Understanding NATIONAL ACCOUNTS

François Lequiller Derek Blades

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Preface

In today's "information society", statistics are thriving. Media pay more attention to economic indicators than ever and analysts spend more time in running their statistical and econometric models, trying to interpret and forecast economic trends. In this context, statistical offices have dramatically increased the amount of data and metadata they publish to satisfy growing demand. New monthly indicators have been produced on important phenomena (activity of the service sector, services prices, vacancies, etc.). There is ongoing competition among OECD countries and regions to produce the most accurate and timely indicators.

Though short-term and structural economic indicators are proliferating, media, analysts and policy makers still pay great attention to the evolution of the gross domestic product (GDP) and to the other variables (investment, consumption, etc.) produced in the framework of the national accounts. In addition to annual national accounts figures, quarterly and even monthly data are available in several countries. The borders of national accounts have also been extended to include new areas, namely social and environmental variables. The integration between economic and financial accounts has been enhanced, coherently with the growing importance of capital markets and the financial dimension of today's economy.

To make a long story short, today's national accounts are at the core of a modern system of economic statistics, and they provide the conceptual and actual tool to bring to coherence hundreds of statistical sources available in developed countries. The question, however, is whether users are fully aware of the data richness national accounts can provide. Do they fully exploit the analytical and statistical potential of national accounts? More conceptually, can we assume that users are aware of the changes introduced in national accounts over the last two decades – which are quite important for drawing meaningful analytical conclusions from them? Are we sure that when analysts use productivity data to make inflation forecasts or to assess the long-term economic growth capabilities of a country, they are aware of the limitations that data can have? And what about the international comparability of data?

For example, are we sure that the differential in economic growth observed over the last ten years between the United States and the European Union is real and not just a statistical artefact? What are the implications for the evaluation of the future of the world economy of a 17% upward revision of the Chinese GDP published at the end of 2005? Is GDP a good measure of wellbeing or should we look at other measures, reorienting policies towards other targets? Can we trust national accounts figures concerning public deficit, or are these figures manipulated for political reasons – for example including or excluding public institutions from the perimeter of the public administration just to reduce the deficit? These are fundamental questions for those who want to understand what is going on in the economy, especially as policy decisions that influence the life of millions of citizens are taken every day on the basis of these figures.

The authors of this book have made a special effort to answer these questions and many more, keeping the necessary conceptual and statistical rigour, but using, as much as possible, language that will allow non-specialists to understand the "religion of national accounts". Because of the complexity of the topic, national accountants have been sometimes considered as an esoteric group of "statistical priests". Well, this book demonstrates that at least some of them are able to explain the key concepts (and even some secrets) of national accounts in an attractive and interesting way. The authors have made interesting choices to achieve this goal: for example, each chapter begins with an introduction discussing some economic statements or policy recommendations of the OECD, and then the chapter explains the definition of the variables used in these economic analyses and, also, their limitations. The book also contains a notable number of concrete examples, illustrated by data from different OECD countries. The book has also Statlinks to the OECD national accounts databases, which allow users to go beyond the figures presented in the book and to learn how to use of the widest sources of national accounts data worldwide.

Another smart choice made by the authors is to conclude each chapter with a summary of "what should be remembered" and several exercises, whose answers will be made available on the web pages devoted to the manual. Last, but not least, the book includes a chapter on international comparisons and three special chapters on the United States, China and India. These chapters are particularly important for those who want to understand how the world economy works and will work in future. While the US case is especially important for the completeness of its national accounts data, this book offers, for the first time, a well structured description of Chinese and Indian data, extremely useful even for specialists of national accounts.

Let me conclude by thanking Derek Blades and François Lequiller, who have successfully completed a difficult task, putting their unique skills in national accounts to the service of a wide audience of non-specialists. Too often statistics are seen as a necessary, but very dry, subject. I always try to advocate the importance of statistics to non-specialists remembering that the origin of the word "statistics" is "science of the State". I use this argument not only to convince people that they should be interested in the subject as individual citizens, but also to underline the ethical spirit that animate statisticians in doing their work. In this context, I would like to pay tribute to Derek and François, who have contributed so much to the theory and the implementation of national accounts. Their past and current work in the OECD has been very important to support the analytical and policy activity of the Organisation, and, on behalf of the latter, I would like to thank them for this additional effort.

Enrico Giovannini
Chief Statistician and Director, Statistics Directorate, OECD

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Note to the Reader

This manual contains a large quantity of data, essentially extracted from OECD sources. *StatLinks* are used to provide access to the data underlying most of the tables and graphs in the book. However, the reader must remember that national accounts are constantly revised. Differences can thus be found between two values of the same variable in two different tables or electronic files as well as between the variables used in the manual and those provided by the latest publications of national accounts by various statistical offices. This is not due to errors, but simply to the fact that the various parts of the manual have been updated at different dates over a period of two years (mid 2004-mid 2006).

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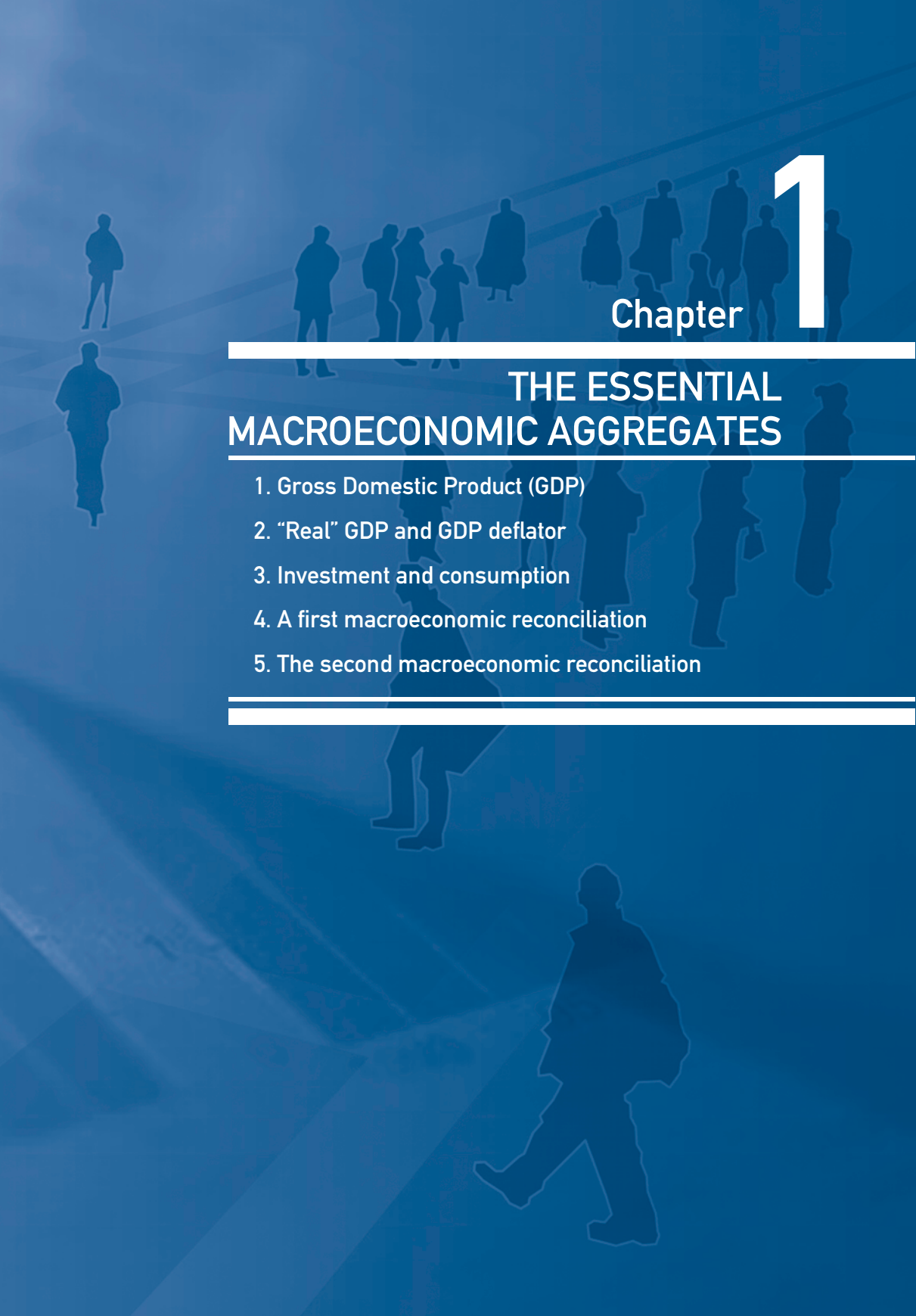


Chapter 1

THE ESSENTIAL MACROECONOMIC AGGREGATES

1. Gross Domestic Product (GDP)
2. “Real” GDP and GDP deflator
3. Investment and consumption
4. A first macroeconomic reconciliation
5. The second macroeconomic reconciliation

In this first chapter, our aim is to give an initial definition of the essential macroeconomic variables, listed in the table below, and taken from the *OECD Economic Outlook* for December 2004.[1] We have chosen to illustrate this chapter using the example of Germany, but we might as well have chosen any other OECD country, since the structure of the country chapters in the *OECD Economic Outlook* is the same for all countries. ▶ I.

I. Each chapter of this book uses an example from a different country.

Table 1. **Main macroeconomic variables**

Germany,[a] 1995 euros, annual changes in percentage

	2002	2003	2004	2005	2006
Private consumption	–0.7	0.0	–0.7	0.8	1.9
Gross capital formation	–6.3	–2.2	–2.0	0.6	3.4
GDP	0.1	–0.1	1.2	1.4	2.3
Imports	–1.6	3.9	6.4	4.9	7.5
Exports	4.1	1.8	8.1	5.7	8.1
Household saving ratio[1]	10.5	10.7	11.1	11.1	10.8
GDP deflator	1.5	1.1	0.9	0.8	0.9
General government financial balance[2]	–3.7	–3.8	3.9	–3.5	–2.7

1. Net saving as % of net disposable income.
2. % of GDP.

a) The report dates from December 2004. At that time, the data for 2004, 2005 and 2006 were forecasts by the OECD economists. The data for 2002 and 2003 were actual observations by the Statistiches Bundesamt, the FRG's statistical office.

Source: OECD (2004), *OECD Economic Outlook,* December No. 76, Volume 2004, Issue 2, OECD, Paris.

StatLink: *http://dx.doi.org/10.1787/563276026371*

Comments on Germany made by OECD economists in December 2004 included the following:

"Based on strong export growth, the German economy is recovering from three years of stagnation. Weak domestic demand is still weighing on activity although there are signs that investment is strengthening. Private consumption declined as consumers' confidence remained subdued and rising unemployment, tighter social security benefits, and accelerating consumer prices reduced disposable income growth. The general government deficit is likely to remain between 3½ and 4 per cent of GDP this year and next, not falling below 3 per cent before 2006."

According to the OECD economists, who were making their comments at the end of 2004, Germany was, at last, expected to experience an acceleration of growth in its **gross domestic product** ▶ **II.** (commonly known as **GDP**) in 2006. The table shows the stagnation of GDP in 2002 (+0.1%) and in 2003 (–0.1%), followed by an expected slight recovery in 2004 (+1.2%) and then by a slightly stronger one in 2005 (+1.4%). The two tenths of a percentage point difference between 1.2% and 1.4% may seem very small, but it must never be forgotten that national accounts variables are very often measured in billions. ▶ **III.** In the case of Germany, 1% of GDP amounts to roughly 22 billion euros, so that 0.1% is equivalent to 2.2 billion euros, corresponding to the total annual net earnings in 2003 of roughly 67 000 workers, a substantial number.

II. Definitions of terms appearing in bold are available in the glossary of this book.

III. In practice, most OECD countries technically compile their national accounts in millions, and thus many tables published appear in millions. But this is far from meaning that the data are accurate at the level of millions. It is wise to round these data to billions.

In this chapter, we begin by defining GDP, before turning to the other principal indicators used by the OECD economists: private consumption, gross fixed capital formation, GDP deflator, **household** saving ratio, and financial balance of **general government**. For all the national accounts data discussed in this chapter, we refer the reader to the OECD website for this book, or to the general OECD website under the heading "quarterly national accounts" or "annual national accounts". The quarterly national accounts are more pertinent for those who wish to have the most recent figures.

1. Defining GDP

GDP, gross domestic product, is the most frequently used indicator in the national accounts. It lies at the heart of the entire system of national accounts, and its definition is now internationally agreed upon (see Box 1 on "The reference manuals"). GDP combines in a single figure, and with no double counting, all the *output (*or *production)* carried out *by all the firms, non-profit institutions, government bodies and households* in a given country during a given period, regardless of the type of goods and services produced, provided that the production takes place within the country's economic territory. In most cases, it is calculated quarterly or annually, but it can also be calculated monthly.

However, measuring a country's total output is not a simple matter (see Section "Accuracy" and "Limitations and pitfalls" at the end of this chapter), and national accountants have therefore had to devise innovative methods of calculation.

The output of a single firm can be measured fairly easily. In the case of a firm making pasta, for example, it can be measured as tonnes of pasta made during the year, or, if we multiply the number of tonnes by the price of the pasta, by the amount of output valued in dollars (or in euros in the case of Germany, since this is the national currency). But we shall see that it makes little sense to add together the output measured in dollars from all firms to

Box 1. **The reference manuals**

The standards governing national accounts are enshrined in two international reference manuals: the "System of National Accounts 1993" (SNA 93), which is recognised globally, and the European version of this called the "European System of Accounts 1995" (ESA 95). The global manual (SNA 93) is co-signed by the five major international economic organisations: the United Nations, the International Monetary Fund, the OECD, the World Bank and the European Commission. The European manual is totally compatible with the global manual and includes additional useful details. It also has a more legally binding character because, according to European regulations, EU member countries are obligated to implement it. These manuals have contributed substantially to improving the international comparability of data, although further progress still has to be made in this endeavor (see Chapter 3). The current complete version of SNA 93 is available online: *http://unstats.un.org/unsd/sna1993/toctop.asp*. A new version is now being prepared and due to be published in 2008.

arrive at a macroeconomic figure. That is because the result of this calculation depends heavily on the way the firms are organised.

