provide a quantitative description of the economy and definitions of more frequently used concepts. As a natural point of departure, the chapter begins with a discussion of the national income accounts and **accounting identities**—how magnitudes we are interested in relate to each other, by construction. The national income accounts play a central role throughout the study of macroeconomics.

Knowing the facts and how these facts are measured are essential for our understanding of the macroeconomy. Chapter 2 presents the most important indicators of an economy's health that we have: the national income and product accounts and the international trade and financial accounts. Moreover, the distinction between description (this chapter) and analysis (the rest of the book) is similar to that found in biology. Describing living organisms as a collection of different cells is only a first step. The second step is to analyse and understand how cells function and affect each other. In a similar way, decomposing the gross domestic product into its components and examining the external accounts describe interactions and relationships without explaining how or why. That is the job of subsequent analytic chapters. It is thus unavoidable to spend time with these definitions. As we shall frequently see, there is much more to them than first meets the eye.

## 2.2 Gross Domestic Product

### 2.2.1 Three Definitions of Gross Domestic Product

The **gross domestic product** (GDP) is a measure of productive activity. It is defined for a particular geographic area—usually a country, but possibly a region or a city, or a group of countries such as the European Union (EU) or the euro area. It is also defined over a time interval, usually a year or a quarter. This is because the GDP is a **flow variable**, much like the amount of water flowing down a river. Flow variables differ from **stock variables**, which are always defined with reference to a particular point in time, such as the quantity of water held back by a dam.[2]

It turns out that there are three ways to measure GDP, and a different definition of GDP corresponds to each measurement. Our first definition of GDP is

[1] Sir Richard Stone (1913–1991) of Cambridge University received the Nobel Prize in Economics in 1984 and is generally regarded as the father of national income accounting.

[2] Another example of a stock variable is a company's balance sheet, which measures its financial state at a single point in time, say 31 December of each year. A corresponding example of a flow variable is an income statement, which records the profit or loss attributed to the firm over a time period, say 1 January to 31 December.

the sum of all final sales of goods and services sold during the measurement period.

**Definition 1**
**GDP = the sum of final sales within a geographic location during a period of time, usually a year.**

This definition refers specifically to **final sales**, i.e. goods and services sold to the consumer or firm that will ultimately use them. For example, the purchase of a loaf of bread or a motor car by a household is a final sale. In contrast, a car sold to a dealer which is subsequently resold during the measurement period, or a loaf of bread purchased by a grocery store which is later sold to a household are not final but **intermediate sales**. Intermediate sales are excluded from GDP to avoid double counting. For this reason, GDP should never be confused with total sales, or turnover. Consistent with this approach, exports are always counted as final sales regardless of how the foreigners use them, because they leave the geographic borders of the national economy.

Our second definition of GDP recognizes that each final sale of a good or service represents the ultimate step that validates all the efforts that have gone into producing and making it available to the buyer. It encompasses a chain of economic activities which are each seen as **value added**.

**Definition 2**
**GDP = the sum of value added occurring within a given geographic location during a period of time.**

A firm creates value added by transforming purchased input goods and raw materials into products it can sell in the marketplace. Value added is thus the difference between sales (turnover) and the costs of raw materials, unfinished goods, and imports from abroad. If the firm produces intermediate goods, its sales are costs to its customers, who themselves are producers. This value added should not be counted twice, and it is deducted from those customers' own sales in computing its own value added. When the final consumer purchases a good or a service in the market, the price includes all the value added created at each stage in the production process; hence the consistency between Definitions 1 and 2. Box 2.1 uses a concrete example to show how various productive activities contribute to an economy's total value added.

GDP also measures all incomes earned within a country's borders—by residents and non-residents alike. Because one person's final spending must be someone else's income, the third definition of GDP is also consistent with the first.

**Definition 3**
**GDP = the sum of incomes earned from economic activities within a geographic location during a period of time.**

GDP statistics are mentioned constantly in the financial and political press. The GDP, and in particular, its rate of growth, are generally considered to be the most important indicators of an economy's health, and their evolution is closely watched by managers, economists, and politicians. They allow us to study the performance of a single economy over time as well as to compare different countries. Three important points are worth mentioning:

(1) For comparison over time, we want to distinguish two reasons why GDP can increase: (1) more real economic activity and (2) higher prices for the same economic activity. This aspect is taken up in Section 2.2.2.

(2) For comparison across countries, we need to convert all GDP measures into a common currency. But, as we will see later, exchange rates are quite volatile and may give a faulty picture. For that reason, we usually use the concept of purchasing power parity, which is presented in Chapter 5.

(3) Small countries tend to have small GDPs, and yet they may still be well-off. This is why we often look at **GDP per capita**, dividing the GDP measures by the population.

The definition of GDP contains a fair amount of arbitrariness, and it is open to debate whether every positive movement in GDP constitutes an improvement in national well-being. All the same, it is the best indicator we have. More details on this controversial issue are provided in Box 2.2.

### Box 2.1 Value Added and Value Subtracted: Two Examples

Consider the following example of value added. A keg of beer is produced and sold for final use for €100. It is useful to break up this final sale into the steps of value added which were involved in its production. First, a brewery bought barley from a farmer, paying €10, used and paid for energy in the brewing process with a value of €20, and bought a keg from a keg manufacturer at a cost of €5. (For simplicity, the intermediate inputs of the farmer, energy producer, and keg manufacturer are assumed to be zero.) The beer is sold to a wholesaler for €80, so the brewery's own contribution to value added per keg is €45, given by his sale price (€80) less costs of inputs (€10 + €20 + €5 = €35). Next, the wholesaler sells the filled keg for €90 to a retailer, contributing value added of €10. The retailer sells the keg for €100 to some consumer (not a pub, which would add another layer to the value added chain!), generating €10 of value added. Summing up, the final price can be broken down into value added at each stage of production and delivery of the final good:

| **Value added contributed by the:** | |
|---|---|
| Farmer | €10 |
| Energy producer | €20 |
| Keg manufacturer | €5 |
| Brewery | €45 |
| Wholesaler | €10 |
| Retailer | €10 |
| Sum | €100 |

Each step in the value added chain represents a source of income for factors of production involved. Suppose for example that the brewer had labour costs of €35 (wages and salaries as well as social security contributions) and €5 in beer taxes. Then the brewery's activity led to profits of €5, which are the income to the owners—assuming there were no further costs such as interest on loans, royalties for brands or trademarks, or rent. Similarly, if the wholesaler had no costs (employees, rent, or interest), the €10 of value added would represent his income, which can also be thought of as the profit he receives as owner of the business. The example shows how the division of the value added is arbitrary and potentially separable from the issue of whether value added is generated at all.

Because value added is the source of income for labour, capital, and other factors of production, few economic activities could survive very long if they *subtracted* value, i.e. if sales did not even cover material input costs. Not only would labour and capital not receive income for their efforts, but also someone would have to pay for the operating loss on each unit of output sold. Yet there are many examples of value subtraction. Often firms sell goods 'below cost' simply to clear inventories for new products. In the centrally planned economies before the fall of communism, many industries were forced to sell their output cheaply. As a result, firms produced too few goods of poor quality, exemplified by the Trabant car, for which the citizens of the German Democratic Republic had to wait for years. In capitalist countries, some public services are thought to be worth less than they cost, and some government enterprises show chronic losses which are ultimately paid for by taxpayers. The non-market value of these services might be high enough to justify those losses; if they can't, then the public sector is also engaged in value subtraction.

## 2.2.2 Real versus Nominal Quantities, Deflators versus Price Indices

### *Real and nominal GDP*

Now that we know what GDP is and how GDP data are constructed, we can immediately see how the national income statisticians have solved the problem of adding up apples and oranges: the solution is to use *prices* to convert volumes (the numbers of apples and oranges) into values (final sales of apples and oranges). Suppose an economy produces only these two goods and requires no imports. Final sales of apples and oranges are obtained by multiplying the quantities of apples and oranges sold, $Q^a$ and $Q^o$, by their respective prices, $P^a$ and $P^o$, yielding **nominal GDP**, or GDP at current prices:

**(2.1)** $$\text{nominal GDP} = P^aQ^a + P^oQ^o.$$

Yet there is a slight problem: if the price of oranges increases from one year to the next, nominal GDP

### Box 2.2 What GDP Measures

The GDP is a measure of recorded market transactions as well as non-market production by the public sector. This leaves out many activities which are not carried out through legal channels or do not reach the marketplace, like growing vegetables in a garden at home. Furthermore, since the value of goods and services is measured using their transaction prices, two identical goods may enter the GDP differently if one of them is sold at a discount. Finally, it is not a measure of happiness: painful expenses (having a tooth removed, for example) enter the GDP in the same way as pleasurable ones. When someone dies, GDP rises: the funeral service, the hospital expenses, and the execution of the will by lawyers and bankers all represent additional final sales of goods and services. Despite the fact that they are costs, pollution and other forms of environmental damage do not count toward GDP, since they are not traded in markets.

Services enter the GDP exactly like goods. Services include medical doctors' fees or an estate agent's commission when an existing house is sold. The GDP also excludes many forms of income. In the case of real estate, if the house's value has increased since it was purchased, the previous owner enjoys a capital gain, but capital gains are not counted in GDP. Used-goods sales, such as cars or antique furniture, do not enter GDP either. Such transactions represent a transfer of ownership rather than production.