Take again the example of the pasta manufacturer and compare two different production scenarios in a given region. Suppose that in the first year there is only one firm, firm A, that makes both the pasta and the flour used to make the pasta. Its output amounts to 100 000 dollars, corresponding to 100 tonnes of pasta, with each tonne valued at 1 000 dollars. Now suppose that the following year, firm A is split into two, with firm A1 specialising in making flour and selling 30 000 dollars' worth to firm A2, which carries out the final production of pasta. Firm A2 makes the same quantity of pasta as in the first year, *i.e.* 100 tonnes, and at the same price, *i.e.* 1 000 dollars per ton.

Pasta industry

	Year 1	
	Firm A	
Output	$ 100 000	
	Year 2	
	Firm A1	Firm A2
Output	$ 30 000	$ 100 000

In the first year, the output in this region will be worth 100 000 dollars; in the second year, the value of total output could be the sum produced by firm A1, *i.e.* 30 000 dollars, and that of firm A2, *i.e.* 100 000 dollars, resulting in a total of 130 000 dollars. But it would clearly be absurd to use this total as our macroeconomic indicator of activity in the region. It shows an increase of 30% (130 000/100 000 = 1.30, often written as + 30%, or more simply 30%), when in fact no change at all took place at the strictly macroeconomic level.

The same quantity of pasta was produced at the same price. All that changed was the legal and commercial organisation of the firms.

The above discrepancy generated the national accountants' innovative idea of calculating the contribution of each firm not as its output, but as its **value added**. This expression is profound since it consists of measuring *the value* that the firm *adds* to that of the firms that supply its inputs. Let us consider the pasta example again. Compared with the situation in the first year, when there was only firm A, the value added by firm A2 is not equal to 100 000 dollars. That is because firm A2 buys 30 000 dollars' worth of flour, whereas previously it had made this flour itself and did not count this as output. Therefore, the national accounts system proposes calculating the value added of firm A2 as 100 000 – 30 000 dollars. In other words, the value of the firm's output minus the value of the products used to carry out its production during the period.

The products consumed in the production process during the period are known as **intermediate consumption**. By deducting their value from that of output, one eliminates the *double counting* that occurred earlier when summing of the output of firms A1 and A2. In the second year, the output of flour was in fact counted twice: once in the value of the output of firm A1 (30 000 dollars) and a second time in the value of the output of firm A2 (whose 100 000 dollars in output in fact includes the value of the flour bought and used in the production process).

If one applies this same reasoning to all firms, calculating for each its value added, it is then possible to add together the value added of each firm, *without double counting*. The result will be an indicator that is independent of the way firms are organised. This is illustrated in the following table, which includes the farm that produced the wheat from which the flour was made. For the sake of simplicity, let us assume the farmer uses no intermediate consumption; he obtains his wheat solely from his labour and machinery, without buying seeds or fertilisers. As can be seen from the following diagram, the total of the output of each unit changes, but the *sum of the value added of each unit* remains equal to 100 000 dollars, regardless of the pattern of organisation.

This is why GDP is defined as being equal to the sum of the value added of each firm, government institution and producing household in a given country: **GDP = Σ value added**. ▶ **IV.** Because each value added is itself equal to output minus intermediate consumption, the end result is: **GDP = Σ outputs – Σ intermediate consumptions**.

IV. To be more precise, one should say "GDP = Σ gross values added, plus taxes minus subsidies on products". See Table 5.

The composite formula for GDP (known as an "**aggregate**") constitutes a macroeconomic indicator of output that is independent of the pattern of organisation and avoids double counting. It provides a good illustration of the three essential rules followed by national accountants when they move from the microeconomy to the macroeconomy:

- avoid double counting;

Year 1		
	Farmer	Firm A
Input	Labour + machinery	Labour + machinery + wheat
Output	Wheat	Pasta
Output	$ 10 000	$ 100 000
Intermediate consumption	0	$ 10 000
Value added	$ 10 000	$ 90 000

Year 2			
	Farmer	Firm A1	Firm A2
Input	Labour + machinery	Labour + machinery + wheat	Labour + machinery + flour
Output	Wheat	Flour	Pasta
Output	$ 10 000	$ 30 000	$ 100 000
Intermediate consumption	0	$ 10 000	$ 30 000
Value added	$ 10 000	$ 20 000	$ 70 000s

- devise aggregates that are economically significant (*i.e.* whose value is independent of non-economic factors); and
- create indicators that are measurable in practice.

GDP *vs.* other aggregates

Why the bizarre title "gross domestic product," or GDP? It should be clear by now that "product" describes what one is trying to measure, *i.e.* the result of production. "Domestic" indicates that the output measured is produced within the economic territory of the country, or the group of countries, concerned. (It is in fact entirely possible to calculate GDP for a group of countries, such as that of the euro area.) "Gross" means the **consumption of fixed capital** is not deducted (see below).

"Domestic" is also in opposition to "national", as in **GNI** or **gross national income**, which is the current title of what was referred to as **GNP**, or **gross national product**, in previous systems of national accounts ("GNP" is still widely used out of habit). GDP measures the total *production* occurring within the territory, while GNI measures the total *income* (excluding capital gains and losses) of all economic agents residing within the territory (households, firms and government institutions).

To convert GDP into GNI, it is necessary to add the income received by resident units from abroad and deduct the income created by production in the country but transferred to units residing abroad. For example, the earnings of workers living in Germany but working in neighbouring parts of Switzerland or Luxembourg have to be added to the German GDP

to obtain its GNI. Conversely, the earnings of the seasonal or regular workers living in France or Poland and working across the border in Germany have to be deducted from the German GDP to obtain the German GNI.

For large countries like Germany, the difference between GDP and GNI is small (0.4%, as seen in the following table). But it is larger for a small country like Luxembourg, which pays out a substantial percentage of its GDP as workers' earnings and other so-called "primary income" to the "**rest of the world**" (which is the term used by national accounts to signify "all countries other than Luxembourg", in this case). Primary income includes interest paid on money invested in Luxembourg. Luxembourg also receives substantial primary income from abroad, including interest. In the final analysis, the difference between GDP and GNI is around –11.5% for Luxembourg. Ireland is in a comparable situation to Luxembourg, since it pays out substantial dividends to the parent companies of the American multinational firms that have set up there, partly, but not entirely, for tax reasons. The result is that Ireland's GNI is 16.2% lower than its GDP. While for these three countries GNI is lower than GDP, the opposite also happens – Switzerland is a case in point.

Table 2. **Reconciliation of GDP and GNI for Germany, Luxembourg and Ireland**

Millions of euros

Year 2003	Germany	Luxembourg	Ireland
Gross domestic product	2 128 200	23 956	134 786
+ primary income (including earnings) received from the rest of the world	+104 610	+52 972	+30 296
– primary income (including earnings) paid to the rest of the world	–118 630	–55 722	–52 139
= Gross national income	2 114 180	21 206	112 943
Difference between GDP and GNI (%)	–0.7	–11.5	–16.2

Source: OECD (2006), *National Accounts of OECD Countries: Volume I, Main Aggregates*, 1993-2004, 2006 Edition, OECD, Paris.

StatLink: *http://dx.doi.org/10.1787/783541142830*

A distinction is also made between GDP and **net domestic product (NDP)**. In order to produce goods and services ("the output") at least three factors are required: labour (the "labour force"), goods and services (intermediate consumption) and capital (machinery). These various factors represent the "inputs" in the production process.

In order to arrive at a genuine measurement of the *new wealth created during the period*, a deduction has to be made for the cost of using up capital (such as the "wear and

tear" on machinery). This is known as **consumption of fixed capital**. When this consumption is deducted, the result is **net value added**, and NDP is the sum of these net values added: NDP = Σ Net Values Added. Although less widely used than GDP, NDP is, in theory, a better measure of the wealth produced since it deducts the cost of wearing out the machinery and other capital assets used in production. For similar reasons, in theory, Net National Income is a better measure than GNI of the income created because Net National Income deducts the cost of using up capital assets. However, OECD economists tend to prefer GDP or GNI (over NDP and NNI) for two reasons. First, methods for calculating consumption of fixed capital are complex and tend to differ between countries, thus creating doubts about the comparability of results. Second, when ranking countries or analysing growth, the differences between GDP and NDP are small and do not change the conclusions.

2. The first fundamental equation: deriving GDP in volume

Let us go back to Table 1: "Main macroenomic variables", shown at the very beginning of the chapter. Comments from OECD economists (shown below the table) indicate that they are not interested in GDP growth as such, but in the growth of "real" GDP. ▶ **V.** What does this expression mean?

V. Economists and journalists have acquired the unfortunate habit of using the general term "growth" instead of specifying "growth in real GDP". A typical sentence is: "growth is 2%" instead of "growth in real GDP is 2%". This lack of precision sometimes results in bizarre terminology, such as "negative growth", which is an oxymoron; it would be better to say "a decrease of GDP in volume". Incidentally, national accountants prefer the term "GDP in volume" to "real GDP" because inflation is just as real as growth.

The A-B-C of macroeconomics consists of distinguishing what part of the change in national accounts aggregates at current prices stems from a change in the quantities produced and what part stems from a change in prices. Let us suppose, for example, that the output of pasta is worth 100 000 dollars in the first year and 110 000 dollars in the second. The macroeconomist will immediately want to know if this 10% growth (which may be described as "nominal" or "in value" or, better still, "at current prices") is due to an increase in the quantity of pasta or to an increase in its price. An increase in quantity is good news, while an increase in prices ("inflation") tends to be bad news. Keeping in mind the aim of separating the good growth (the quantities) from the bad growth (inflation), national accountants have developed sophisticated methods for separating out movements in GDP "at current prices" into two components: 1) an indicator of the change in quantity (the "real GDP" or, preferably, "**GDP in volume**"); and 2) an indicator of the change in prices, called the "**GDP deflator**". These methods are described in detail in Chapter 2.

Recall that the 100 000 dollars' worth of pasta production mentioned earlier equals 100 tonnes of pasta (the quantity) multiplied by 1 000 dollars (the price per tonne). In almost the same way, the index of the growth rate of GDP at current prices is exactly

equal to the index of the growth rate of GDP in volume multiplied by the index of the growth rate of the GDP deflator:

Fundamental equation (1)

[1 + the growth rate (divided by 100) of GDP at current prices] =
[1 + the growth rate (divided by 100) of GDP in volume] x
[1 + the growth rate (divided by 100) of the GDP deflator]

This is a fundamental equation in the national accounts, and the term "deflator" stems directly from it. This is because one can derive from this fundamental equation the following equation (with "/" standing for "divided by"):

[1 + (Growth rate of GDP in volume/100)] =
[1 + (Growth of GDP at current prices/100)] / [1+ (Growth of the GDP deflator/100)]

In this way, starting with GDP growth at current prices, one "deflates" (*i.e.* divides) this by the price indicator (the GDP deflator) to obtain the volume indicator (GDP volume). Conversely, in the previous version of the equation, GDP growth in volume was "inflated" by the price indicator in order to obtain GDP growth at current prices. Note that these equations showing the breakdown into volume and price movements apply not only to GDP but also to some of the other key variables in the national accounts, notably investment and consumption. Note also that this equation also applies to absolute levels. Thus, GDP in volume at absolute levels (*i.e.* in millions of dollars of the "base" year) is equal to GDP at current prices at absolute levels (*i.e.* in millions of dollars) divided by the implicit deflator, expressed as a price index divided by 100. When this operation is done, the base year for GDP in volume corresponds to the year for which the price index is conventionally equal to 100.

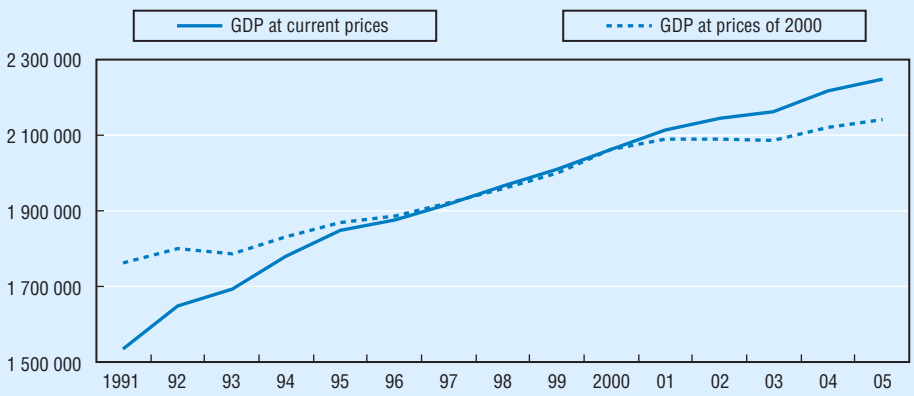
Macroeconomists pay very little attention to the evolution of GDP at current prices. It does not even appear in the main OECD table for Germany (see Table 1). In contrast, its two main components – real GDP and the GDP deflator – feature prominently in the table, one of them being used to measure growth and the other to measure inflation. GDP at current prices is, however, used as the denominator to standardise many important aggregates, such as the public deficit, the balance of exports and imports, national savings, etc. Ratios calculated as percentages of GDP, with both numerator and denominator usually expressed in current prices, are used to make international comparisons of variables that would otherwise depend on the size of the country.

Figure 1 illustrates for Germany the relationship between GDP at current prices, GDP in volume and the GDP deflator. Unlike the earlier OECD table, which shows growth rates, this chart contains "absolute amounts". In other words, the two aggregates – GDP at current prices and GDP in volume – are expressed in billions of euros.

It can be seen that German GDP at current prices was roughly 2 200 billion euros in 2004, while the German GDP in volume (*i.e.* at constant prices, shown in the chart as "GDP at prices of 2000") was around 2 100 billion euros for the same year. The GDP

Figure 1. **Gross domestic product, in value and in volume**

Germany, millions of euros



Source: OECD (2006), *National Accounts of OECD Countries: Volume I, Main Aggregates*, 1993-2004, 2006 Edition, OECD, Paris.
StatLink: *http://dx.doi.org/10.1787/142154615437*

deflator (inflation) cannot be calculated in billions of euros and therefore does not appear as a separate line on the chart.[2] However, the GDP deflator can be inferred as the gap between GDP in volume and GDP at current prices. The widening of this gap after the year 2000 indicates, in principle, the existence of inflation.[3] This is indeed the case, as can be seen from the fact that after 2000, GDP at current prices (the dark line) increases much faster than GDP in volume (the dotted line).

Notice that the two lines coincide in the year 2000. That is because in this chart, GDP in volume for all the years has been calculated using the prices prevalent in the year 2000. It is for this reason that the legend for the dotted line refers to GDP "at 2000 prices". By definition, the two aggregates – GDP at current prices and GDP in volume – have to be equal for this particular year (known as the "base year" or the "reference year"). It is interesting to note that in Table 1, economists had used aggregates in volume expressed at "1995 prices", while in the Figure 1, we have an aggregate at "2000 prices". The explanation is that national accountants regularly update the base year. When Table 1 was published, Germany was still using 1995 as its base year. When Figure 1 was produced, the base year had changed to 2000. We shall come back to these questions in Chapter 2, but what one should infer from this example is that, while it is very important whether the aggregate is in volume or not, the choice of the base year is less important, especially when applied to growth rates, which is what economists focus on.

Table 3 shows the variations in Germany's GDP deflator. It can be seen that the years 2000 to 2003 were characterised by fairly low inflation, which remained below 2%.

For comparison, the table also shows the annual variation in the consumer price index (CPI).[4] This index is another indicator of inflation that is better known and more frequently used than the GDP deflator, mainly because it is available monthly and relates to the aggregate that is of most interest to people, namely consumption. The GDP deflator, also called "the implicit GDP price index" or, simply "implicit GDP deflator", is on the one hand more general in scope than the CPI, since it also covers capital goods. But on the other hand, it is less general because it measures only domestic inflation, with increases in import prices not directly taken into account. Moreover, except for the very few countries that compile their national accounts each month, the GDP deflator is available only quarterly.

Table 3. **GDP deflator and consumer price index**

Germany, annual growth rates in percentage

	2002	2003	2004	2005	2006
GDP deflator	1.5	1.1	0.9	0.8	0.9
Consumer Price Index (HICP)	1.3	1.0	1.7	1.3	0.6

Source: OECD (2004), *OECD Economic Outlook,* December No. 76, Volume 2004, Issue 2, OECD, Paris.

StatLink: *http://dx.doi.org/10.1787/454532272722*

3. Defining demand: the role of investment and consumption

Let us return to Table 1 at the beginning of this chapter. The OECD economists had noted that the stagnation of GDP between 2002 and 2004 was due to weak domestic demand. Private consumption had declined but "*there [were] signs that investment [was] strengthening*".

The upturn in investment by firms and households can be seen in Table 1 by looking at the variable "gross capital formation", which had declined 6.3% in 2002, 2.2% in 2003 and 2.0% in 2004, but was expected to rebound by 0.6% in 2005, followed by a 3.4% increase in 2006. Like real GDP, this variable is shown in Table 1 "at 1995 prices", in other words, "in volume". For a macroeconomic aggregate, growth of more than 3% in volume is a good performance, even if China or Eastern European countries show even better performance. However, at the time of writing, this was still only a forecast waiting to be confirmed.

In the national accounts, investment, *i.e.* the purchase of machinery (including software) and buildings (offices, infrastructure, dwellings) and the constitution of stocks (inventories) is known as **gross capital formation (GCF)**. When stock-building (or "**changes in inventories**") is excluded, leaving only the purchases of buildings and machinery, the result is known as **gross fixed capital formation (GFCF)**. This variable measures total expenditures on products intended to be used for future production. These types of products are

collectively known as "fixed" capital.[5] Why not simply call them investment, as economists in fact often do? Because the word "investment" in everyday use applies as much to financial investment ("I invest in shares of the stock market") as it does to investment in machinery and buildings. So to make a clear distinction between the two applications, the national accountants use this somewhat peculiar terminology. Finally, the word "gross" indicates that the expenditure is measured without deducting the consumption of fixed capital (the wear and tear).

VI. Private consumption includes household consumption expenditure and also expenditure by "non-profit institutions serving households" (NPISHs). For the definition of "households" and "NPISHs", see Chapters 5 and 6.

The OECD economists were counting to some extent on "private consumption" to underpin demand in 2005 and 2006 in Germany. "Private consumption" is essentially what the national accountants call **household final consumption expenditure**. ▶ **VI.** This variable covers all purchases made by consumers: food, clothing, housing services (rents), energy, durable goods (notably cars), spending on health, on leisure and on miscellaneous services. Consumption expenditure does not, however, include households' purchases of dwellings, which are counted as household GFCF. The "consumption" variable is in contrast to "GFCF", with consumption intended to designate purchases that are consumed (in the sense of "used up" or "destroyed") during the period, while GFCF refers to purchases intended to be used for future production. However, this distinction is somewhat arbitrary, since purchases of cars by households (goods that are certainly intended to last) are classified as consumption (see Section "Limitations and pitfalls"). Why "final" consumption? It is in contrast to intermediate consumption, referred to earlier.

After GDP, household final consumption is undoubtedly the most important variable in the national accounts, representing in general around 60% of GDP. Indeed, the economic model providing the underlying framework for the national accounts is aimed at maximising this consumption, although today there is increasing concern that consumption should be sustainable in the longer term ("sustainable development").

4. Second fundamental equation: reconciling global output and demand

Final consumption and investment are two of the main components of "final" macroeconomic demand. The great attraction of the national accounts is that they constitute a "reconciled" model of the economy, balancing supply and demand. In fact, the second fundamental equation of the national accounts can be written as follows:

Fundamental equation (2)

GDP = Sum of final demand aggregates

In order to grasp the origin of this essential accounting equation, let us return to the example of the pasta industry.

Year 2			
Input	*labour + machinery*	*Labour + machinery + wheat*	*Labour + machinery + flour*
Output	*Wheat*	*Flour*	*Pasta*
Output	$ 10 000	$ 30 000	$ 100 000
Intermediate consumption	0	$ 10 000	$ 30 000
Value added	**$ 10 000**	**$ 20 000**	**$ 70 000**

Recall that GDP is equal to total value added or, equivalently, to total output minus total intermediate consumption. If one adds up the output, this means adding together the 10 000 dollars' worth of wheat, the 30 000 dollars' worth of flour and the 100 000 dollars' worth of pasta, resulting in a total of 140 000 dollars. If one now deducts the intermediate consumption, this means removing the 10 000 dollars' worth of wheat and the 30 000 dollars' worth of flour, leaving the 100 000 dollars' worth of pasta. If one simplifies matters by ignoring possible inventory accumulation in the factory and in the distribution circuit, the 100 000 dollars corresponds exactly to the purchases by households, in other words to household final consumption expenditure. This example shows that GDP, the sum of all values added, is equal, *by definition*, to final demand which, in this case, consists only of household demand for pasta.

Only a small amount of elaboration is needed to bring this example much closer to reality. If one introduces a firm that makes the machinery used to manufacture pasta, it can be verified that GDP equals exactly the consumption of pasta plus the purchase of the machinery used to make it, *i.e.* household consumption plus GCF. This opens the system up to GCF in addition to household consumption. In addition, if we assume that the economy is open to imports and that there is external demand reflected in exports, the equation is now supplemented with these additional flows:

GDP + Imports = Household consumption + GCF + Exports

The left-hand side of the equation consists of supply at the macroeconomic level, made up of domestic production (GDP) and external supply (imports). The right-hand side consists of final demand, broken down into domestic demand (household consumption and GCF) and external demand (exports). Macroeconomists often use this equation in another, mathematically equivalent form:

GDP = Household consumption + GCF + Net Exports

The left-hand side now consists solely of GDP, the principal indicator of economic activity. The right-hand side consists of the "final uses" that are the major components of domestic demand together with "net exports", which is simply the difference between

exports and imports. This accounting equation is fundamental in analyzing the economic condition. It provides a perfect illustration of the impact of demand on supply, according to Keynesian reasoning. It is no accident, in fact, that national accounting was developed during the 1940s, just after Keynes' major discoveries.

To be fully precise, the above equation has to be made slightly more complex, as shown in Table 4. The second fundamental equation in the national accounts can easily be verified by looking at this table. The addition of the rows in bold type (total final consumption, gross capital formation, external balance of goods and services) is equal to GDP, to the nearest million euros. This table introduces the concept of *final consumption of NPISHs* ("non-profit institutions serving households"), which accounts for only a tiny proportion of GDP (2.1%),[6] so that economists often add it to household consumption, thus creating the "private consumption" aggregate.

Table 4. **GDP: expenditure approach**

Germany, 2004[a]

Codes		Million euros	% of GDP
GDP	Gross domestic product	2 177 000	
P3	**Total final consumption**	**1 677 450**	
	of which:		
P31-S14	Household final consumption expenditure	1 225 870	56.3
P31-S15	Final consumption of NPISHs	44 900	2.1
P31-S13	General government final consumption expenditure	406 680	18.7
P5	**Gross capital formation**	**385 480**	
	of which:		
P51	Gross fixed capital formation	378 550	17.4
P52	Changes in inventories	6 930	
B11	**External balance of goods and services**	**114 070**	
	of which:		
P6	Exports	834 820	38.3
P7	Imports	720 750	33.1

a) This table shows the official SNA codes, which the reader can find on the website accompanying this book. These codes facilitate the understanding and manipulation of the data.

Source: OECD (2006), *National Accounts of OECD Countries: Volume I, Main Aggregates,* 1993-2004, 2006 Edition, OECD, Paris.

StatLink: *http://dx.doi.org/10.1787/502048533886*

A much more important introduction is that of *general government consumption* (18.7% of GDP), which exceeds GFCF (17.4%) but is substantially smaller than household consumption (56.3%). We shall return to the significance of this "general government consumption" variable in Chapter 5. The table also shows stock-building ("changes in inventories"). Although usually small in absolute terms, stock-building nevertheless plays an important role in the short term. In fact, inventories come into play as a "shock absorber" between production and final demand from households and firms. Note that unlike other variables, changes in inventories are not shown in macroeconomic tables as a percentage of GDP or as a growth rate, but as contributions to GDP growth (see Box 2 "Contributions to growth").

Short-term macroeconomic analysis relies heavily on the fundamental equation (2) but expressed in volume. The equation provides a mathematical explanation of GDP growth in terms of its various components. The value of national accounts is that the general macroeconomic concept of the influence of demand on supply in this way takes concrete form as an accounting equation.[7] This was the same equation underpinning the OECD economists' remark: "*Based on strong export growth, the German economy is recovering from three years of stagnation… [but] weak domestic demand is still weighing on activity…*" .

5. Third fundamental equation: reconciling global output and income

The previous section dealt with the first macroeconomic reconciliation, between global output (measured by the sum of the values added) and final demand. There is a second reconciliation, this time between global output and the income of economic agents. Any production activity generates income that is shared between the three "factors of production": labour, capital and intermediate consumption. Since value added is equal to output minus intermediate consumption, this second macroeconomic reconciliation can be written more simply by eliminating intermediate consumption and using value added as the global indicator of output. This means that there are now just two factors creating value added, namely labour and capital, which are compensated respectively by salaries and by the profits generated through production. It is these types of income that subsequently enable economic agents – households and firms – to consume and invest. For example, the 100 000 dollars of GDP of our now-familiar pasta industry are divided between the profits of the farmer, the two firms A1 and A2, and the salaries of the staff at firms A1 and A2.

In the end, our two macroeconomic reconciliations can be summarised in the following double fundamental equation:

Fundamental equation (3)

Box 2. **Contributions to growth**

In this box, the sign Δ will be used to express the difference between two years (or two quarters), so that ΔGDP_t signifies $GDP_t - GDP_{t-1}$, in other words the difference between GDP in year (quarter) t and GDP in year (quarter) t–1. Using this notation, $\Delta GDP_t/GDP_{t-1}$ will be equal to the GDP growth rate for year (or quarter) t compared with year (or quarter) t–1.

The starting point is a simplified volume equation: $GDP_t = C_t + I_t + X_t$ (where GDP = Final consumption + GFCF + Exports). For this simplified equation, we assume that there are no imports and no inventories. Mathematically, this results in the "difference" equation: $\Delta GDP_t = \Delta C_t + \Delta I_t + \Delta X_t$. Dividing both sides by GDP_{t-1} then results in equation (a): $\Delta GDP_t/GDP_{t-1} = \Delta C_t/GDP_{t-1} + \Delta I_t/GDP_{t-1} + \Delta X_t/GDP_{t-1}$.

Dividing and multiplying each term on the right-hand side by its value in t–1 and reorganising, one obtains equation (b): $\Delta GDP_t/GDP_{t-1} = (C_{t-1}/GDP_{t-1})(\Delta C_t/C_{t-1}) + (I_{t-1}/GDP_{t-1})(\Delta I_t/I_{t-1}) + (X_{t-1}/GDP_{t-1})(\Delta X_t/X_{t-1})$.

The verbal translation of this second equation is as follows: GDP growth breaks down exactly into the contribution of consumption plus the contribution of investment plus the contribution of exports. Each contribution is equal to the weight of the variable multiplied by the growth rate of the same variable in the current period. The weight of the variable is equal to its value in the previous period divided by the GDP of the previous period.

This breakdown of growth is widely used by macroeconomists. As can be seen, it is based on the second fundamental equation. Exercise 4, at the end of this chapter, will enable you to carry out a practical application. It involves the calculation of the contribution of changes in inventories and net exports. Since these variables can be positive or negative, it is necessary to use version (a) of the above equation to calculate their contributions to growth, and not version (b). In macroeconomic tables expressed in growth rates, changes in inventories and net exports are never shown in terms of percentage growth rates but solely as contributions to growth.

It is important to note that the calculation of contributions to growth basically relies on the accounting identity between GDP and final demand. Unfortunately, this mathematical link is no longer fully valid when using chain-linked volume measures because the results are not additive. Chapter 2 explains chain-linked volume accounts, their advantages and disadvantages, and shows how to compile contributions to growth in this new context.

Output (sum of the values added) =
Income (employees' salaries + company profits) =
Final demand (Consumption + GCF + Net exports)

We shall be evaluating the way in which the national accounts record income in the chapters dealing with the accounts of households, enterprises and government sectors. For the moment, let us note simply the following fundamental result: GDP is also equal to total income. This is the third fundamental equation. Note also that in the national accounts one talks of "**compensation of employees**" rather than salaries, because the cost of labour

includes social contributions paid by the employers, and that profits are known as **operating surplus** or, in some cases, as **mixed income**.[8] The operating surplus is described as "gross" when no deduction is made for the cost of the depreciation of capital, known as "consumption of fixed capital" in the national accounts. It is in fact preferable to analyse this surplus in "net" terms, in other words, after deducting consumption of fixed capital, as we shall see in Chapter 7.