Public services are part of GDP, even if they are not really sold. Their price is simply measured by their cost of production. For example, public education enters GDP as the sum of teachers' salaries, operating costs such as electricity or heating costs, and equipment including rents. Similarly, the national defence enters the GDP as total expenditure on armed forces.

The digital revolution represents a new challenge to the measurement of GDP. It is claimed that GDP may have been growing faster by as much as 0.3 to 0.7% per year than actually measured.[3] One example is phone calls with VoIP (Voice over Internet Protocol) which allows users to use free internet connections. Another is music streaming, which has led to both a massive increase of music listening and an abrupt fall in sales of CDs and other conventional means of music storage. While the sales of recordings have declined significantly, sales of music services have increased—a radically different good, yet one that is a close substitute. To date, conventional income and product accountants are challenged to find adequate ways of capturing the impact of digital goods on GDP.

rises even while the volume of final sales has not changed at all! An increase in nominal GDP can result from either higher prices *or* more output. To separate the effects of output and price movements, national income accountants distinguish between nominal and **real GDP**. Increases in real GDP correspond to increases in physical output, the number of apples and oranges produced and sold. Whereas nominal GDP is computed as in (2.1), using the actual selling prices, real GDP is computed by using prices observed in some agreed base year.[4] In our example, suppose that in the base year *0* the prices of apples and oranges are $P_0^a$ and $P_0^b$ final sales of apples and oranges are $Q_0^a$ and $Q_0^b$ respectively. Then real GDP in year $t$ is given by:

$$\textbf{(2.2)} \qquad \text{real GDP}_t = P_0^a Q_t^a + P_0^b Q_t^b$$

This distinction is very general and applies to all macroeconomic variables: nominal variables represent values at *current* prices; real variables represent volumes at *constant* prices. As an example, consider Table 2.1, which reports growth rates of nominal and real GDP for the euro area.[5]

[3] As estimated by Charles Bean in 'Time to rethink the way we measure economic activity', see the fun-to-read article on http://www.voxeu.org/article/rethinking-measurement-economic-activity.

[4] Problems arise when new goods are introduced (e-readers, tablets, or drones), or existing goods improve in quality (personal computers). National income accountants have devised procedures to deal with such effects.

[5] In previous decades, it was common to update the base year every five or more years. Rapidly changing product mixes and globalization have increased the importance of redefining base years more frequently. It is now EU national income accounting practice to redefine the base year *every* year, effectively rendering real GDP a so-called chain standard index. With this change, growth rates in real GDP are more reliably measured. As a result, some national statistically authorities have even stopped publishing real GDP levels, using an index number without units instead.

**Table 2.1 Growth Rates of Nominal GDP, Real GDP, and GDP Deflator: Euro Area 2005–2015 (% per annum)**

| | Nominal GDP | Real GDP | GDP deflator |
|---|---|---|---|
| 2005 | 3.6 | 1.7 | 1.9 |
| 2006 | 5.2 | 3.2 | 1.9 |
| 2007 | 5.5 | 3.1 | 2.4 |
| 2008 | 2.4 | 0.5 | 1.9 |
| 2009 | –3.6 | –4.5 | 1.0 |
| 2010 | 2.8 | 2.1 | 0.7 |
| 2011 | 2.7 | 1.6 | 1.1 |
| 2012 | 0.4 | –0.9 | 1.2 |
| 2013 | 1.0 | –0.3 | 1.3 |
| 2014 | 1.8 | 0.9 | 0.9 |
| 2015 | 2.8 | 1.6 | 1.2 |

*Source*: *AMECO on line*, European Commission.

***Price deflators and indices***

The distinction between nominal and real GDP can be used as a measure of the general price level, or the price of the broadest possible basket of goods in terms of money. The **GDP deflator**, one way of measuring the price level, is simply the ratio of nominal to real GDP:

**(2.3)** GDP deflator = nominal GDP/real GDP

In the base year, nominal and real GDP coincide and the GDP deflator equals 1.0. Often it is multiplied by 100 for ease of comparison over time. The GDP deflator can be thought of as an average of all prices of final goods in terms of money, where each price is implicitly weighted by the share of the corresponding good in the GDP. As these shares change over the years, so do the weights.

The inflation rate can be measured by the rate of increase in the GDP deflator, which in turn can be approximated by the following formula:[6]

**(2.4)** GDP deflator inflation = nominal GDP growth rate − real GDP growth rate

For example, Table 2.1 shows that in 2015 the nominal GDP of the euro area rose by 2.8% while the real GDP increased only by 1.6%. On average, therefore, prices rose by roughly 1.2%.[7]

An alternative measure of inflation is based on an average of prices with fixed weights, called a price **index**. A basket of goods is selected and the amount of each good, or category of goods, in the basket is used to weight the corresponding prices. An example is the **consumer price index (CPI)**. This is based on a basket of goods consumed by a representative individual.

Figure 2.1 shows the growth rates of the GDP deflator and of the CPI in Italy. Differences between the two measures of inflation are usually not very large, but they can become significant when import prices—which matter for the CPI but not for the GDP deflator—behave differently from domestically produced good prices. For example, in the late 1980s the price of crude oil increased less than prices of goods and services produced in Italy. In the early 2000s, domestic wage increases put pressure on domestic production costs and the GDP deflator rose faster than the CPI, an evolution that was abruptly reversed in the financial crisis after 2009.

Other price indices can be tailored to track prices of certain types of goods, consumers, or sectors of the economy. Along with price deflators, there is a large menu to choose from, with each price index or deflator having its own special emphasis. Box 2.3 presents some frequently used deflators and indices.

## 2.2.3 Measuring and Interpreting GDP

The GDP, which represents the economic performance of an entire economy, is not easy to measure.

[6] Box 5.3 in Chapter 5 provides the derivation of for this formula. If we denote nominal GDP as $Y^N$, real GDP as $Y$ and the GDP deflator as $P$, we have $Y^N = PY$, which means $P = Y^N/Y$. Then, using the results from Box 5.3, we have $\Delta P/P = \Delta Y^N/Y^N - \Delta Y/Y$.

[7] To see why this formula is an approximation, suppose real GDP increased at rate $g$ and inflation at rate $\pi$. If these rates are expressed as fractions (per cent change divided by 100), then the rate of nominal growth is given by $(1 + g)(1 + \pi) - 1 = g + \pi + g\pi$. For $g$ and $\pi$ small, $g\pi \approx 0$, so the rate of growth of nominal GDP is approximately $g + \pi$.

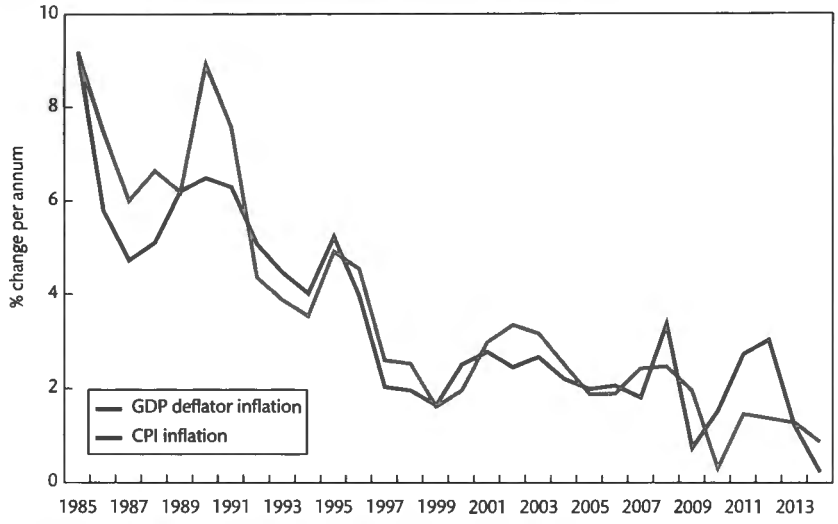


**Fig. 2.1 Inflation Rates, GDP Deflator, and Consumer Price Index: Italy, 1985–2014**

Both the GDP deflator and the consumer price index (CPI) measure the price level, or the price of goods in terms of money. The inflation rate is simply the rate of growth of one of these measures. The figure shows that both GDP deflator and CPI measures of inflation tend to move together over time, with occasional exceptions when the difference in the underlying 'baskets' matters. In the late 1980s and in 2015, world oil prices declined sharply. Since gas and heating oil are part of household consumption, inflation measured by the CPI declined. Since oil is imported, it does not contribute value added directly in Italy, and has only a small impact on the GDP deflator. The opposite occurred between 2009 and 2014.

*Source*: World Development Indicators, the World Bank.

## Box 2.3 Price Deflators and Price Indices

The price index closest to the GDP deflator is the producer price index (PPI), with fixed weights corresponding to a basket representative of national production. Similarly, the CPI is closely tracked by the consumption deflator, the ratio of nominal and real aggregate consumption expenditures by households. A price index like the CPI or the PPI is an example of a fixed-weight, or *Laspeyres index*. The consumption deflator, which is based on the actual share of goods in the corresponding year's consumption, is called a variable weight or *Paasche index*. The CPI and the consumption deflator include goods and services produced abroad and imported, while the PPI and the GDP deflator do not, but these latter measures include goods and services locally produced and exported. Figure 2.1 suggests a growing divergence between the PPI and the CPI in Italy in the late 1980s. The reason is that imported goods prices increased by less than those of domestically produced goods.