Three ways to measure GDP

To summarise, there are three "approaches" to GDP: 1) the output approach (the sum of gross values added); 2) the final demand approach (consumption + investment + net exports); and 3) the income approach (compensation of employees + gross operating surplus + gross mixed income).[9]

Table 5 illustrates the equality of the three approaches for 1991 and 2004. The presentation is slightly more complicated than the double equation set out above, notably because of the introduction of **taxes net of subsidies**. For the time being, however, we will ignore this difficulty. The reader can verify that the "three" GDPs are exactly equal, at 1 502.2 billion euros in 1991 and 2 177.0 billion euros in 2004.[10] Comparison between the two years illustrates certain fundamental changes that have taken place in Germany since reunification. For example, the share of employee compensation in GDP fell slightly from 56.2% in 1991 to 52.0% in 2004. As Figure 2 shows, this reduction was fairly continuous.

Saving ratio and the general government financial balance

The principal macroeconomic indicators used by the OECD in Table 1 include two aggregates to which no reference has yet been made: the *household saving ratio* and the *general government financial balance*. They are shown again below.

Summary of recent results and forecasts

Germany

	2002	2003	2004	2005	2006
Household saving ratio[1]	10.5	10.7	11.1	11.1	10.8
General government financial balance[2]	–3.7	–3.8	–3.9	–3.5	–2.7

1. Net saving as % of net disposable income.

2. % of GDP.

Source: OECD (2004), *OECD Economic Outlook,* December No. 76, Volume 2004, Issue 2, OECD, Paris.

The **household saving ratio** is equal to **saving** by households expressed as a percentage of their **disposable income,**[11] both these variables being expressed at current prices, and represents the portion of household income that is not consumed. In 2004, the German household saving ratio was 11.1%. In other words, out of every

Table 5. **The three approaches to GDP**

Germany, billion euros

Codes[1]		1991	2004
GDP	Gross domestic product (output approach)	1 502.2	2 177.0
B1B	Value added at base-year prices	1 359.5	1 965.1
D21	+ taxes net of subsidies on the products	142.7	211.9
GDP	Gross domestic product (demand approach)	1 502.2	2 177.0
P3	Final consumption expenditure	1 140.9	1 677.5
P5	+ Gross capital formation	364.9	385.5
P6	+ Exports of goods and services	395.2	834.8
P7	– Imports of goods and services	398.7	720.8
GDP	Gross domestic product (income approach)	1 502.2	2 177.0
D1	Compensation of employees	844.0	1 133.1
B2 + B3	+ Gross operating surplus and gross mixed income	515.1	811.9
D2	+ Taxes net of subsidies on production and imports	143.1	232.1

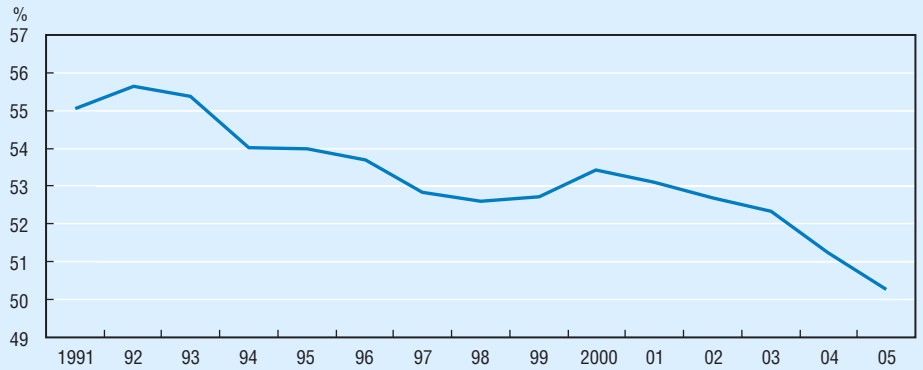
1. These are the official SNA codes

Source: OECD (2006), *National Accounts of OECD Countries: Volume I, Main Aggregates,* 1993-2004, 2006 Edition, OECD, Paris.

StatLink: *http://dx.doi.org/10.1787/400886162203*

Figure 2. **Employee compensation**

As a percentage of GDP, Germany



Source: OECD (2006), *National Accounts of OECD Countries: Volume I, Main Aggregates,* 1993-2004, 2006 Edition, OECD, Paris.

StatLink: *http://dx.doi.org/10.1787/706731537741*

thousand euros of household income (after tax), 111 euros were saved – for investment in housing, kept as cash or used to purchase financial products such as shares, bonds or life insurance. This variable is of great importance in macroeconomics, as its evolution determines the relationship between income and consumption. As can be seen from the table, the household saving ratio rose in 2002 and 2003, probably reflecting an increase in precautionary saving in response to the economic slowdown and the rising unemployment. This rise in the saving ratio contributed to a slowdown in consumption in Germany.

The *general government financial balance* corresponds to what is commonly referred to as the public surplus or deficit. ▶ **VII.** In the national accounts, it has the more complicated but fairly eloquent title "**net lending/net borrowing of general government**". This variable is equal to the difference between the sum of all general government revenues and the sum of general government expenditures, whether they be "current" (civil service salaries, interest on the public debt) or "capital" (investment). A negative difference shows that government has a borrowing requirement. That is because when revenue falls short of expenditure it will be necessary to find financing for the difference, mainly through borrowing and hence increasing the public debt. A positive difference shows the existence of a financing capacity. Since the 1991 unification, this has occurred only once (in 2000) in Germany.

VII. "General government" includes the central government, local authorities, social security and the various organisations depending on them. However, it does not cover enterprises such as railways, telephone companies or electricity firms, which are state-owned in some countries. We shall be returning to these classifications in Chapters 7 and 9.

It has become customary, especially for European countries since the signing of the Maastricht Treaty, to express "net lending/net borrowing of general government" as a percentage of GDP at current prices. This is one of the cases in which GDP at current prices is used in absolute terms as the denominator of a magnitude. This approach makes it possible to compare deficits between countries while automatically adjusting for the different size of their economies, and it underlies the "Maastricht criterion" stipulating that the public deficit must not exceed 3% of GDP. During the recent past, the financing requirement of the German government has been estimated by the OECD and the EU Commission to be systematically in excess of the critical 3% threshold. However, thanks to the support of France, which had also exceeded the 3% threshold, Germany avoided the threat of sanctions imposed by the European Commission, and this subsequently led to reform of the Stability and Growth Pact in 2005.

This completes our presentation of all the variables that appear in Table 1 "Main macroeconomic variables". Let us review the main points.

Notes

1. The "OECD Economic Outlook" contains the biannual macroeconomic forecasts for each OECD country and the OECD area as a whole. Each edition is numbered, with the edition for December 2004 being the 76th in the series.
2. When not shown as a growth rate, the GDP deflator is shown, like all price indices, as a series of dimensionless numbers whose change represents changes in prices, with the value in a given base year equal to 100.
3. Strictly speaking, one should use a logarithmic scale for the vertical axis.
4. In fact, what we have here is the European version of this index, known as the "Harmonised index of consumer prices" for Germany.
5. In contrast to "variable" capital, consisting of changes in inventories. These expressions go back to Karl Marx, who provided the far-distant inspiration for some of the ideas behind the national accounts.
6. Non-profit institutions may account for an appreciable part of GDP but most of them are recorded in a different sector in the national accounts. For example, mutual insurance institutions are included in the insurance sector. The NPISH sector covers only a small portion of all non-profit institutions, specifically those that are both financed and controlled by households.
7. Unfortunately, modern calculating methods mean that fundamental equation 2 no longer holds exactly in volume. We shall be returning to this problem of non-additivity in Chapter 2. For the time being, it is possible to ignore this difficulty.
8. "Mixed income" is the term applied to the gross operating surplus of "non-incorporated enterprises". Further light will be thrown on this point in Chapter 6.
9. One could also calculate the three approaches in terms of Net Domestic Product: the output approach (the sum of net values added); the final demand approach (consumption + net investment plus net exports); and the income approach (compensation of employees + net operating surplus + net mixed income).
10. This equation is not strictly verifiable for all countries, because of statistical discrepancies – notably in the case of the United States. See Chapters 10 and 12. Moreover, and this is a remark valid for the rest of the book (including exercices), the numbers shown in the tables are often rounded, so that totals do not match exactly the sum of their components. It may happen that there is a mistake, but more often it is simply that the sum of rounded numbers is not exactly equal to the rounding of the sum. This is the case in Table 5 with the value of 1 502.2 for the GDP (demand approach) for 1991. If one compiles P3 + P5 + P6 – P7, one obtains 1 502.3, and not 1 502.2. There is no mistake here. It is simply that the equality holds exactly when numbers are expressed in millions of euros, but does not when they are rounded into billions.
11. In this case, the saving and the disposable income are both net, meaning that consumption of fixed capital on dwellings and other capital goods owned by households is deducted from both aggregates. It is also possible to calculate the saving ratio on a gross basis.

Key points

- GDP is the sum of output within the country's territory minus the sum of intermediate consumption (increased by taxes net of subsidies on products).
- GDP is equal to the sum of the gross value added of each firm, non-profit institution, government body and household producing on the territory (increased by taxes net of subsidies on products).
- The change in GDP expressed in volume is the principal indicator of the change in macroeconomic activity.
- First fundamental equation: the index of the variation in GDP (or any other variable) at current prices breaks down precisely into the product of the index's variation in volume and the index's variation in prices, the latter being known as the "deflator" or the "implicit price index". The deflator can be used as a measure of inflation but differs from the consumer price index.
- Second fundamental equation: GDP is equal to the sum of the final demand aggregates.
- Third fundamental equation: GDP is equal to the sum of incomes (compensation of employees, gross operating surplus and gross mixed income of firms) increased by taxes net of subsidies on production.
- There are therefore three equivalent approaches to GDP: the output approach (sum of gross values added); the final demand approach (the sum of final consumption, GFCF, changes in inventories and net exports); and the income approach (sum of employee compensation, gross operating surplus and mixed income).

Going Further

How are these figures obtained?

This is probably the most difficult question to answer in a short textbook on national accounts, but we shall attempt to do so. The illustrations will be taken from the French case, the one the authors know best. However, it will not be possible to give the reader precise answers, since many different methods are used, as is only natural in drawing up accounts covering all economic agents, including in the French case some 25 million households.

Despite their name, the national accounts bear only a partial similarity to the accounts of a company. The general frameworks are similar but the data sources are entirely different. The company accountant has at his disposal a ledger showing to the last cent all the transactions carried out by the firm during the period. The national accountant obviously has nothing similar for all agents, especially for households. For this reason, it is not unreasonable to speak of "national accounts statistics". The addition of the word "statistics" implies acceptance of the notions of approximation, estimation and revision, things in which the national accountants excel but which are anathema to company accountants.

In France, the principal methods for calculating the figures in the national accounts are based on the exploitation of the extremely comprehensive administrative sources available. These consist, on the one hand, of the database built up by Insee (the French public statistics office) on the basis of companies' tax declarations and, on the other, on the centralised information gathered by the public accounting system regarding government institutions. The tax source provides Insee with regular and virtually exhaustive information on more than 2 million French firms. Because these firms are obliged to submit fairly complete accounts drawn up according to precise rules (the "plan comptable general" or general accounting framework), it is possible to use these accounts to calculate the value added of each individual firm (in the case of the large firms) or for groups of firms (in the case of the small ones) and then to add them up. This covers the private sector (referred to as the "market" sector in the national accounts). As regards the "non-market" sector (central government, local authorities and tens of thousands of government institutions) the centralisation of their accounts is carried out by the "Direction de la Comptabilité Publique" (Public Accounts Directorate) in the Finance Ministry, making it possible to calculate fairly precisely the value added for the non-market sector.

There is no such direct source in the case of households, whose consumption represents 60% of GDP. The national households' account is often calculated indirectly by using statistics from other sources. For example, the compensation of employees received by households is calculated by adding up compensation of employees paid out by firms, non-profit institutions and public units. Another common method is to obtain estimates of household aggregates "by difference". Take dividends for example. The dividends paid out by firms are known and the receipts of these dividends by firms and public bodies are also known. The balance of payments provides estimates of the dividends paid to, and received from, the rest of the world, from which one can compile the net dividends received from abroad (dividends received from abroad less dividends paid to other countries). There is a macroeconomic "accounting identity" which states that: "Dividends paid by firms = Dividends received by general government and firms + Net dividends from abroad + Dividends received by households". Turning this equation around gives: "Dividends received by households = Dividends paid by firms – Dividends received by firms and by general government – Net dividends received from abroad". Dividends received by households can therefore be calculated in this way as a "balance", *i.e.* what is left over. National accountants readily admit that it would be better to have direct sources concerning households, since calculation as a balance has the drawback of concentrating all measurement errors on the single household item. However, it is out of the question to ask households to draw up accounts, and it is therefore necessary to make the best of what is available.

As for the measurement of changes, the sources differ between quarterly accounts (these being the first to be published) or annual accounts. Quarterly accounts use monthly indicators to extrapolate the value of the national accounts variables. These indicators may not correspond perfectly to the definition used in the national accounts but are rapidly available. For example, use is made of the monthly turnover statistics that Insee obtains using Value-Added Tax (VAT) declarations in order to extrapolate, as a growth rate, the "output at current prices" variable. The figure for turnover is admittedly not exactly equal to output, since there may have been changes in inventories between the two periods concerned, but it is the only reasonably similar variable readily available. These "provisional" figures are subsequently revised when Insee has at its disposal (one year later) first-hand information regarding companies' accounts, the result being the so-called "semi-definitive" and, (two years later) the "definitive" accounts based on quasi exhaustive companies' accounts. This term is in fact an overstatement, because these "definitive" accounts can themselves later be revised when a new "base" year is introduced. We shall be returning to these issues in Chapter 10.

Accuracy of national accounts

National accounts could more appropriatly be called "national accounts statistics", so that users do not think they are as reliable as the business accounts of a company.

This is not true. In particular, while GDP for technical reasons is often expressed in millions of units of the national currency, users should be aware that they are very, very far from being accurate at the level of millions. National accounts' quality is highly dependent on the quality of the statistical system that exists in a given country. And in all countries, at varying degrees, this system does not cover all units, leaving a significant number of adjustments to be made. National accounts data are therefore approximations. It is not even possible to give a summary figure of the accuracy of the GDP. Indeed, national accounts, and in particular GDP, are not the result of a single big survey for which one might compile a confidence interval. They are the result of combining a complex mix of data from many sources, many of which require adjustment to put them into a national accounts database and which are further adjusted to improve coherence, often using non-scientific methods.