Other frequently used deflators are related to exports, imports, investment goods, and government purchases. The wholesale price index (WPI) measures the average price of goods at the wholesale stage, and various commodity price indices track the evolution of raw materials prices. The dizzying diversity of indices and deflators reflects the fact that a perfect price index simply does not exist. Different price measures are used for different purposes. For example, wage-earners would like to tie their wages to their cost of living; in this case, the relevant index is the CPI or the consumption deflator. In the case of Italy, linking wages to the CPI rather than to the PPI resulted in higher profits for firms whose sales are better tracked by the PPI. Because the CPI and other Laspeyres indices are easier to compute, they are used most often in practice.

### Box 2.4 The Underground Economy and Unpaid Work

Who hasn't had an offer from a carpenter, a car mechanic, or painter to do some work 'without a receipt'? Agents engage in the underground, or informal, economy for straightforward reasons. First, they want to avoid taxes (the value added tax, employment and social security charges, profit taxes). Second, while significant, criminal activities, such as drug-dealing, prostitution, or racketeering, are intentionally concealed and kept underground by market participants. By definition, the size of the underground economy is unknown, but national income statisticians often attempt to guess its importance. They use various approaches such as monitoring household electricity use, which tends to be higher in economies where unreported market activity is more significant, or looking at the amount of large-denomination currency in circulation, since underground transactions do not use bank accounts and profits are conveniently held in large bills. The sale of intermediate inputs related to final production often indicates underground economy activities. For example, a large discrepancy exists between the purchase of construction materials and reported construction activity. Figure 2.2 shows the extent of the underground economy in a number of countries.

The task is generally carried out by official statistical offices which draw on various sources of information. One natural source is the tax authorities. Firms report sales (first definition of GDP), individuals report incomes (third definition), and in most countries (all EU countries, but not the USA) value added taxes (VAT) are collected by intermediate and final sellers who then report their value added when they pay the tax (second definition).

The fact that GDP figures are collected through tax returns immediately raises the suspicion that individuals and firms may misrepresent their finances to the fiscal authorities. Such unreported income and output is frequently referred to as the **underground economy**. Box 2.4 presents estimates of how large it could be. It also alerts us to the importance of work that is not paid for in the marketplace.

Another shortcoming associated with the magnitude of the task is the time it takes to get reasonably accurate numbers. Data from tax returns are processed with some delay. Usually at the end of the first month of each quarter, figures for the preceding quarter are released. Box 2.5 explains how such flash estimates are produced and updated several times over the following years. The inaccuracy of these estimates is unsettling because they are frequently used by governments when deciding on economic policies, by investors when valuing their assets, and by firms deciding on

### Box 2.5 How National Accounts Estimates Can Vary over Time

Because governments, firms, and investors require timely information about the economy, national statistical institutes in advanced economies have devised ways of quickly producing preliminary estimates of GDP. The procedure is based on the knowledge that the value added of, for example, the 100 largest corporations represents a given proportion of GDP. If the proportion were 10%, as these firms fill in VAT tax reports or respond to specially designed questionnaires, multiplying by 10 their combined value added provides a rough early estimate of GDP. A few months later, revised estimates can be based on data provided by a larger sample of firms. Waiting still longer will allow the incorporation of estimates based on an early and partial analysis of tax returns. Detailed analysis of all tax returns data—using procedures to reconcile differences between measures based on the three definitions—leads to a final figure. Table 2.2 shows successive estimates of German GDP in 2008. The first estimate, published in January 2009, exceeded the final figure by €8 billion, or by about 0.3% of the initial estimate.

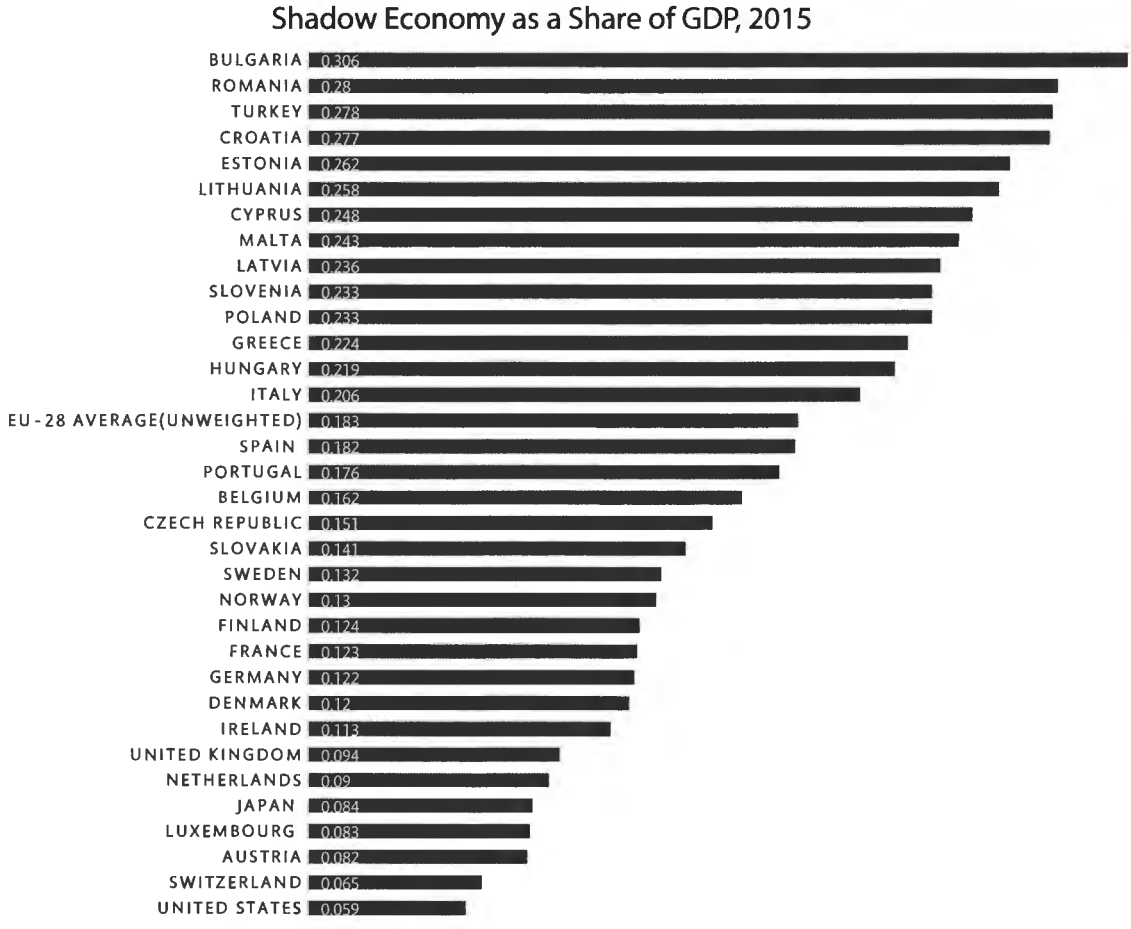


**Fig. 2.2 Estimates of the Size of the Underground Economy (% of GDP)**

Another serious drawback of GDP as a measure of economic activity is unpaid work. Minor repairs around the house, caring for children, cooking for the family, and cleaning up take up much time and effort. Wealthier people hire help for these chores, in which case it becomes part of GDP (if reported to the tax authorities). Most people do it themselves, and it is unrecorded.

*Sources*: Schneider (2015), AMECO, own calculations.

hiring or firing workers and on acquiring new plant and equipment. This is why other indicators are often used to supplement the GDP figures.[8] It is also why analysts tend to concentrate on growth *rates* rather than levels. As long as the distortions do not change much over time, measured GDP growth rates offer a good picture of average economy performance.

[8] Chapter 16 discusses some of the most frequently used indicators.

It is tempting to compare GDPs across countries. Because countries have different populations, it is natural to look at GDP per capita, or the average income earned within a country's boundaries. Such data must be regarded with caution, however. First, GDP is a measure of income, not wealth. Income is a flow, while wealth is the stock of assets accumulated over longer periods of time. For example, the average income earned in the UK is lower than that of Abu Dhabi. Yet average British wealth is likely to be much higher because Britain has been accumulating

**Table 2.2 Estimates of 2008 German Nominal GDP**

| Date of publication | GDP (€ bn, 2000 prices) | % difference from previous estimate | % difference from Jan 2009 |
|---|---|---|---|
| Jan 2009 | 2489.4 | — | — |
| Feb 2009 | 2489.4 | 0.00% | 0.00% |
| May 2009 | 2492.0 | 0.10% | 0.10% |
| Aug 2009 | 2491.4 | –0.02% | 0.08% |
| Nov 2009 | 2495.8 | 0.18% | 0.26% |
| May 2010 | 2495.8 | 0.00% | 0.26% |
| Nov 2010 | 2481.2 | –0.58% | –0.33% |
| Feb 2011 | 2481.2 | 0.00% | –0.33% |

*Source*: Estimates as published in the monthly bulletin of the Deutsche Bundesbank, various issues.

wealth for centuries, in the form of private assets (e.g. houses, factories, jewels, stocks) and national assets (e.g. the London Bridge, paintings in the British Museum, railroads, highways and telecommunication networks, and much more).

Second, a large number of transactions are not recorded, especially in developing countries. They belong to what is sometimes called the informal economy. For example, much food can be produced within the extended family (a non-market activity), or exchanged for other food (a non-reported market activity). Very low reported per capita income levels in developing economies are believed to underestimate true value added and income, even though efforts are being developed to reduce the gap. Finally, GDPs are measured in the country's local monetary unit, or currency, and are then converted into a common currency using the exchange rate. But local costs are often much lower in poor countries, for reasons discussed in Chapter 15. To correct for this effect, economists often use GDP figures that have been adjusted for differences in purchasing power, as already mentioned above.