It is useful to know that GDP levels can be revised by 1 to 3 percentage points when new benchmark data are introduced (excluding conceptual changes). It can even happen, although rarely, that some countries modify their estimate of GDP by more than 15% (Italy in 1987, China in 2005). In international comparisons, it is important to note that the quality of national accounts is not the same in all countries (see Chapter 3 on international comparisons). Overall, the OECD Statistics Directorate believes it may be misleading to establish a strict order of ranking countries based on GDP per capita at purchasing power parity in cases when countries are clustered around a narrow range of outcomes of less than 5 percentage points.

Limitations and pitfalls to be avoided

The results provided by the national accounts are now such a familiar part of everyday economic information that there is a tendency to forget how extremely ambitious the original project was and still is. It is no accident that the two major creators of modern national accounts (Simon Kuznets of the United States and Richard Stone of the United Kingdom) were both awarded Nobel prizes for economics (Kuznets in 1971 and Stone in 1984). However, it must be realized that, in order to achieve the aim of summarising a country's entire economic activity in a set of internally consistent tables, national accounts have to accept significant approximations and adopt conventions that are sometimes arbitrary. It is necessary to be well aware of these conventions in order to avoid certain pitfalls. The following are a few of them.

Households' internal production (cooking, cleaning, running errands) is not covered in the national accounts. The principal reason is that inclusion would involve making very bold estimates of market value. This leads to the familiar criticism of GDP that if a man marries his cook the result is a reduction in GDP – perfectly true, but the problem is nevertheless marginal.

On the other hand, the national accounts include an estimate of the production of services in the form of the accommodation house owners provide for themselves. This is called "imputed rents" and is fairly difficult to estimate, since there is no observable transaction involved. However, if one were not to make this estimate, the change in GDP could be affected by a change in the proportion of households owning their own dwelling.

GDP includes the value added of general government. However, part of the production of general government ought in fact to be counted as the intermediate consumption of other branches. The national accounts assume that the services of general government are final uses. But in reality, firms also use the services of the police and other collective services provided by government. However, since there is no means of measuring this intermediate consumption, it is ignored, and GDP can therefore be said to be correspondingly overestimated.

The underground economy is badly measured in the national accounts. While, in principle, illicit activities should be included in GDP, this is impossible in practice. However, statistical offices make adjustments to take into account "underground" employment or tax fraud. In the case of France, for example, these adjustments increase GDP by around 4%.

Expenditure on research and development (R&D) is considered by some economists as investment. But in the national accounts, R&D is treated as current expenditure, in other words intermediate consumption, and therefore it is not included in GDP. However, it will probably be included in the future, when the new SNA 2008 is to be implemented.

On the other hand, the current version of the international system of national accounts (SNA 93) contains a recommendation that software be counted as GFCF (investment) and not as intermediate consumption (current expenditure), with the result that GDPs have been revised upwards, by between 1% and 4% depending on the country. This is because GFCF forms part of final demand and hence GDP, whereas intermediate consumption does not. Unfortunately, the practical application of this recommendation poses problems because most firms do not record their spending on software as investment, but as current expenditure.

Expenditure for the purchase of a house is recorded as GFCF, but expenditure by households on durable goods, cars in particular, is classified as consumption. And yet the services rendered by a car generally last a fairly long time, although obviously not as long as those of a house. However, it was necessary to draw a line somewhere between consumption and investment.

It may seem strange that GDP rises if there are more road accidents. This is partly because of greater activity by emergency services. On the contrary, one would intuitively like to see GDP diminishing in such circumstances. But this would be to confuse a measure of output (GDP) with a measure of welfare, which GDP is not. At most, GDP is a

measure of the contribution of production to welfare. There are a great number of other dimensions to welfare that GDP does not claim to measure.

We shall be returning to these conventions throughout this book. They may be open to criticism, but it must not be overlooked that they have been the subject of lengthy discussions by national accountants and were often chosen for sound practical reasons. For example, we shall see in Chapter 10 that indirect taxes can be said to be counted twice over in GDP, but this was the only solution that met other criteria.

While the national accounts system has the above major limitations, it should not be criticised out of misunderstanding about its objectives and definitions. For example, many people fail to understand why GDP does not fall following major natural catastrophes (or terrorist attacks). This is because they misunderstand the definition of GDP, which, as we have seen, measures output during a given period. People tend to confuse GDP with the country's economic wealth. Undoubtedly, major calamities destroy part of the economic wealth (buildings, houses, roads and infrastructure*), but they do not, *per se*, constitute negative production and so do not directly contribute to a decline in GDP. Destruction can indirectly affect production in a negative or positive way. When a factory is destroyed it ceases production, but it also has to be rebuilt and this constitutes production. For this reason, paradoxically, it is possible for a natural catastrophe to have a positive impact (in the purely mathematical sense of the word "positive") on GDP.

The above remarks should also make it clear to the reader that GDP does not represent "the national wealth", as is sometimes said. National wealth is the stock of the nation's assets, while GDP is a flow of output. At the very most, GDP might be considered a measure of the change in national wealth. But even this is incorrect, since GDP does not contain the whole of this change because it excludes capital gains and losses. It is therefore preferable to speak of GDP as total output during a specific period.

Shortcuts

The national accounts are complicated and at the same time have important implications. For example, a major part of the EU member countries' contributions to the budget of the European Commission depends directly on their relative levels of GDP (GNI to be more precise). When methods are modified or figures are revised, it is useful for national accountants to know rapidly whether these modifications have "an impact on GDP", in their jargon. In order to find a quick answer to this question, the national accounts experts use certain "shortcuts". For example, they use this rule based on final demand: GDP is modified only if an element of final demand is modified.

* Only a very few economic accounting systems, and not the national accounts, include an evaluation of human capital. This is why human losses do not appear in this list.

Consider the following example. In 2004, the accounts for the year 2002 are recalculated using the database consisting of comprehensive company accounts. It then turns out, on the basis of these more reliable statistics, that the output of temporary employment services (in other words, the hiring of manpower) was substantially underestimated in the initial estimates. This leads to an appreciable increase in total output. Does this have an impact on GDP? The immediate answer is, no! The hiring of manpower is not part of household consumption; it is not investment; it does not enter foreign trade (or only to a very small extent). It therefore does not enter into final demand and is instead intermediate consumption. As a consequence, GDP is unaffected. This does not mean, however, that no modification has taken place. For one thing, the distribution of value added between the various branches has changed, with that of services increasing and that of manufacturing decreasing because of the increase in its intermediate consumption. However, the modification in total output is neutralised by an increase in intermediate consumption. See Exercise 7 for a practical application of this point.

This final demand rule works well in numerous cases. Take two other examples, software and VAT (Value Added Tax, a type of sales tax). The new system of national accounts SNA 93 introduced new rules for the treatment of software. Instead of being recorded as intermediate consumption, purchases of software were to be regarded as GFCF. Does this modification have an impact on GDP? The answer is, yes, because GFCF forms part of final demand, which is modified accordingly. Suppose the government decides to finance its expenditure by reducing income tax (which is unpopular) by 5 billion euros and by correspondingly increasing VAT (a less painful tax). This modification appears to be neutral at the macroeconomic level, since the deficit is unchanged. But that is not actually the case. Because final demand includes household consumption, which is measured at market prices and includes VAT, GDP will be increased by 5 billion euros (everything else remaining equal). It can therefore be shown that the precise origin of government financing (direct or indirect taxes) can affect the Maastricht public deficit criterion without any change in the deficit itself. This is because the denominator of the ratio on which the criterion is based is GDP. The ratio can therefore change even if the numerator, in this case the deficit, is unchanged. The national accounts are full of surprises.

On the other hand, GDP does not change if two elements of final demand are adjusted in opposite directions. For example, if the estimate for exports is reduced, and if this reduction is offset by an increase in final consumption, GDP remains unchanged.

Exercises

Answers at www.SourceOECD.org/understandingnationalaccounts

Exercise 1: Observations and forecasts

Go to the OECD website (*www.oecd.org*), find the most recent issue of the "Economic Outlook" and update Table 1 at the beginning of this chapter using the most recent figures. Comment on the differences between the new figures and the old. What has happened to bring about the change in the figures? In which direction did the OECD forecasters err?

Exercise 2: A simple calculation of GDP

Consider four firms: firm A, a mining enterprise, extracts iron ore; firm B, a steelmaker, uses iron to make steel sheets and ingots; firm C, a carmaker, makes automobiles using steel; firm D, a manufacturer of machinery and robots, also uses steel. Calculate the production, intermediate consumption and values added in millions of euros based on the following assumptions.

Firm A extracts 50 000 tonnes of ore, at 200 euros per tonne, its purchases during the period are limited to the purchase of one machine made by firm D, costing 10 million euros. Firm B produces 15 000 tonnes of steel sheet at 3 000 euros per tonne, having bought and used all the ore produced by firm A. Firm C has manufactured 5 000 vehicles and sold them all to households for 15 000 euros each, having purchased 20 million euros' worth of steel sheet from firm B, but using only 18 million euros' worth in the manufacture of its cars. In addition, Firm C imported 5 000 engines from a foreign subsidiary, each being valued at 4 000 euros, and purchased domestically 2 robots made by firm D. Firm D sold one machine for 10 million euros and two robots, each worth 5 million euros, having used 10 million euros' worth of steel sheet from firm B.

Calculate the GDP of this economy. Calculate also the final demand of this economy, assuming that it has no exports. Verify that GDP is equal to final demand. (Remember that purchases of machinery are not intermediate consumption, but GFCF).

Exercise 3: Relationship between current prices, volume and deflator

The table below shows the series for GDP growth at current prices and the GDP deflator growth rate in the case of France. GDP at current prices in 1995 was equal to 1 181 849 million euros. Calculate the series for GDP first in current prices and then in volume in millions of "1995 euros". Show how to calculate the growth of GDP in volume directly from the initial growth rates, without using absolute amounts and without using division.

	1995	1996	1997	1998
Gross domestic product at current prices (% growth rate)	3.37	2.57	3.22	4.37
(2) GDP deflator (% growth rate)	1.67	1.45	1.29	0.94
(3) GDP at current prices (Meuros)	1 181 849			

Exercise 4: Calculation of contributions to growth

The following table shows the French quarterly national accounts for Q3 2002, in volume, in millions of 1 995 euros. Using the box earlier in the text, calculate to two decimal places the breakdown of growth in Q3 2002 for the contributions to GDP of domestic demand excluding inventories, changes in inventories and net exports. Comment.

Quarterly national accounts, at 1995 prices

Million euros

	Q2 2002	Q3 2002
Gross domestic product	347 951	348 697
Imports	94 327	94 562
Domestic demand excluding inventories	343 796	344 638
Changes in inventories (including acquisitions of valuables)	–2 817	–3 885
Exports	101 299	102 505

Exercise 5: The public deficit and the Maastricht criterion

On the basis of the following table, determine whether France met the public deficit criterion (not more than 3% of GDP) during the period in question.

Billion euros	1996	1997	1998	1999	2000
Total expenditure	672.5	687.7	703.2	723.9	747.7
Total revenue	623.1	649.7	668.4	701.9	728.7
Gross domestic product	1 212.2	1 251.2	1 305.9	1 355.1	1 416.9

Exercise 6: Synonyms

There are a number of terms that are used in national accounts, but economists use a wide range of synonyms for them. Choose from the list in italics below all the correct synonyms for: (A) GDP at current prices; (B) GDP in volume; (C) GDP deflator; (D) public deficit. Beware that not all of them are synonyms for any of the above.

1. GNP 2. GNI at current prices 3. Nominal GDP 4. Sum of output in euros 5. GDP in quantities 6. GDP in value 7. GDP at constant prices 8. Sum of gross values added in volume 9. Deflated Net Domestic Product 10. Real GDP 11. GDP price index 12. Consumer price index 13. GDP at 1995 prices 14. Sum of deflated incomes 15. "Growth" 16. Financing capacity of public enterprises 17. General government net borrowing.

Exercise 7: Impact of modifications to GDP

(Follow-up to Exercise 2 and application of the "Shortcuts" Section.) In Exercise 2, you calculated the GDP of this economy. Let us now suppose that we omitted to mention that firm C, the car maker, hired manpower from firm E, the temporary employment agency, for the sum of 15 million euros. Has the GDP of the economy been modified by this fresh information? Confirm your reply by reconstituting the table for the different industries, with comments.

Exercise 8: Deflators and growth

There has recently been controversy regarding the comparability of growth as measured in Europe and in the United States. More particularly, this concerns the deflator for firms' investment in computers, now a very large item of expenditure. The statistical methods used in the United States mean that the relevant deflator falls faster than in Europe (see box in section 3 of Chapter 2). First, show why for the same growth in purchases of computers at current prices, this difference in statistical method leads to a difference in GDP growth in volume. Go on to explain why this difference in GDP diminishes (to a vanishing point) if European countries produce few computers (or none).

Chapter 2

DISTINGUISHING BETWEEN VOLUME AND PRICE INCREASES

1. A word of caution: compare volumes
2. The volume/price breakdown applied to changes over time
3. The difficulties of aggregation
4. Volume indices and price indices
5. Constant prices
6. "Chained" accounts and the loss of additivity
7. Unpleasant practical consequences of chain linking
8. The special cases
9. And what about the price indices?

Everyone wants the maximum possible growth, although today that the preference is for "durable" or "sustainable" growth. The generic term "growth" indicates the overall change in the quantity of goods and services produced and made available to consumers and investors. The prime task of national accounts is to separate out, within the change in the observed monetary aggregates, the part of growth that stems from a change in quantities from the part that is due to a change in prices. An increase in quantities or, as the national accountants would say, in "volumes" is generally a good thing. A rise in prices, known as inflation, is not generally good news. A change in a monetary aggregate has accordingly very limited interest in the national accounts. However, it takes on economic significance when, to use the national accountants' jargon, one carries out its "volume/price breakdown". This is why this highly technical chapter comes first, even before those on output and final uses.

1. A word of caution: compare volumes

The following table, taken from the OECD national accounts database, compares GDP growth for the Netherlands, Mexico and Turkey between 1980 and 2003. Looking at this table, one might get the impression that Mexico and Turkey posted formidable growth compared with the Netherlands. Indeed, while the Netherlands is reported to have annual average growth of 4.6%, Mexico was bounding along at 37.1% and was itself outstripped by Turkey, with 62.3%. This conclusion, however, contains a huge trap. It only takes a glance at the second line of the table's title to see the words "current prices", meaning that the table is comparing amounts calculated at the average prices of each year. Consequently, these amounts reflect the full impact of the rise in prices, or the inflation occurring between 1980 and 2003. As it happens, Mexico and Turkey are two countries that continued to suffer from galloping inflation during this period, whereas the Netherlands experienced significantly lower inflation starting at the end of the 1980s.