## 2.3 Flows of Incomes and Expenditures

### 2.3.1 The Circular Flow Diagram

***From final expenditures to net taxes and factor income***

Each individual's expenditure necessarily contributes to some other individual's income. The simplified **circular flow** diagram represented in Figure 2.3 is based on this simple truth and goes a long way in tracking the functioning of an economy. Based on the first and third definitions of GDP, it shows how GDP arises as final sales, and how it is paid out to households, the owners of the factors of production. In addition, it shows how firms—around which market activity is organized—households, and the government interact to make GDP possible.

The GDP appears in the left part of the figure. It represents the final net sales of firms. Since firms are owned by households, the GDP represents the

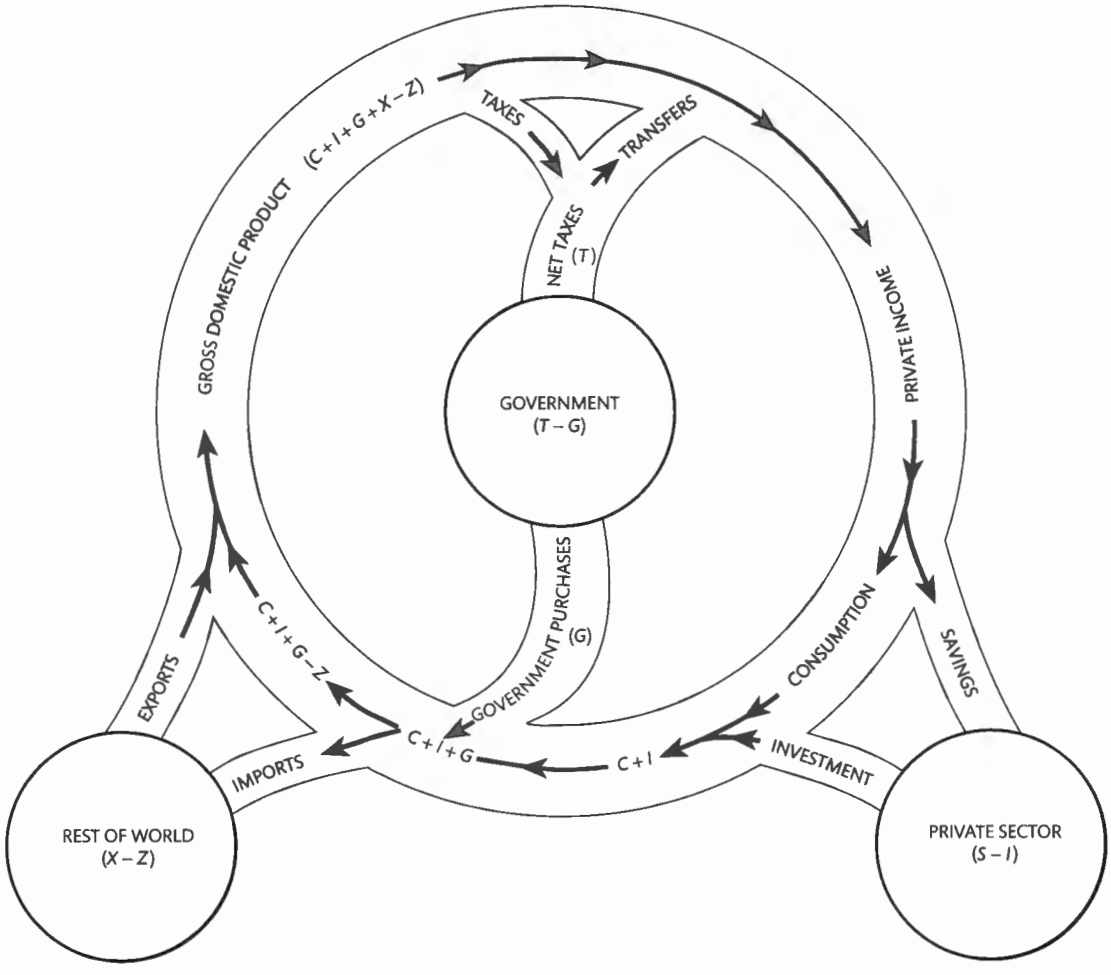


**Fig. 2.3 The Circular Flow Diagram**

The lower left part of the wheel represents final sales of goods and services which are domestically produced. It is the sum of consumption spending (*C*), investment spending (*I*), government purchases (*G*), and exports (*X*) less imports (*Z*). In the upper left part of the wheel this is interpreted as income to residents. This income is taxed by the government, but is also supplemented by transfers to households and firms, resulting in net taxes (*T*). The remainder is private income, which may be saved (*S*) or spent (*C*). The private sector invests in productive equipment (*I*), which it finances in part by savings (*S*); the balance $S - I$ is the private sector's net saving behaviour. Similarly, the public sector's net saving behaviour is reflected in its budget surplus $T - G$. The balance $X - Z$ represents net exports of goods and services.

gross income of factors of production employed in the country or geographic region under consideration. To see what firms do with revenues coming from final sales, we move clockwise. The government, shown as the circle inside the flow diagram, takes (in the form of taxes) and gives (in the form of various transfers) to both households and firms. It also purchases goods and services directly. Because it needs to pay for them, the government takes in more than it gives away in transfers. The difference between taxes and transfers is called **net taxes** and is represented by *T*. These taxes are taken in at several points of the value added chain—as indirect taxes such as value added taxes,

or as direct taxes on different types of income. Here we consolidate them for simplicity. What is left of GDP after these taxes and transfers are subtracted is called **private income**, $Y - T$.

#### *From private income to absorption plus net exports—GDP*

Private income is ultimately earned by those households which own the factors of production involved in creating the value added. The largest part of private income is wages and salaries paid to workers plus payments for rent and royalties, as well as net interest on loans from banks. The residual which remains after firms pay all these other factors is known as gross profit. This profit can either be saved by the firm or redistributed back to firm owners as income.[9] Since all factors of production are ultimately owned by some households, households receive income as employees, as bondholders, as shareholders, as owners of land, and as holders of patents. Households can either save this income, or spend it on **consumption**.

The private sector represents the consolidation of households with the firms that they own. The flow diagram shows how the aggregate savings of the private sector (S) are deposited with the financial sector. The financial sector includes banks, financial institutions, and stock markets whose function is to collect savings and channel them to firms seeking to invest, that is, to purchase productive equipment. This activity, called **financial intermediation**, is represented by the lower-right circle. In the aggregate, the private sector uses its **savings**—the income that it does not consume—to finance, or pay for, the acquisition of new productive equipment by firms. The stock of existing productive equipment, including structures, is referred to as **physical capital**, while the purchase of new equipment is called **investment**. The excess of private saving over investment ($S - I$) is called net private saving. Net private saving can be positive or negative. Firms and households spend their income—part of it borrowed—to consume (C) and to invest (I).[10]

To private sector expenditures on goods and services ($C + I$) the government adds its own demand ($G$). Governments purchase goods (e.g. roads, military equipment, newly built buildings, or stationery for the bureaucracy) and services (of civil servants and other employees). While governments transfer lots of income, distribute various subsidies to firms and households, and pay interest on the public debt, these are not purchases of goods and services and not included here. Total domestic spending, sometimes called **absorption**, is the sum ($C + I + G$) of private and public spending on all goods and services. Part of absorption includes the purchase of imported goods and services (Z). This is shown as the branch going into the leftmost circle, which represents the rest of the world. Similarly, while some domestic income thus leaks abroad, foreigners buy domestically produced goods and services. Those purchases are the country's exports ($X$). Netting these two flows with the rest of the world yields net exports ($X - Z$).[11] When positive, net exports increase demand for domestic production above that originating with domestic residents; when negative, demand for domestic production is less than total domestic demand.

The sum of absorption and net exports represents the total final sales that occur within the geographic area, i.e. the GDP. The circular flow of income is closed. This circularity is the essence of economic activity: we (collectively) earn to (collectively) spend.

### 2.3.2 Summary of the Flow Diagram

The flow diagram can be summarized using the first and third definitions of GDP ($Y$). As final sales, the GDP is broken down into four main categories: (1) final sales of consumption goods and

[9] The other production costs are mainly land and buildings, financial costs (borrowing from banks and bondholders), and raw materials and intermediate goods which, for the country as a whole, are frequently imported.

[10] There is an important difference between this terminology and that used in the business or popular press, in which 'investment' includes the acquisition of existing assets or financial instruments. Although stocks and bonds are often issued by firms to finance purchases of productive equipment, their simple acquisition or sale does not necessarily imply 'investment' in economics, i.e. the creation of new productive capacity.

[11] As we will see in Section 2.4, net exports ($X - Z$) do not take into account some international income movements that go beyond sales of goods and services.