Average annual % GDP growth, 1980-2003

Current prices

Netherlands	+4.6
Mexico	+37.1
Turkey	+62.3

The above international comparison is therefore not meaningful. It is necessary to separate the wheat (the growth, understood as being "in volume") from the chaff (the

inflation, or the change in prices). Table 1 shows the figures in volume, accompanied by those for the changes in prices. The performance of the Netherlands then turns out to be much better: its volume growth is only slightly lower than those of the other two countries, while its inflation is dramatically lower. ▶ I. The aim of this chapter is to explain in detail how statisticians set about distinguishing changes in volume from changes in prices, in other words arriving at what is known as the *volume/price breakdown*.

I. If, in addition, the volume growth is adjusted for population growth, the Netherlands performance comes out even better, with volume growth per head of 1.7% a year over the same period, compared with 0.5% for Mexico and 1.7% for Turkey.

But even if this second international comparison is correct, it still lacks something, since it provides information only on the changes and says nothing about the comparative *level of* each country's GDP. Filling this gap seems like a simple matter. One takes GDP at current prices and then makes two modifications. First, divide by the number of inhabitants to obtain GDP per head, so as to avoid comparing things that are not strictly comparable. Second, use the same currency. OECD practice is to express all amounts in United States dollars, but one could just as well have used the euro or the Mexican peso; the essential thing is to use one single unit of account. Table 2 shows the level of GDP per head for these three countries, expressed in US dollars. What does it tell us? That the inhabitants of the Netherlands have an annual average income well above those of the other two countries: if the figure for the Netherlands is conventionally equal to 100, that of Turkey is 10.7 and that of Mexico is 19.3. But are we comparing things that are genuinely comparable?

Table 1. **GDP, volume and price indices**

Average annual growth in percentage, 1980-2003

	Volume	Prices
Netherlands	+2.3	+2.3
Mexico	+2.4	+33.9
Turkey	+4.1	+60.0

Source: OECD (2006), *National Accounts of OECD Countries, Volume I, Main Aggregates, 1993-2004, 2006 Edition*, OECD, Paris.
StatLink: *http://dx.doi.org/10.1787/508232480000*

Table 2. **GDP per capita**

2003

	In US dollars	Netherlands = 100
Netherlands	31 602	100.0
Mexico	6 091	19.3
Turkey	3 385	10.7

Source: OECD(2006), *National Accounts of OECD Countries: Volume I, Main Aggregates, 1993-2004, 2006 Edition*, OECD, Paris.
StatLink: *http://dx.doi.org/10.1787/731223078504*

The answer is not really, since even when the figures are expressed in a common unit of account, they fail to obey our watchword of only comparing volumes. Prices of certain goods and services can be very different from one country to another. For example, the price of renting a 100 m^2 apartment may be 2 000 euros in Amsterdam (the Netherlands), while for the same money one can rent a 300 m^2 apartment in Istanbul (Turkey) or Mexico City. One therefore has to go further and eliminate differences in price levels so as to be able to compare solely the *volumes* producedin each country and not figures that are affected by differences in price levels. The OECD makes this adjustment by using "purchasing power parity". Table 3, based on this adjustment, provides the proper comparison for volume among the three countries. While it confirms that the standard of living in the Netherlands is much higher, it raises the levels of GDP per head for Turkey and Mexico. This international comparison of absolute levels in the national accounts uses what the statisticians describe as the *spatial volume/price breakdown.* This technique will be described in more detail in Chapter 3. The present chapter will focus on *temporal volume/price breakdown.*

Table 3. **GDP per capita using purchasing power parities**

2003

	In US dollars, adjusted for purchasing power parity	Netherlands = 100
Netherlands	30 317	100.0
Mexico	9 543	31.5
Turkey	6 937	22.9

Source: OECD(2006), *National Accounts of OECD Countries: Volume I, Main Aggregates, 1993-2004, 2006 Edition*, OECD, Paris.

StatLink: *http://dx.doi.org/10.1787/853524217471*

2. The volume/price breakdown applied to changes over time

To respect the watchword "compare volumes", it is necessary to calculate national accounts aggregates in volume. To do this, the first step is to take detailed statistics, product by product, each one expressed in volume. Then, in a second step, aggregate them, or calculate their total.

Generally speaking, the detailed statistics typically available to national accountants are of three types: *a)* statistics expressed in quantities, such as the number of tonnes of steel produced; *b)* statistics expressed in current prices (also called "in value"), such as figures taken from company accounts; and *c)* price indices, such as the numerous components of the household consumer price index (CPI). Statistics of type *a)* are used directly by national accountants to calculate the change in volume within the detailed classifications. The variation in the output volume of a specific type of steel, as measured in the national accounts, will then equal the variation in the tonnage produced of this steel.

If statistics expressed in quantities are not available, national accountants combine statistics of types *b)* and *c)* to obtain an indicator of volume. As we saw in the first fundamental equation in Chapter 1, if one divides the change in magnitude expressed in current prices (or "in value") by the change in the price of the corresponding products, one obtains a measure of the change in volume. This is what national accountants call "deflation". Exercise 1, at the end of this chapter, illustrates a very simple case of "deflation".

To calculate macroeconomic growth, national accountants use hundreds of statistical series that are either directly expressed in quantity or derived via this process of deflation. In the case of France – and the figures are probably similar in other countries – almost 85% (in terms of value added) of the detailed series of output in volume in the national accounts are derived from the deflation of a series at current prices by an appropriate price index. In order for the deflation approach to work well, it is necessary to have good figures for sales or corresponding monetary flows (at current prices) and suitable price indices. National statistical offices in the OECD countries construct indicators of this kind, the best-known being the indices of turnover, of consumer prices and producer prices. These indicators are essential for the national accounts, but to enumerate them would go beyond the scope of this textbook. In the remainder of this chapter, we shall deal only with the problem – quite difficult in itself – of how to combine (*i.e.* aggregate) these detailed statistics in volume.

3. The difficulties of aggregation

If we had a very simple economy that produced and consumed just one product, there would be no difficulty in measuring the macroeconomic growth in volume. One would simply have to calculate the number of tonnes (or, more generally, any physical units) of this single product. However, the economy is made up of a multitude of products, goods and services, very different from each other. How can one add these together in order to obtain a macroeconomic indicator? First, we need a common unit of measurement. One could, for example, add the physical units expressed in tonnes. But how meaningful would it be to add tonnes of apples to tonnes of clothes and to tonnes of battle tanks? The result might possibly be useful for the logistic management of an army on the move, but it obviously has little macroeconomic meaning. Is it even legitimate to add, one by one, all the cars produced in a country in order to create a macroeconomic indicator? Not really, since adding a small cheap car to a luxury car would give a false picture of the total output: a large car "counts" for more in economic terms than a small one. Therefore, we have a problem of "aggregation" that is fundamental to macroeconomic measurement.

The answer to this problem is fairly obvious to economists. It consists of relying on the price structure. Once products are expressed in monetary units, it becomes legitimate to add them together. Therefore, adding the number of small cars multiplied by their price to the number of luxury cars multiplied by their price will equal the total turnover of the carmakers, and it will also equal the total value of cars bought by households. These

aggregate figures, in which units are "weighted" by their prices, are additive and have a macroeconomic meaning. The relative price of products provides a good economic weighting system for physical quantities because it represents the relative cost of manufacturing the products and/or the relative utilities attributed to them by consumers. Clearly, prices are not always set by the relative costs or the relative utilities, and they might be influenced by monopolistic behaviour or by distortions due to taxation. Even so, broadly speaking, the structure of relative prices provides a valid weighting system.

To calculate volumes, national accountants therefore rely on the summation of physical units weighted by the prices of these units. This still leaves one problem, however. Since the aim is to measure the change in volume, one wants to compare several different periods. Unfortunately, prices vary at the same time as the physical quantities. It will therefore be necessary to "freeze" the variation in prices. To calculate the evolution in volume between two periods, national accountants compare the sum of the physical units in the first period, weighted by a given price structure, with the sum of the physical units in the second period, weighted by the *same* price structure. An example will make this easier to grasp.

Let us suppose that there are two types of cars, small cars, which we shall call "s" and large cars, which we shall call "l". We shall denote the number of units of the small cars by Qs and the number of units of the large cars by Q_l. We shall add to these variables a subscript t to signify that this is the value of the variable in period t. For example, $Q_{s,t}$ signifies the number of units of small cars produced (or purchased) in period t. P_s denotes the price of the small car and P_l that of the large. In order to calculate the evolution in volume between period t and period t', national accountants compare the amount $(Q_{s,t} . P_s) + (Q_{l,t} . P_l)$, which is the volume in period t, with the amount $(Q_{s,t'} . P_s) + (Q_{l,t'} . P_l)$, which is the volume in period t'. It can be seen that prices remain constant in this comparison, with P_s and P_l used for both periods. It is in fact possible to choose different price pairs: those of period t, those of period t', or a combination of the two. However, regardless of the choice, the pairing will be the same for the two periods. Hence the terminology used to describe this system of calculating volumes, namely *constant-price accounting*. Exercise 2, at the end of this chapter, provides an example of constant-price accounting.

The manipulation of volumes can produce certain surprises for those unfamiliar with the system. Let us suppose that the price of the large cars is twice that of the small ones. Let us also suppose that the carmaker produces exactly the same total number of cars (say, 100) in both years but that the proportion of the large cars rises from 50% to 80%. Let us calculate the variation in volume using the previous formula. This equals (80 x 2) + (20 x 1), which is the volume of cars produced in the second year, divided by (50 x 2) + (50 x 1), which is the volume of cars produced in the first. The result of this calculation is 1.2, signifying an increase of 20%. ▶ **II.** This means that, despite the fact that the total number of cars expressed in units has

II. This example shows that to measure the change in volume there is no need to know the absolute price of the small or large cars. All that matters is their relative pricing.

remained unchanged, the national accounts record a growth of 20%. Is this really a surprise? No, because the volume in the national accounts measures not the increase in the number of cars, but the utility derived by the consumers. This utility has indeed increased by 20% when measured using the yardstick of relative prices. This is not surprising, since the utility of a luxury car is greater than that of a small car. It is essential to fully understand the difference between an increase in quantities and an increase in volume in order to grasp the measurement of growth as recorded in the national accounts.

In particular, volume takes into account all kinds of differences in quality. For example, the national accounts do not add together tonnes of top-grade petrol and tonnes of second-grade petrol, since the two products are not entirely substitutes for each other, despite their similarity. The national accountants also consider the type of sales outlet involved (small local store or supermarket), since this is one of the characteristics of the product, and in principle will not add together two identical products distributed through different retailing circuits. The impact of taking into account these differences in quality is most striking in the case of computers (see Box 1). This case illustrates another essential difficulty of measuring volume and prices when new products are introduced into the market. In this case, constant-price accounting is an inadequate instrument, because it presupposes that all products existed in the first period of comparison, which, by definition, cannot be true for entirely new products (mobile telephones, for example, in the middle 1990s).

4. Volume indices and price indices

At this point, it is necessary to take a fairly long mathematical digression to explain the notions of volume index and price index so that the reader can fully understand how volume is measured in the national accounts. A **volume index** is a weighted average of the changes between two periods in the quantities of a given set of goods or services. Traditionally, these indices are given a standard value of 100 for a given period, although in this text the indices are implicitly standardised as 1, and not 100. This is of little importance, however, since both volume and price indices are numbers that can be interpreted only in terms of change. By convention, the time period used as the starting point will be denoted as being period 0 and the period being compared with it as period t. The two time periods can be consecutive or non-consecutive.

The ratios of the quantity or the price of a given product in period t to the quantity or the price of the same product in period 0, *i.e.* q_t/q_0 or p_t/p_o, are known as the quantity ratio and the price ratio, respectively. The quantity and price ratios are independent of the units in which the quantities and prices are measured. Most of the indices can be expressed in the form of weighted averages of these price or quantity ratios, or can be derived from them. The various formulae differ mainly in the weighting attached to the individual price or quantity ratios and in the particular type of mean used – arithmetic, geometric, harmonic, etc.

Box 1. **Measured in the national accounts, the volume of computers rises very sharply**

Let us suppose that in year A, 1 000 computers of type X were sold, having a power of P_x and a clock speed of V_x. Let us now suppose that in year A + 1, 1 000 computers were again sold, this time of type Y, having a power of P_y and a clock speed of V_y, for the same unit price. The spectacular advance in microprocessor technology means that P_y and V_y are considerably greater than P_x and V_x.

The national accounts are not going to say that the volume of computers is equal to the number of computers. Account will be taken of the quality of each computer and these qualities will be weighted by their prices. In most cases, however, the computer of type Y did not even exist in the previous period A so that no price is available to provide the weighting. The statisticians then carry out econometric (also known as "hedonic") studies of the relationship between the prices of computers and their key characteristics, such as their power and their speed, the purpose being to determine what value purchasers of computers put on improvements to each of these characteristics. Using these relationships, they estimate what the computer type Y would have cost in year A, had it existed. Let us suppose, for example, that the price of the new computer type Y is estimated to be 20% higher than that of the computer of type X in year A. This means that the price of Y has decreased by 20% since year A. It is a realistic hypothesis, as it is well known that PC prices fall very rapidly even when their power is increasing. The volume of computers in the national accounts for year A + 1 will therefore be calculated "at year A prices", *i.e.* at prices that are 20% higher than those of year A. The volume of computers as measured in the national accounts therefore rises much faster than the number of computers bought. It is indeed this phenomenon that explains why the national accounts now make use of chained accounts rather than constant-price accounts (see following boxes).

The same phenomenon would be observed in cars if the prices of Mercedes fell to become closer to those of Fiats. The public would buy Mercedes instead of Fiats, and the national accounts would record a sharp increase in volume, even though the number of cars sold remained unchanged. Unfortunately, this phenomenon does not occur in cars.

The two most commonly used indices are those of Laspeyres and Paasche, named after two 19th-century statisticians. Most national accounts systems (and in particular the European systems) use Laspeyres indices to calculate volumes and Paasche indices to calculate changes in prices. Both the Laspeyres and Paasche indices can be defined as weighted averages of price or quantity ratios, the weights being the values at current prices of goods or services in one or other of the two periods being compared.