**Table 2.3 Components of GDP by Expenditure, 1999–2015 (% of GDP)**

| | Consumption (C) | Investment (I) | Government Purchases (G) |
|---|---|---|---|
| Australia | 56.5 | 26.9 | 17.6 |
| Canada | 55.4 | 22.2 | 20.4 |
| France | 55.2 | 21.8 | 23.1 |
| Germany | 56.3 | 20.3 | 18.7 |
| Italy | 60.3 | 19.8 | 19.2 |
| Japan | 58.6 | 22.4 | 18.9 |
| Switzerland | 56.0 | 24.1 | 11.0 |
| United Kingdom | 64.5 | 17.6 | 19.9 |
| United States | 67.6 | 20.8 | 15.3 |
| Euro area | 56.1 | 21.5 | 20.3 |

*Source*: AMECO, European Commission.

services ($C$), (2) final sales of investment goods and changes in inventory stocks ($I$), (3) final sales to the government ($G$), and (4) sales to the rest of the world ($X$). Since part of domestic income leaks abroad to pay for imported goods, imports ($Z$) must be subtracted, which gives the first decomposition of GDP by final expenditures:

**(2.5)** $Y = C + I + G + X - Z.$

The flow diagram also shows that GDP can be viewed as net incomes earned by the owners of production factors. What do they do with this income? The three possibilities are given on the right-hand side of the flow diagram: they pay taxes net of transfers ($T$), they save ($S$), and they consume ($C$). Hence the second decomposition by uses of income:

**(2.6)** $Y = C + S + T.$

Table 2.3 displays the components of the first decomposition as a percentage of GDP for a few countries. Consumption typically represents about 60% of GDP in Europe, but it is much higher in the US. The investment rate—the ratio of investment expenditures to GDP—amounts to some 20%, with few differences among the developed countries, but it is about twice as much in China. Because investment corresponds to the accumulation of productive equipment, it matters for future economic growth. The table shows that public spending varies quite a bit, but comparisons are not always easy. Investment in infrastructure equipment (roads, bridges, public utilities) may be undertaken privately in some countries and publicly in others. Many goods and services are privately produced in some countries while they are delivered freely as public goods in others: these include medical services, schools, child care, and public transport. Finally, the 'size of government' is considerably greater than the share of government purchases of goods and services: transfers to firms and households, not reported in Table 2.3, may be as large as direct expenditures or even larger. When total spending is considered, which adds transfers to direct purchases, the government often 'handles' more than half of GDP.

The flows of incomes and spending captured by Figure 2.3 constitute the real, as opposed to financial, side of an economy. Parts of these flows leak out to the financial side in the form of corporate and household savings; others leak out to the government in the form of tax payments or social security contributions; others to foreigners through imports. To the extent that withdrawals of resources from the circular flow due to a particular sector are not matched exactly by inflows

in the form of spending, then that sector's net asset position must be changing, by definition.[12] If savings of the private sector exceed investment spending, for example, this means that the private sector is accumulating assets. The same holds for the general government if net taxes exceed government purchases of goods and services, or for a nation if net export of goods and services, broadly defined, is positive. Asset accumulation or decumulation has economic consequences. How the financial side of the economy functions, and how the real and financial sides are linked, is studied in Part III of this book.

### 2.3.3 More Detail

#### *Domestic vs national*

Economic boundaries are important for the measurement of national output and income. As noted earlier, the GDP defines a country by the people and firms that operate within its borders, quite independently of their nationality or residence. An alternative is to define the economic activity of a country by its residents, both people and the firms they own, wherever they produce or earn income. This leads to an alternative concept, called **gross national income** (GNI). The GNI is obtained by adding to GDP those incomes earned abroad by resident entities and subtracting incomes generated by non-resident entities within the country. The net of these two measures is the **balance on primary international income**. These are called primary incomes because they are directly associated with production.

The **balance on secondary international income** adds up various forms of payment 'without consideration' (taxes paid to the home authorities by non-residents or paid to foreign authorities, gifts and transfers sent to or received from abroad, etc.). Adding the secondary income balance to the GNI provides the gross disposable national income. This is summarized in Figure 2.4, which explains these concepts using the case of Belgium and Germany. In 2013, Belgian GDP was about half a

[12] If the net outflow of goods and services is positive, net assets owned by the sector must be increasing; if the net outflow is negative, net assets are decreasing. Technically, increases in net assets can occur by increases in gross financial assets holding liabilities constant, or by reducing gross liabilities (i.e. paying off existing debt to other sectors) holding assets constant.

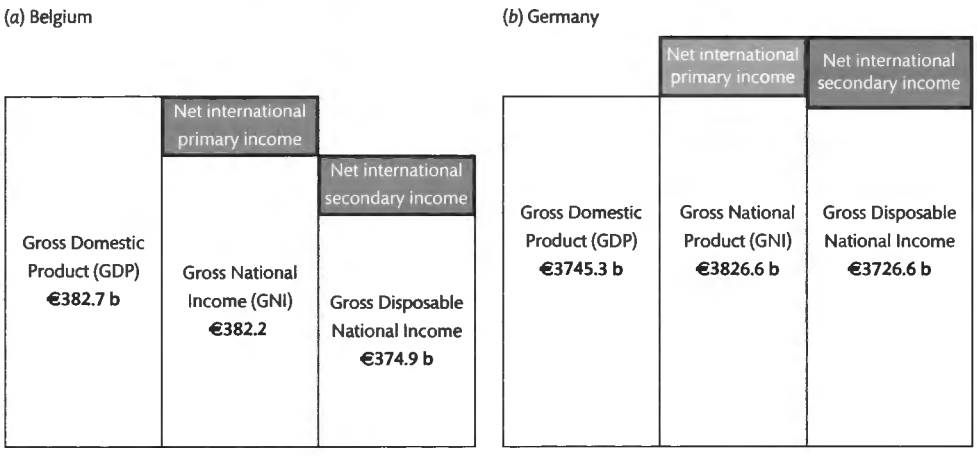


**Fig. 2.4 From Domestic Product to Disposable National Income, 2013**

Many foreigners reside in both Belgium and Germany, but GDP deviates from GNI in qualitatively different ways. In Belgium, interest income of foreign firms and wages of workers who live outside of the country dominate, so that GNI and GDNI are less than GDP. In Germany, foreign investment income of German residents outweighs that of non-residents. On the other hand, German residents transferred more money abroad than they received (€51 bn in 2013), which partially offsets the inflow of foreign primary income.

*Sources*: knoema.com.

**Table 2.4 GDP and Household Disposable Income, 2014**

| | GDP (billions of €) | Households Disposable Income | |
|---|---|---|---|
| | | in € | % of GDP |
| Germany | 2916 | 1710 | 58.7 |
| France | 2132 | 1307 | 61.3 |
| Sweden | 431 | 216 | 50.1 |
| Switzerland | 516 | 315 | 61.1 |
| United States | 13058 | 9399 | 72.0 |
| United Kingdom | 2253 | 1352 | 60.0 |

*Note*: Data for Switzerland: 2013.

*Sources*: AMECO, European Commission.

billion euros greater than GNI. This means that Belgium had a *deficit* on its primary income balance; in total, more payments were made by Belgian residents for the use of foreigners' labour, capital, or other contributions to value added which occurred in Belgium in 2013. Similarly, the net flow of gifts, transfers, taxes, and related payments meant that more was paid to the rest of the world than Belgian residents received. As a result, Belgian gross disposable national income was a whopping €7.3 billion, or about 5% less. In contrast, Germany received more primary income from abroad than it paid out, while it was a net payer on secondary income.

#### Household incomes

It is also important to note that a big share of GDP does not reach individual households. It either goes to the government (as net taxes) or is saved by firms (as retained earnings). This is illustrated in Table 2.4.

#### Gross and net

All of the concepts presented so far are 'gross'. What is 'net', then? In the process of producing output, productive equipment is subjected to wear and tear and obsolescence. Properly measured, this depreciation should be subtracted to give a clearer picture of the output that is really available as income if we are to preserve the value of our productive capacities. Subtracting depreciation from GDP gives us the **net domestic product (NDP)**, **GNI** becomes **NNI**, etc.[13]

### 2.3.4 A Key Accounting Identity

The two decompositions of GDP, (2.5) and (2.6), are accounting identities: they hold by definition. Therefore it is always the case that:

$$C + S + T = C + I + G + X - Z$$

Consumption $C$ appears on both sides of this equality and can be eliminated. When this is done and terms are rearranged, the two accounting identities yield a third one:

**(2.7)** $(S - I) + (T - G) = (X - Z)$.

The last term, $X - Z$, is the balance of exports over imports of goods and services. Parentheses highlight the fact that the corresponding expressions appear in Figure 2.3 as net flows of the private sector (household and business), government, and the rest of the world, respectively. Each of the three net flows can be thought of as a form of saving or withdrawal from the circular flow income and expenditure: a leakage if positive, or an injection if negative. If $S > I$, the private sector in the aggregate is a net saver. If $S < I$, the private sector is a net borrower. Similarly if $T > G$, the government is saving, and if $G > T$ it is borrowing by issuing debt to domestic or foreign residents. The identity (2.7) shows how these leakages are linked, by definition. Table 2.5 provides some examples in the year 2010, when the European debt crisis was in full swing.

The table shows that, in 2010, both Italian private and public sectors were spending more than they took in; the country as a whole, therefore, had to borrow abroad, which explains why they were running sizeable external deficits, as will become clear in Section 2.4. The Eurozone as a whole was

[13] In practice, tax laws determine financial accounting practices as regards depreciation of machines and other forms of physical capital. Firms are generally allowed to subtract part of the book value of equipment from their revenues each period when computing taxable profits. It may under- or overstate actual economic depreciation by a wide margin.