Let $v_{ij} = p_{ij}\, q_{ij}$ be the value at current prices of product i in period j. The Laspeyres volume index (L_q) is a weighted average of the quantity ratios:

$$L_q = \sum_i v_{i0} \cdot \frac{q_{it}}{q_{i0}} \Big/ \sum_i v_{i0} \qquad (1)$$

The period providing the weights for the index is known as the "base" period. It typically (but not always) coincides with the "reference" period for which the index has a standardised value of 100. Since the summation always involves the same set of goods and services, it is possible to dispense with the subscript i in expressions of type (1). And since by definition v_j is equal to $p_j q_j$, it is also possible to replace it in (1) to obtain (2):

$$L_q = \frac{\sum p_0 q_t}{\sum p_0 q_0} \qquad (2)$$

Algebraically, expressions (1) and (2) are identical. This means that the change in volume at constant prices can be calculated in two ways with the same result: either as the average of the *changes* in quantity of the various products weighted by the values at current prices in the base year; or, as the amount of quantities in period t multiplied by the prices in the base year divided by the value at current prices in the base year. Exercise 3, at the end of this chapter, illustrates this result using the example given earlier of the small and large cars.

The Paasche price index can be defined in reciprocal fashion to the Laspeyres index, applying the values at current prices in period t as weights and using a harmonic mean of the price and ratio quantities instead of an arithmetic mean.

The Paasche price index P_p is defined as follows:

$$P_p = \frac{\sum v_t}{\sum v_t . \frac{p_0}{p_t}} = \frac{\sum p_t q_t}{\sum p_0 q_t} \qquad (3)$$

It will be seen from this formula that what we have is indeed a price index, since in this case it is the prices that vary and the quantities that remain fixed, in contrast to the volume indices we saw earlier. The Paasche index can be interpreted as the reciprocal of a Laspeyres index "turned backwards", in other words the inverse of a Laspeyres index for period 0, with period t as the base period. The reciprocity between the Laspeyres and Paasche indices leads to numerous symmetries that can be exploited in calculations.

In particular, the product of a Laspeyres *volume* index and the corresponding Paasche *price* index is equal to the change in the value, at current prices, of the goods or services between period 0 and t, *i.e.*:

$$L_q . P_p = \frac{\sum p_0 q_t}{\sum p_0 q_0} . \frac{\sum p_t q_t}{\sum p_0 q_t} = \frac{\sum v_t}{\sum v_0} \qquad (4)$$

Relationship (4) is fundamental in national accounts. Reading it from right to left, it shows that the variation of an aggregate at current prices is equal to the product of the volume index and the price index. It expresses mathematically what we called the "first fundamental equation" in Chapter 1. This equation is constantly exploited in national accounts. For

example, it is used to obtain indirectly the volume index by dividing the relative variation in values by the Paasche price index, in a method discussed earlier and known as "deflation":

$$L_q = \frac{\frac{\sum v_t}{\sum v_0}}{P_p} \tag{5}$$

Because it is generally easier, and less costly, to calculate price indices than volume indices, it is the usual practice in economic statistics to calculate volumes using deflation. This practice is constantly applied in national accounts (see Exercise 4).

5. Constant prices

Let us now consider a chronological series of Laspeyres volume indices, *i.e.*:

$$\frac{\sum p_0 q_0}{\sum p_0 q_0}, \frac{\sum p_0 q_1}{\sum p_0 q_0} \cdots \frac{\sum p_0 q_t}{\sum p_0 q_0} \tag{6}$$

If one multiplies all the items in the series by the common denominator $\Sigma p_0 q_0$, one obtains the so-called "constant-price" series, which we saw an example of earlier, in the case of the small and large cars:

$$\sum p_0 q_0, \sum p_0 q_1 \cdots \sum p_0 q_t \tag{7}$$

The relative movements of this series, from one period to another, are identical to those of the corresponding Laspeyres indices given by (6), since the two series differ only by a scalar equal to the first term of the second series. The term "constant prices" is justified by the fact that these aggregates use the price structure of a fixed period, in this case period 0.

This system of accounts at constant prices was widely used by national accountants since it has one very useful property, namely that the aggregates obtained are additive; in other words, it is legitimate to add or subtract "bits" of these accounts. For example, the volume of output for cars plus trucks is exactly equal to the volume of output of the two together. It will be seen later that this property of additivity is lost when this system is abandoned in favour of the more complicated volume indicators recommended in the current version of the international manual SNA 1993, and applied by nearly all OECD countries.

The units in which these accounts at constant prices are expressed nevertheless remain artificial. Given that what is involved is the multiplication of a dimensionless series (the series of indices in (6)) by a value in the current prices of the base year ($\Sigma p_0 q_0$), one might conclude that the result is a series expressed in the current monetary unit (billions of euros, example). However, since the prices are those of a past year and not current prices, the terminology "accounts in [base year] [monetary units]" is used – for example "in 1995 euros" for the euro area.* Although this terminology is widely used, it does have an inherent weakness: there are as many values of the "1995 euro" as there are transactions in the

national accounts. The series for household consumption in volume uses a value of the "1995 euro" equal to that deflated by the household consumer price indicator, whereas the series for GFCF uses a value deflated by the price index for GFCF, and so on.

When the national accounts are calculated at constant prices and the base period is 2000, one speaks of aggregates "at 2000 prices". But, increasingly, national accounts in volume are not strictly calculated at constant prices, but are obtained through a chaining process of constant prices for the previous year. It is this complication that we are now going to tackle below.

6. "Chained" accounts and the loss of additivity

Without going into the detailed problems of volume indices, it is relatively easy to explain why constant prices are not fully satisfactory for economic analysis. The choice of a fixed year means that one is using price structures that become more and more remote from the current structure, the further one moves away from the base year. Take the French case, for example. Prior to recent reforms of the French national accounts, the pattern of relative prices used in France for calculating changes in volume in the current year dated as far back as 18 years, because the French national accounts continued using the old "base 1980" until 1998. The increasing remoteness from the base period can clearly lead to measurement distortions. For example, the "quantities" of computers bought towards the end of the 1990s were rising steeply from year to year. It was hardly reasonable to weight these increases using the price structure of the year 1980, when the relative prices of computers were very high. On the contrary, it was precisely because the relative prices of computers fell sharply that the market for computers boomed. Weighting this increase using the old price structures led to changes in volume being overstated and the decrease in prices being understated in the more recent periods, thus distorting the historical picture (see Box 2).

It is for this reason that the national accounts use what is now called the "chain-linking method". The most widely used method involves three stages. In the first stage, the accounts are calculated at the prices of the previous period. The price structure of the previous period is valid for weighting the changes in quantity in the current period. In this way, one obtains the change in the aggregates between the preceding and the current period, referred to in the case of annual accounts, as "accounts at previous year's prices". Next, these changes are chained (*i.e.* multiplied each one with the subsequent one),

* It may seem somewhat absurd to talk of "1995 euros" when the euro was not yet in existence in that year. But this is a presentation commonly used in all time series in European national accounts. All series denominated in euros are expressed in euros even for periods before 1999, the year the euro was launched. Prior to 1999, pricing corresponds to the series in national currencies (the franc, for example, for France) divided by the exchange rate between the national currency and the euro on 1 January 1999 (6.55957/1 in the case of the franc).

Box 2. **An example of distortion due to the use of constant prices**

The use of constant prices taken from a distant base year leads to distortions in the evolution of volume, which become all the more significant when there are substantial variations in relative prices. The best-known example is that of computers. Using the case of France, let us calculate the volume of equipment GFCF, including traditional types of machinery as well as computers (excluding transport). Between 1980 and 2000, the price index for computers, with 1980 = 100, plummeted to 8.7. In the same period, the price index for other types of equipment rose, reaching 136.1 at the end of the period. Now let us compare the volume of the aggregate formed by computers plus the other types of equipment (see Figure 1). When one uses the constant prices of the year 1980, this combination shows a rise of 316% between the two dates. When one uses the constant prices of the previous year and then chains them, the figure is only 143%, and this is the correct figure. The first figure, based on the structure of relative prices in 1980 overstates the recent increases in investment in computers, increases that are explained in large part precisely because the relative prices of computers have fallen.

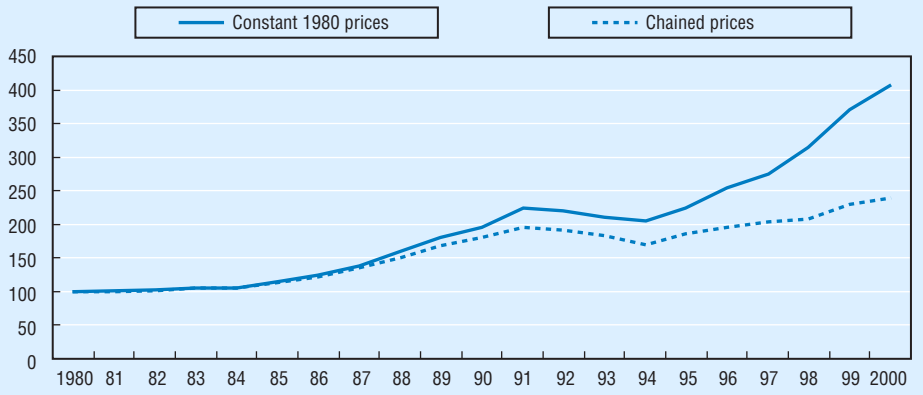
aggregate by aggregate. In this way, one obtains a series of growth rates each of which uses the price structure of the previous period. Finally, in order to provide volume series in levels, this series is multiplied by the value of the accounts at the current prices of the reference year, currently, for many countries, the year 2000 (but this changes every five years).

The advantage of the chain-linking method is that the previous period's price structure is more relevant than the price structure of a fixed period from further into the past. It can be shown, however, that in theory an even better measure of volume changes is obtained when the average price structure of the previous and current period is used. Chained volumes using the previous year's structure are usually described as "Laspeyres chains"; indices that use the average of the previous and the current period are described as "Fisher chains". For practical reasons, most countries use Laspeyres chains, although both Canada and the United States are now using Fisher chains (see Box 3). The differences between the two are generally very small. Fisher chains are well-suited to the method used to produce national accounts in the United States. But Fischer chains are considered too complicated by other countries in particular because they are entirely non additive. These countries indeed use production processes for their national accounts that require the use of accounting identities, thus necessitating at least additive accounts in prices of the previous year.

Presentation of the accounts based on Laspeyres chained volumes should be called "accounts at previous year's prices, chained, reference 2000". However, in practice, countries and economists continue to use the term "constant prices" or even describe the series as "in 2000 euros". (Exercise 5, at the end of this chapter, shows a chained-volume presentation in three stages.) The advantage of chained accounts compared with accounts at constant prices is that they avoid distortions arising from changes in the price structure over time and the overstatement discussed earlier. The United States, whose statistical office was the first to introduce chained accounts, has calculated that the use of a

Figure 1. **Difference between constant 1980 prices and chained prices**

France, computers and other materials



StatLink: *http://dx.doi.org/10.1787/458283387513*

US GDP between 2001 and 2003: instead of being 2.7% annually, US GDP growth would have been 4.3%, which seems unrealistic. The bulk of the difference comes, once more, from computers, whose large quantity increases in 2001-2003 would have been overestimated had the pricing of 1996 been used.

The great disadvantage of the chain-linking method is that additivity of the chain-linked volume levels is no longer possible. In particular, and this is of fundamental importance, it is no longer possible to derive one aggregate in volume by taking a combination (sum of or difference between) other aggregates also expressed in volume. For example, an item in a less detailed classification is not exactly equal to the sum of the corresponding items in a more detailed one. Exercise 6, at the end of this chapter, shows how it is possible to calculate with all due rigour an aggregate that is not supplied by a statistical institute. Box 5, "Contributions and additivity", shows that this problem also affects the calculation of contributions to growth.

7. Unpleasant practical consequences of chain linking

Chain linking has now been adopted by nearly all OECD countries, both for annual and quarterly accounts. As explained above, it has a substantial advantage compared to the use of pricing in a fixed year because it gives more accurate aggregate volume *growth rates*. It has, however, a major practical drawback because given the loss in additivity in chain-linked levels, users cannot easily make simple calculations based on accounting identities, a situation that makes the life of macroeconomists quite miserable. For example,

Box 3. **How volumes are obtained in the United States national accounts**

The volume series of the US national accounts (NIPAs, see Chapter 12) are obtained using chained Fisher volume indices that are currently "referenced" to year 2002 (in the United States, the term "reference" is preferred to the term "base"). These series are entitled "chained (2002) dollars", or sometimes, simply "chained dollars". The volume change of each quarter is compiled as a Fisher volume index, which is the geometric mean of a Laspeyres volume index and a Paasche volume index. This index number has the advantage of using price weights that are representative of both periods for which the change is calculated. These quarterly links are then chained (multiplied each one to the other) to form an index number time series, which is conventionally given the value of 100 for the reference year, currently the year 2002. This reference year changes every four or five years, on the occasion of a comprehensive revision of the NIPAs. This time series is then multiplied by the value at current prices of the given aggregate for the year 2002. Thus users obtain time series expressed in "billion dollars of year 2002". As with all chained series, these aggregates are not additive. Exercise 7, at the end of this chapter, illustrates how to manipulate forecasts of the US data, taking into account these complex chained series.

now that almost all OECD countries have adopted chain linking, it is not possible for a scrupulous economist to derive a simple total, such as the volume time series of total final demand based on the sum of internal plus external final demand. More generally, the second fundamental equation of Chapter 1, GDP = C + GCF + X – M, does not hold mathematically for volume time series expressed in chain-linked levels because there is an additional residual term between the two elements of this equality. This residual term has no economic interpretation.

In practice, economists regularly use totals, sub-totals or differences to make their economic models function. The less scrupulous (or those in a hurry) simply ignore the problem of non-additivity and continue to use these identities as if they were still valid. As the residual term is often small, this remains acceptable in many cases. However, it becomes imprudent when manipulating aggregates containing time series with significant differences in relative pricing over time, such as the pricing of computers compared to other machinery.

In the OECD, the main forecasting model of the Economics Department ("Interlink") functions, like others, with sums and differences. However, because the OECD wants to obtain exactly what OECD countries publish, it is obligated to be as scrupulous as possible. Thus, all totals, sub-totals or differences are obtained through a two-steps process that replicates almost exactly the chain-linking calculation made by the national accounts of each country. For example, total final demand, as in our example above, is not compiled directly but in two steps. First, one calculates separately internal demand and external demand in volume terms expressed *in prices of the preceding period.* This is obtained via the application of the growth rate of each of these variables to the current price level of the preceding year. Second, the sum of the two amounts will be calculated, and the

corresponding correct growth rate can be derived from it. This is a valid process because volumes expressed in *prices of the preceding year* are additive, at least for countries that use chained Laspeyres indices (most OECD countries). It is a very good approximation for the few countries that use Fisher indices (USA, Canada).