**Table 2.5 The Accounting Identity in 2010 (% of GDP)**

| | S–I | T–G | X–Z |
|---|---|---|---|
| USA | 5.6 | –8.8 | –3.2 |
| Japan | 10.3 | –6.7 | 3.6 |
| Belgium | 3.9 | –2.6 | 1.3 |
| Denmark | 4.7 | 0.8 | 5.5 |
| France | 2.6 | –4.8 | –2.2 |
| Germany | 8.1 | –2.5 | 5.6 |
| Italy | –1.3 | –2.2 | –3.5 |
| Netherlands | 11.5 | –3.8 | 7.7 |
| Spain | 0.7 | –5.2 | –4.5 |
| Sweden | 4.7 | 1.6 | 6.3 |
| UK | 5.8 | –8.3 | –2.5 |
| Euro area | 4.1 | –3.9 | 0.2 |

*Note*: Data for net exports include incomes that have been ignored so far: primary incomes that remunerate the services of factors of production employed outside national borders and secondary incomes that include various taxes and transfers. Section 2.4.1 explains these additions and identifies extended net exports as the current account balance, which is shown in this table.

*Source*: OECD.

running balanced net exports as budget deficits were about matched by private sector savings. Japan, the USA, and the UK were running huge budget deficits but Japan's net exports were in surplus, due to even larger net private savings, while the US and the UK had to borrow abroad.

### 2.3.5 Identities versus Economics

Identity (2.7) is a particular way of stating that all goods and services produced (Definition 3 of GDP) must be purchased (Definition 1). For example, if private savings exceed private investment ($S > I$), either net exports must be positive or the government budget must be in deficit, or both. This is an accounting fact, true by definition.

It is important to remember that identities tell us little or nothing about causation. Without more information, it is impossible to know whether (1) the government deficit is at the origin of positive net private savings, (2) high exports are generating income that is simply saved by residents, or (3) low domestic investment spending is coinciding with a domestic recession, in which both imports and tax revenues are low, bringing either current account or government budget or both into deficit. This highlights the difference between simply collecting data and interpreting them, that is, the difference between accounting and economics. The identity (2.7) is not only a requirement that accounts be correctly measured; we will see later that, as a market equilibrium condition, it also tells us a lot about how adjustment mechanisms work.

## 2.4 Balance of Payments

The **balance of payments** accounts record all economic transactions between a geographical entity and the rest of the world. Usually this entity is a country, and almost all countries have adopted a classification of payments designed by the International Monetary Fund. Following that system, the presentation in Table 2.6 separates out international transactions in goods and services in a broad sense (Parts I and II) from financial transactions (the lower Part III). Some useful rules of thumb on how transactions are recorded in the balance of payments are presented in Box 2.6.

Simply put, the current account captures commercial transactions as explained in Section 2.4.1. The **capital account** further broadens the notion of commercial transactions to include purchases and sales of rights to exploit natural resources or buildings, and copyrights. It also includes transactions such as nationalizations, private and public debt forgiveness, and ownership transfers to residents abroad. The

**Table 2.6 The Balance of Payments**

| |
|---|
| I. Current account |
| A. Goods and services |
| 1. Goods |
| 2. Services |
| B. Income account |
| 1. Primary income |
| 2. Secondary income |
| II. Capital account |
| III. Financial account |
| 1. Direct investment |
| 2. Portfolio investment |
| 3. Other investment |
| 4. Reserve assets |
| IV. Errors and omissions |

current account, or net national saving in the form of acquisition of claims on foreigners, is found by combining I and II. It can also be thought of as net national lending if positive, and net borrowing if negative.[14] What is being lent or borrowed is described in the financial account, which is Part III of the balance of payments. Financial transactions imply the purchase and sale of assets such as stocks and bonds, loans and credit, bank deposits and currency, as well as real estate and other forms of wealth. Purchases of assets are recorded as a positive entry, sales with a negative entry.

### 2.4.1 The Current Account and its Components

The first account to consider in Table 2.6 records exports and imports of goods and services. Imports are entered with a minus sign (called debits), while exports contribute positively to the balance (called credits). The net result is line IA, the **balance of goods and services**. The balance of trade in goods (line IA1) includes merchandise trade as well as trade in intermediate inputs, goods repair, goods held in ports, and non-monetary gold. The balance of trade in services (line IA2) incorporates a wide and growing variety of intangibles (so-called 'invisibles') such as transport and travel, communication, insurance, financial, and other services. It also includes royalties and licence fees.

A second account to consider is the **balance of international income** (line IB). This account summarizes the net income of a nation which originates from abroad, as already noted in Section 2.3.3. It captures those transactions that do not represent direct sales of goods and services but can be considered as commercial in a general sense. Following that same logic, the international income account is broken down into two components. **Primary income** consists of non-resident employee incomes, interest earned abroad and repatriated profits of foreign-owned corporations. **Secondary income** includes remittances of employees who reside in a foreign country and send money home, as well as gifts and transfers. For example, when a Polish plumber living in London sends money to relatives living in Warsaw, this counts as a credit to the Polish secondary income account and as a debit to the UK's. The secondary income account also includes tax payments by foreign firms or persons, insurance claims, as well as private or public gift or transfers. An example of the latter is foreign aid granted at the national or multinational level. It may be helpful to think of the primary international income account as a summary of transactions involving the sale ('export') and purchase ('import') of factors of production (capital and labour services), while the secondary international income account captures sale and purchases of 'good will' broadly defined.

The sum of the balances of trade in goods, services, and of international income is called the **current account** balance.

### 2.4.2 The Capital Account

In the IMF classification the capital account captures various commercial transactions that involve 'intangible', non-produced assets like the right to use land or the acquisition (or loss) of good will through debt cancellation (or the expropriation of

[14] Net lending thus includes the purchase of stocks, real estate, and other forms of asset purchase.

foreigners).[15] Because the capital account is usually small and captures rare transactions not easily classified elsewhere, we will ignore it throughout the rest of the book.

### 2.4.3 Net Borrowing or Lending

The financial account is a country's net lending or borrowing. Under the convention that borrowing is negative lending, we will call it net lending for short. But why is it called net lending? The answer is provided by the national income decomposition (2.5) which can rewritten as:

$$X - Z = Y - (C + I + G) = Y - A,$$

where $X - Z$ is the balance on goods and services, $Y$ is GDP, and $A = C + I + G$ is referred to as absorption, or total domestic spending on goods and services by domestic and foreign households, firms, and government agencies. Net lending is defined as the sum of the balance on goods and services ($X - Z$) and the income account balance ($IAB$). Again ignoring the capital account, it follows that:

**(2.8)** Net Lending $= CA = X - Z + IAB =$
$Y + IAB - A = Y^D - A,$

where $Y^D = Y + IAB$ is the Gross National Disposable Income, an extended definition of income further explained in Box 2.7. This makes it clear that Net Lending is the excess of income ($Y^D$) over spending ($A$) and thus indicates indeed whether the country is a net borrower or a net lender. When a country earns more than it spends (i.e. $CA = Y^D - A > 0$), it is a net lender vis-à-vis the rest of the world. Conversely, a country running a current account deficit spends more than it earns ($CA < 0$ and $A > Y^D$) and must match the difference by borrowing abroad.

### 2.4.4 The Financial Account and its Components

Mechanically, when a country saves—equivalently, when it is a net lender—it acquires foreign assets or gets rid of some of its foreign liabilities by repaying some of its debt. Conversely, a net borrower increases its liabilities or disposes of some its foreign assets. These financial transactions, collected in the financial account, are the counterpart of the current account (*plus* the capital account, which is ignored) and they are shown in Part III of Table 2.6. Somehow, they must be equal. The remaining question is: who actually performs the balancing act, and how?

The answer is to be found in the **financial account**, which aims at fully describing all lending and borrowing activities by the country's private and public sector. The IMF defines four categories of financial transactions which affect this account:

(1) Direct investment (line III.1)—purchases and sales of shares (equity investment) in business enterprises in excess of 10% of the total value; reinvested profits; real estate purchases.

[15] The capital account also accounts for changes in ownership or transfers of certain types of non-financial assets.

### Box 2.6 Examples of Balance of Payments Accounts

Two simple rules help understand balance of payments. The first one concerns the current account: international transactions are recorded with a minus sign when they involve an outgoing payment (e.g. for imports) and positive signs represent receipts in the domestic currency (e.g. for exports). If incoming payments exceed outgoing payments—the current account is in surplus—the country earns more than it spends, which means that it is a net saver. If the current account balance is negative, it is a net borrower.

The second rule applies to the financial account, and matches the saving/borrowing distinction. Buying foreign assets represents saving and is registered with a positive sign, even though money if leaving the country. Selling assets represents borrowing and is registered with a negative sign. In Table 2.7 we give some examples of transactions and how they are recorded, using these two rules.

## Table 2.7 Balance of Payments: Some Examples

| Transaction | Credit (+) or debit (–) | Country | Account |
|---|---|---|---|
| UK exports chemicals to France to the amount of £1 million | + £1 m | UK | Goods and services |
| | –£1 m | France | Goods and services |
| French school trains German cyclists for €500,000 | +€500,000 | France | Goods and services |
| | –€500,000 | Germany | Goods and services |
| German construction company is paid SF 5 million to build a Swiss bridge | +SF5 m | Germany | Goods and services |
| | –SF5 m | Switzerland | Goods and services |
| Swiss ski instructor is paid salary of €80,000 for work performed in Austria | +€80,000 | Switzerland | Primary income |
| | –€80,000 | Austria | Primary income |
| UK fast food franchises remit £1 million in profits to headquarters in the USA | +£1 m | USA | Primary income |
| | –£1 m | UK | Primary income |
| Austrian government gives €3 million in relief aid to tsunami victims in Thailand | +€3 m | Thailand | Secondary income |
| | –€3 m | Austria | Secondary income |
| Estonian worker in Denmark sends DK 100,000 to family in Tallinn | +DK 100,000 | Estonia | Secondary income |
| | –DK100,000 | Denmark | Secondary income |
| Spanish government forgives debt of €10 million owed by Peru | +€10m | Peru | Capital account |
| | –€10m | Peru | Capital account |
| Swedish investor purchases a factory in Germany for €100 million | –€100 m | Germany | Financial account/ direct investment |
| | +€10 m | Sweden | Financial account/ direct investment |
| Portuguese bank buys €20 million of stock in German company from French bank based in France | –€20 m | France | Financial account/ portfolio investment |
| | +€20 m | Portugal | Financial account/ portfolio investment |
| UK bank based in London lends £50 million to subsidiary in Ireland | –£50 m | Ireland | Financial account/ other investment |
| | –£50 m | UK | Financial account/ other investment |
| Slovenian resident transfers €100,000 from home account to a bank account in Italy | –€100,000 | Italy | Financial account/ other investment |
| | +€100,000 | Slovenia | Financial account/ other investment |

### Box 2.7 Links Between National Income Accounts and the Balance of Payments

In this section and in Section 2.2.2, we face three different definitions of income. The differences are all related to international transactions and are therefore linked to the balance of payments. This box makes all this more precise. As before, assume a zero capital account balance. As explained in Box 2.2, the Gross National Income (GNI) concerns earnings by domestic residents while the Gross Domestic Product (GDP) refers to incomes earned within the country's borders. The link with the balance of payments is:

$$\text{GNI} = \text{GDP} + \text{primary income account balance},$$

since the primary income account captures payments received from nationals living abroad (a credit) and payments from foreigners who live domestically (a debit).

The Gross National Disposable Income (GNDI) builds upon the GNI by adding net secondary incomes:

$$\text{GNDI} = \text{GNI} + \text{secondary income account balance}.$$

Combining these two definitions, we have:

$$\text{GNDI} = \text{GDP} + \text{income account balance}.$$

Thus, to the extended definition of income, GNDI, relative to GDP, corresponds the extended definition of trade as we move from the balance on goods and services $(X-Z)$ to the current account balance $CA$, as shown by a comparison between (2.5) and (2.8) rewritten respectively as:

$$\text{GDP} = Y = (X-Z) + A,$$
$$\text{GNDI} = Y^D = CA + A.$$

(2) Portfolio investment (line III.2)—purchases and sales of shares (equity investment) in business enterprises of less than 10% of total value; purchases and issues of bonds, money market instruments, and financial derivatives.

(3) Other investments (line III.3)—trade credits; loans by banks; deposits held at banks; currency.

(4) Reserve asset transactions (line III.4)—transactions involving monetary gold, special drawing rights and reserve positions with the IMF, and foreign exchange reserves held by the monetary authorities.

An overall positive financial account indicates **net lending** to the rest of the world, a deficit corresponds to **net borrowing**. In other words, a positive entry in the financial account indicates that money flows out of the country to purchase foreign assets, it is a credit item, while inflows are recorded as deficits as domestic assets are sold to foreigners. While the first three types of financial account transactions can be conducted by the private or public sector, the fourth item is performed exclusively by the monetary authorities, usually the central bank. This action is called a **foreign exchange market intervention**.

Summarizing, net lending is measured by the current account but also by the financial account plus changes in official reserves, or the **foreign reserves account balance**. Ignoring the capital account, we have:

$$\textbf{(2.9)} \quad \text{Net Lending} = \underset{\text{current account}}{\text{CA}} = \underset{\text{financial account}}{\text{FA}}.$$

### 2.4.5 Errors and Omissions

Accounting principles require that net lending be the same whether calculated as (2.8) or as (2.9). Trade data originate with customs authorities. Financial data come from the banking system, since international transactions are mediated by financial institutions. Given the sheer number of observations that must be gathered, it should not be surprising that, in practice, discrepancies emerge. While there are genuine mistakes—the sheer volume of data to be treated is an invitation for errors—there may also be omissions which are less than innocent such as tax

**Table 2.8 Balance of Payments, Various Countries, 2014 (US$ billion)**

| | Eurozone | US | Sweden | Turkey | Brazil | China | Russia | UK |
|---|---|---|---|---|---|---|---|---|
| Current account | 320 | −390 | 33 | −47 | −104 | 220 | 58 | −152 |
| Balance on goods | 332 | −741 | 18 | −64 | −7 | 435 | 190 | −203 |
| Balance on services | 94 | 233 | 9 | 25 | −48 | −151 | −55 | 146 |
| Primary income balance | 79 | 238 | 15 | −9 | −52 | −34 | −68 | −54 |
| Secondary income balance | −186 | −119 | −10 | 1 | 3 | −30 | −8 | −41 |
| Capital account | 27 | 0 | −1 | 0 | 0 | 0 | −42 | −2 |
| Net lending | 346 | −390 | 32 | −47 | −104 | 220 | 16 | −154 |
| Financial account balance | 403 | −240 | 13 | −45 | −100 | 79 | 23 | −166 |
| Direct investment, net | 62 | 489 | 4 | −7 | −71 | −209 | 34 | −134 |
| Portfolio investment, net | 97 | −167 | 21 | −20 | −39 | −82 | 40 | −189 |
| Other investment, net | 183 | −240 | −7 | −17 | −3 | 253 | 51 | 170 |
| Reserve assets | 6 | −4 | 0 | 0 | 11 | 117 | −108 | 12 |
| Net errors and omissions | 56 | 150 | −17 | 2 | 3 | −140 | 6 | −12 |

*Note*: By construction, 'net errors and omissions' are equal to the financial account balance less the sum of current account and capital account balances. Deviations are due to rounding error.

*Source*: OECD.

evasion, illicit trade (drugs, arms, and counterfeiting come to mind) or money laundering.[16]

This is why an additional account called 'errors and omissions' or 'balancing items' is needed, item IV in Table 2.6. Again suppressing the capital account, the errors and omissions are computed as the amount that must be added to (2.9) to make it 'add up':

$$E\&O = FA - CA.$$

There is no presumption where these errors come from. Table 2.8 shows that errors and omissions can at times be embarrassingly large.

Table 2.8 also illustrates the balance of payments accounts for a number of different countries with widely different experiences. The enormous current account deficit in the USA can be linked to a deficit in trade on goods, only partially offset by surpluses in services and income balance. The primary income balances of the Eurozone and the US are positive, partly reflecting income from subsidiaries abroad. Their negative secondary income balances are partly driven by money sent home by foreign employees. The financial account of the Eurozone is in surplus as local firms and investors acquire shares in foreign firms. The US financial account is in overall deficit, but it combines a large surplus in direct investment, i.e. the acquisition of foreign firms, and the acquisition by foreigners of minority shares in US firms (portfolio investment) and of US government debt, some of which is held by foreign central banks to use as reserves. Indeed, we can observe a large increase of reserve by the Chinese central bank, while the central bank of Russia has been active limiting the depreciation of its currency by selling foreign exchange reserves. Finally, note that errors and omissions can be very large, as is the case in the US and China.

[16] By definition, the sum of the current accounts of all countries in the world should equal zero. In fact, it is systematically negative, as receipts are 'omitted' more often than expenditures.

### Box 2.8 China's Foreign Exchange Reserves

In 2008, just as the developed world plunged into a massive financial crisis, China posted a large current account surplus, making it a net lender of some $420 billion. Its non-official financial account was slightly negative as foreign corporations were rushing to escape the financial crisis and invest in the world's fastest growing country. In order to avoid a currency appreciation, the central bank increased its reserves by nearly $500 billion. By end 2014, China was holding foreign exchange reserves of $4,000 billion, more than one third of the world total and more than four times as much as the whole European Union. Then the tide reversed. In 2015, its current account surplus shrank and the financial account turned positive as Chinese residents sought to park their money abroad and foreigners retreated. This time the central bank sold about $500 billion worth of its reserves to avoid a sharp currency depreciation.

## 2.4.6 The Meaning of the Accounts

Equation (2.9) implies that net lending corresponds to the current account, which also equals the financial account balance. While this is obvious from an accounting viewpoint, it is remarkable that it occurs in practice since it sums up millions of commercial and financial transactions. Of course, accounting mistakes occur, and they are captured as errors and omissions, but there is much more to it. To see that, consider (2.9) again, breaking out the change in reserve assets from the financial account:

$$\textbf{(2.10)} \quad CA + KA = NOFA + \Delta R,$$

| current and capital accounts | = | Non-official financial account | | Official interventions |
|---|---|---|---|---|

where *NOFA* is defined as the financial account excluding change in foreign exchange reserves held by the central bank. Changes in foreign exchange reserves—sometimes called 'official interventions by monetary authorities'—occur when the central bank also gets involved in the financing of international transactions. If the central bank has been a net buyer of foreign currency or other financial assets, for example, this would be registered as net lending and mean that $\Delta R > 0$.

Why should the monetary authorities accumulate ($\Delta R > 0$) or decumulate ($\Delta R < 0$) reserves? Consider the case when the sum of the current and the capital accounts is in surplus but investment abroad *NOFA* is smaller ($CA + KA > NOFA$). This means that, collectively, the residents want to save and yet they do not acquire enough foreign assets. In chapters to follow, we will see that foreign currency is also a foreign asset. In the event that $CA + KA > NOFA$, this implies that domestic residents will have received through $CA + KA$ more foreign currency than they voluntarily acquired through *NOFA*. They will want to get rid of this unwanted money, which means selling it to acquire domestic money. This will strengthen the value of the domestic currency.[17] At this stage the monetary authorities will decide whether they want the domestic currency to become stronger, that is to appreciate. If not, they will step in and absorb the unwanted foreign currency, which means that they increase their stock of foreign exchange reserves ($\Delta R > 0$) and restore the equality in (2.10). Later chapters will examine this decision in detail. At this stage, we just note that item (4) in the financial account (line III.4 in Table 2.6) is an important variable of economic policy. Box 2.8 provides an example.

[17] Later chapters will explore this process in much greater detail. A currency appreciates when its value in terms of other currencies increases. Conversely, if its value decreases, we speak of a depreciation.

## Summary

1 The gross domestic product (GDP) can be defined in three equivalent ways: (1) as the sum of final sales, (2) the sum of value added, or (3) the sum of factor incomes. GDP is a flow variable measured over a well-defined time interval, usually a year.

2 Because nominal GDP measures final sales at market prices, an increase in the price level leads to an increase in GDP even if quantities sold are constant. Real GDP is computed by pricing current output with constant prices, corresponding to a chosen base year.

3 The GDP deflator is the ratio of nominal to real GDP. It is one measure of the price level. Inflation is approximately equal to the difference between the growth rates of nominal and real GDP. Price indices, also used to compute inflation rates, use constant-weight baskets of goods and services.

4 Measurement of GDP is imperfect, costly, and time-consuming. A large amount of economic activity is unmeasured, such as household services and the underground economy. Yet year-on-year comparisons, such as annual growth rates, are less affected by measurement problems.

5 GDP is equal to the sum of consumption, investment, government spending, and net exports ($Y = C + I + G + X - Z$). At the same time, GDP is equal to consumption, plus private sector savings, plus net taxes (gross taxes less public transfers received by the private sector) ($Y = C + S + T$). It follows as an identity that the current account surplus is equal to the surplus of the government plus the surplus of the private sector $(X - Z) = (T - G) + (S - I)$.

6 The balance of payments is a record of current account transactions and their financial counterparts, the financial account. The current account is the sum of the merchandise, invisibles, and income accounts. Net lending is measured either by the sum of the current and capital accounts or by the balance of the financial accounts. Net errors and omissions are a balancing item to account for any discrepancy between the two.

7 If the monetary authorities want to maintain the value of their country's exchange rate, they must intervene on exchange rate markets to match any possible balance of payments imbalance. Conversely, the exchange rate floats freely when the monetary authorities refrain from intervening; then all adjustment for balance of payments equilibrium occurs within the private sector, as a result of changes in the market-determined exchange rate.

## Key Concepts

- **accounting identities**
- **gross domestic product (GDP)**
- **flow versus stock variables**
- **final versus intermediate sales**
- **value added**
- **GDP per capita**
- **nominal and real GDP**
- **GDP deflator**
- **consumer price index (CPI)**
- **underground economy**

- **circular flow**
- **net taxes**
- **private income**
- **consumption**
- **financial intermediation**
- **savings**
- **physical capital**
- **investment**
- **absorption**
- **gross national income (GNI)**
- **net national income (NNI)**
- **primary international income**
- **secondary international income**
- **gross disposable national income**
- **net domestic product (NDP)**
- **balance of payments**
- **capital account**
- **balance of goods and services**
- **balance on international income**
- **primary and secondary incomes**
- **current account**
- **net borrowing or lending**
- **financial account**
- **foreign exchange market intervention**
- **foreign reserves account balance**
- **currency depreciation**

## Exercises

**1** You are given the following data:

| | |
|---|---|
| GDP | 2,500 |
| Depreciation | 250 |
| Before-tax corporate profits | 500 |
| Social security contributions | 350 |
| Transfers to households and firms | 500 |
| Net interest to foreigners | 100 |
| Proprietary income | 35 |
| Net corporate saving | 300 |
| Indirect taxes | 500 |
| Subsidies to enterprises | 200 |
| Fines and fees | 50 |
| Net remittances to rest of world | 250 |
| Corporate taxes | 50 |
| Consolidated government deficit | 50 |
| Personal taxes | 750 |
| Household savings | 100 |
| Investment expenditure | 600 |

Compute: NDP, national income, personal disposable income, consumption, government purchases, GDP, the current account balance. State your assumptions clearly.

**2** What happens to GDP when a music teacher marries his student whom he was tutoring previous to the marriage, but stops billing her for her private lessons? What happens when a housewife becomes self-employed at her own day-care centre?

**3** 'Services do not contribute to GDP as much as industry because industry produces *things*—tangible goods.' Comment on this using what you have learned about the national income accounts.

**4** I bought my house for €100,000. I have just sold it for €200,000, and the estate agent received a 10% commission from the buyer. What is the effect on GDP?

**5** Suppose you have the following data on prices and quantities transacted:

**Prices (€)**

| | Apples | Pears | Petrol |
|---|---|---|---|
| 2006 | 1.0 | 2.0 | 5.0 |
| 2007 | 1.0 | 3.0 | 6.0 |

**Quantities**

| | Apples | Pears | Petrol |
|---|---|---|---|
| 2006 | 300 | 100 | 50 |
| 2007 | 400 | 150 | 40 |

(*a*) If the economy produced all three (and only these three) goods, compute the nominal GDP in both periods, and real GDP at 2006 prices. What is the rate of inflation in 2007, as measured by the change in the GDP deflator?

(*b*) Suppose a CPI is constructed using weights corresponding to quantities produced in 2006. What is the rate of inflation measured by the CPI?

**6** Give the three definitions of GDP. Explain whether the following transactions contribute to UK GDP, and, if so, explain how all three definitions apply.

(*a*) A resident of York purchases a bag of sweets produced in Manchester.

(*b*) A tourist visiting York purchases a bag of sweets produced in Manchester.

(*c*) An operator of a Slovakian food chain purchases a large order of sweets produced in Manchester which are sent in the measurement period to Bratislava.

(*d*) A Manchester businessman purchases a machine to mould the sweets, which is manufactured in the Czech Republic.

(*e*) A store manager purchases several boxes of sweets from the Manchester sweet company, but stores them in the stock room, where they sit until the beginning of next year.

(*f*) The city government of York purchases several boxes of sweets from the Manchester sweet company for its reception for the Lord Mayor.

**7** Over the past five years, taxes were about 60% of GDP in Sweden. Yet disposable income over the past five years also amounted to 60% of GDP. How can these numbers be reconciled?

**8** 'Commuters increase GDP because they send home a large fraction of their earnings.' Comment.

**9** How would the following transactions be recorded in the *French* balance of payments?

- A French resident buys an Austin Mini produced in the United Kingdom.
- A French resident purchases stocks in a German corporation from a German bank based in Germany.
- A French national living in Switzerland buys stock in a French company from a bank based in Switzerland.
- A French resident builds a house in Italy, paying Italian residents to do the job.
- A French resident gives money to Greenpeace located in Hamburg, Germany.
- A French banker sends a wire transfer of euros to his daughter at the Humboldt University of Berlin.
- The same French banker wires euros from his bank account in Berlin to his account in Paris.
- A Tunisian worker in Marseilles sends money to his family in Tunis.
- Peugeot SA, a French concern, pays dividends to a resident of Finland.
- Profits of Owen Corning, a US company, are reinvested in capacity expansion of a factory in Fontainebleau, France.
- The Banque de France (a part of the European Central Bank) purchases Danish kroner to prevent the exchange rate (in euro) from falling in Copenhagen.
- A French resident of Colmar, a town in Alsace near the German border, smuggles home a stereo purchased in Freiburg (Germany).

**10** By definition, we do not know what is in the Errors and Omissions account. Beyond genuine data collection mistakes, we can only speculate what is in there. Table 2.8 shows large values in the cases of the US, China and, to a lesser extent, the Eurozone. Can you guess what items these entries might include?

## Essay Questions

1 Evaluate the following statement: 'Bringing the underground economy above ground would increase the GDP, but worsen tax receipts and the balance of payments.'

2 In recent years firms in Europe as well as in the USA have begun to 'outsource' or divest themselves of many traditional service functions, purchasing them on the market instead. Companies are increasingly obtaining computer, catering, legal, consulting, and other business services by ordering them from outside, independent companies. What is the effect of outsourcing on GDP? (Think of the example of a firm which turns its cafeteria into an independent contractor.) How does your answer depend on what the new firm does with its independence?

3 GDP mixes up everything. It includes 'goods' such as apples we eat and theatre shows we enjoy, but also 'bads' such as petrol burnt in traffic congestion and burial costs. It ignores many 'goods' as well: the value of a good neighbour or the free time that we can spend watching a sunset. Comment and explore how you would compute gross domestic happiness?

4 Countries which generate most economic activity from the exploitation of natural resources often experience large fluctuations in their national income and product account results. Explain why this might be the case, carefully defining the terms value added and costs of production. Why might the national income and product accounts lose their relevance for these countries? How might the problem be solved?

5 'The EU member states don't need balance of payments statistics. The individual states of the USA get along fine without them.' Discuss.