An interesting feature of this scrupulous approach is that it does not use any of the volume levels expressed in chain-linked terms. Only *growth rates and levels at current prices* are used. The question is therefore raised: why do statistical offices continue to publish volume time series in chained-linked levels? The answer seems to be that it is by force of habit, since volume time series in chain-linked levels are of no real use; they cannot be used in accounting identities, and they cannot be used to compile shares. They can only be used to derive growth rates. But then why not simply publish growth rates? This is typically why the US Bureau of Economic Analysis (BEA) recently stopped publishing some volume series expressed as chained-linked levels (*i.e.* "in 2002 dollars"), since these results were likely to be misinterpreted by users.

Last, but not least, we should consider the treatment of two variables that, by definition, have no meaning when expressed in terms of growth rates: the volume of changes in inventories and the volume of changes in net exports. These two variables appear in the main aggregate table for each OECD country in the *OECD Economic Outlook*. They are not expressed in terms of growth rates (as all other variables) but in terms of *contributions to GDP growth*. This is because growth rates have no meaning for these variables since they can be negative in one period and positive in the next, or conversely. These variables are therefore shown in terms of their contributions to GDP growth. If it is deemed essential to present them in terms of chain-linked *levels*, one simple solution is to calculate these levels so that they correspond to the level which would generate the exact contribution to growth as if the data were additive. ▶ **III.** This may seem complicated, but it is in fact simple and is illustrated in Exercise 7. See also the box "Going a step further: chain-linked levels of changes in inventories and other similar variables", at the end of this chapter.

Overall, the rationale of this subsection has been to show that because of the loss of additivity due to chain linking, volume series of national accounts expressed as chain-linked levels should be replaced by growth rates and/or contributions to growth. In particular, tables of contributions to growth are the only tables in volume that remain additive (when they are compiled correctly using additive accounts), regardless of whether Laspeyres or Fisher indices are used. Thus, it is more than probable that econometric models will increasingly use contributions to growth, and statistical offices should give these a high priority.

III. At present, many OECD countries calculate the level of chained net exports simply as the difference between chain-linked imports and chain-linked exports. But this approach does not result in an exact amount for the contribution of net exports to GDP.

8. The special cases

Since the national accounts cover the entire economy, they include certain products for which the notion of quantity is not always clear. The first case is that of unique products. For example, it is very difficult to calculate the change in volume for the output of shipyards because it is practically never the same ship that is built in successive years. Each ship is a unique product made up of a multitude of variable elements. In that case, how is one to make a comparison between the two years?

A second example is that of services provided between firms, such as software maintenance, or the services of business-law firms. How is the quantity of these services to be defined? One possibility is to rely on ancillary indicators like the number of hours worked. For example, the quantity of software maintenance could be regarded as equal to the number of hours worked by the computer experts. A very similar result could be obtained by using a volume indicator derived by deflating the turnover of the maintenance firms by an hourly wage index. This is what the national accountants often do in practice. However, the result is open to dispute. For one thing, this indicator implicitly assumes that there is no productivity gain affecting these software experts, which is not a realistic hypothesis. Fortunately, the measurement of the volume of these services does not affect GDP because they are intermediate consumption, and only elements contributing to final demand affect GDP (see the box "Shortcuts" in Chapter 1). How such services are measured nevertheless affects the allocation of GDP among sectors.

This difficulty crops up especially when measuring the volume of output for public services, which account for a very substantial part of GDP, since they include education and public health care, defence, law and order and general administration, all of which are elements of final demand. In these cases, there is simply no price available, since by definition this output is not offered for sale. In principle, therefore, one cannot even use deflation. Nevertheless, these services have a cost, consisting mainly of the pay received by the public employees, plus various types of intermediate consumption (for example, electricity, telecommunications, stationery and other office supplies) and also of consumption of fixed capital (wear and tear, for example, on school and hospital buildings). In order to calculate the volume of output, these costs will have to be deflated and then added together. For example, salaries can be deflated by a salary index for teachers, public hospital staff, military personnel and other government workers. As with the example of the software-service providers, this method implies constant productivity for these categories of personnel, which is disputable to say the least.

For this reason, many statistical offices are considering introducing direct indicators of volume, known as "output indicators". For example, in the case of education, the direct indicator might be the number of pupils successfully completing their schooling, although this indicator has the defect of considering all pupils as identical and assuming that the standard of examinations remains constant. In the case of public hospital services, the

indicator could be the number of patients weighted by the cost of treatment, with a careful distinction being made between the different types of treatment. This is a highly promising indicator.

Unfortunately, it is not easy to find suitable indicators for the output of other services rendered by general government. For example, how is one to assess the output of tax inspectors, firemen or members of the armed forces? For these branches of general government, one is reduced to deflating the costs – and in particular, deflating wages paid by an index of salaries. The usual practice is to deflate wages paid by the increase in basic wage rates agreed upon by the government and employee representatives. However, the government's wage bill will change not only because of these agreed upon changes to the basic wage but also because of changes in the composition of the labour force: if there are more staff in higher grades this year compared to last year, then the government wage bill will rise. In addition, in most countries the wage scales for government employees provide for regular increases based on years of service. Note that a deflation process that depends only on agreed upon changes to the **basic wage** will mean that increases in the government wage bill that arise either because more staff are being hired in senior grades or because the government labour force is ageing (and presumably becoming more productive) will count as increases in the volume of output. There is, however, not much empirical evidence to show that the output of government increases either because more high-grade civil servants are employed or because the average length of service is increasing. It may or may not be true, but this is the best that national accountants can do at the present time.

The volume/price breakdown is even more difficult in the case of industries such as banking and insurance. We shall see in Chapter 4 that national accountants measure the output of these activities "by difference": the difference between interest receipts and payments in the case of the banks, and the difference between insurance premiums received and insurance indemnities paid out in the case of insurance. This way of measuring current price output provides no clear indication of how to allocate output between volume and price. The definition of volume in the case of these services therefore remains somewhat vague, and countries use different methods.

Other special cases relate to trade and transport margins and to taxes on products. Many countries estimate their national accounts using what is known as a **supply and use balance** (see Chapter 10) using the following equation:

Production
+ Imports
+ Trade and transport margins
+ Taxes on products
– Subsidies on products
= Intermediate consumption
+ Final uses

In order to establish this equilibrium in volume, "taxes and subsidies in volume" and "margins in volume" must be estimated. These are strange concepts, to say the least, since they relate to prices and comprise no element of quantity.

The convention adopted is as follows: the volumes are seen as equal to the tax (or marginal tax rate) of the base year (which is the previous year when using chain-linked Laspeyres) applied to the tax base of the current year, itself valued in volume terms. For example, the Value Added Tax (VAT) at 2000 prices on the consumption of cars in year 2001 would equal the VAT rate for the year 2000 applied to the the consumption of cars in the year 2001, at 2000 prices. In the case of a basic product, the VAT in volume will therefore move exactly in line with the tax base in volume. Exactly the same will be true of the subsidies and margins in volume at the basic level (see box below for an exception). National accountants attempt to present taxes and margins in volume, and – stranger still – create price indices for taxes and margins, only because they want to provide the same presentation for accounts in volume as for accounts at current prices.

Box 4. **The case of margins on computers**

As explained above, the volume trade margin on sales of computers evolves, by definition, in line with the volume of computer purchases. However, in many countries national accountants measure the volume of computer purchases not by the number of computers sold, but, to simplify, by their calculating power, and this power evolves much more rapidly than the number of computers sold. Is it then reasonable to think that the trade margin in volume on computers evolves in line with computer purchases in volume? This is tantamount to saying that the volume of the commercial service produced by a seller of computers in a retail outlet (or on the Internet) is proportional to the power of the computer – not a very convincing assumption. In fact, the volume of the commercial service is the same for a powerful computer as for a not-so-powerful one. To this extent, it would seem that the national accounts overstate the volume of output of the commercial service in the case of computers. Fortunately, the amounts involved are small and do not affect GDP, only the distribution of value added between industry and trade.

9. And what about the price indices?

So far, not much has been said about price indices because we preferred to concentrate on the estimation of volumes. In practice, however, once one has defined the method for calculating volumes, the method for calculating price indices is also entirely determined, because of the first fundamental equation set out in Chapter 1: *the variation in a variable at current prices breaks down exactly into its variation in volume and its variation in price.* This principle has been confirmed by formula (4) in the present chapter. Since the variation in current prices is a simple and self-evident notion, and since we have defined above the variations in volume, there is nothing to add on price indices apart from saying that the variation in prices is obtained by dividing an index at current prices by a volume index. Remember that when volume is expressed via a Laspeyres index, the result of

this division is – by definition – a Paasche index (chained, in the case of chained accounts), and not a Laspeyres index.

In fact, macroeconomists make less use of price indices in the national accounts (which they often refer to as "implicit price indices" or "implicit deflators") than they do of volumes. In order to monitor inflation, they often prefer to use the Consumer Price Index (CPI) rather than the deflator of household consumption. For one thing, the CPI is available monthly and the household-consumption deflator quarterly at best. In the United States, however, macroeconomists are increasingly using the deflator of household consumption (called "Personal Consumption Expenditure (PCE) Implicit Price Index" – see Chapter 12). In the national accounts, the price index of household consumption is also widely used to calculate the **purchasing power of household gross disposable income** (see Chapter 6).

Box 5. **Contributions and additivity**

The problem of non-additivity in chained accounts also affects the calculation of contributions to growth. Let us recall first the method used for calculating a contribution. Using a simplified example, let us assume there are only two aggregates in GDP: household consumption, denoted by C_t, and exports, denoted by X_t. GDP_t will denote GDP in year t. Δ will be used to indicate the variation in an aggregate, so that ΔGDP will signify the variation of GDP between t and t+1. Using this notation, the GDP growth rate can be written as $\Delta GDP/GDP_t$.

Taking as starting point the equation $GDP_t = C_t + X_t$, it is possible to write $GDP_{t+1} - GDP_t = C_{t+1} - C_t + X_{t+1} - X_t$, which in turn gives, using our notations, $\Delta GDP = \Delta C + \Delta X$, or, dividing through by GDP_t: $\Delta GDP/GDP_t = \Delta C/GDP_t + \Delta X/GDP_t$. This last equation can also be rewritten if we multiply and divide both terms on the right-hand side by the same term (either C or X), as follows:

$$\Delta GDP/GDP_t = (C_t/GDP_t) \cdot (\Delta C/C_t) + (X_t/GDP_t) \cdot (\Delta X/X_t)$$

We therefore have the following result: the GDP growth rate is equal to the growth rate for consumption, weighted by the share of consumption in the previous year's GDP, plus the growth rate for exports weighted by the share of exports in the previous year's GDP. The two terms on the right-hand side of the equation are known as "contributions to the GDP growth rate" from consumption and exports, respectively. The sum of the two together is equal to the GDP growth rate.

As can be seen, the above result stems from the equation GDPt = Ct + Xt. With chain-linked data, however, this equation no longer strictly holds, since chain-linked accounts are not additive. Therefore, in order to calculate the precise contributions it is necessary to revert to additive accounts (see Exercise 6 at the end of this chapter), and then make the calculations. It is only by using additive accounts that contributions to growth can be correctly calculated. It is indeed this method that is used by statistical offices when they publish tables of contributions to growth. And it is important to note that the tables on contributions to growth published by statistical offices have not been calculated from the chained volume levels disseminated in traditional tables, but from additive accounts that are not easily available to users. One advantage of using the correct tables for contributions to growth is that because they are derived from additive accounts, they are themselves additive. Economists can therefore use these tables to calculate sums and differences in various types of contributions, including changes in inventories and net exports, as illustrated in Exercise 7.

Key Points

- To compare growth rates, use only the volume series and not the current price series.
- Detailed volume indices in the national accounts are commonly derived by deflating figures at current prices using the appropriate price indices.
- For aggregating quantities, national accountants use a fixed price structure. The volumes obtained in this way are known as constant-price accounts. The year corresponding to the fixed price structure is known as the base year.
- A change in volume is not the same thing as a change in quantity, since volume takes into account differences in quality and in the price levels of products.
- The Laspeyres volume index is the most widely used formula for calculating aggregated volume indices for national accounts.
- A Laspeyres volume index is a weighted average of changes in quantities, weighted by the values at current prices in the base year.
- The Paasche price index is the most widely used formula for calculating aggregated price indices in the national accounts.
- The product of the Laspeyres volume index and the Paasche price index is equal to the index of current prices.
- In most OECD countries, the national accounts in volume are calculated at the prices of the previous year, and then chained. The chained accounts use as weights the prices of the previous year and are therefore suitable for measuring changes in volume. Their drawback is their non-additivity.
- In North America, national accounts in volume also use the chaining principle, but they are based on Fisher volume and price indices. Their levels are not additive either.
- It is recommended that growth, and contributions to growth, figures be used to represent volume growth. Contributions to growth are additive when calculated from additive accounts.

Going further

Chain-linked levels of changes in inventories and other similar variables

The compilation of chain-linked changes in inventories is a problem. Let us use CI(Y) for the changes in inventories of year Y. In principle, if one applies the general formula for chain-linked volumes expressed at previous year prices, then CI(Y) chained linked = CI(Y – 1) chained linked x [CI(Y) in previous year's price/CI(Y – 1) at current prices].

But experience shows that the above multiplication formula in not applicable. Indeed, it results in extreme values for chain-linked changes in inventories (for reasons discussed at the end of this box). These extreme values cannot be used to calculate contributions to GDP growth, although, as explained in the main text, economists report volume changes in inventories exclusively as "contributions to growth of GDP". What is to be done? As discussed in the main text, one solution is to avoid presenting these series in terms of chain-linked levels. However, many statisticians still want to present these series in such a format. One proposal is interesting: it is based on the fact that the above multiplication formula is mathematically equivalent to the following additive formula:
CI(Y) chain-linked = CI(Y – 1) chained linked + [CI(Y) in previous year prices – CI(Y – 1) at current price]/Chained linked price index of CI(Y – 1).
However, this formula remains unusable because the chain-linked price index of CI(Y – 1) can also take extreme values.

A possibility is to substitute in the above additive formula a reasonable chain-linked price index instead the one liable to take extreme values. One could use the producer price index for the goods for which the changes in inventories are compiled, or, at the level of total changes in inventories, the chain-linked price index of GDP. It can be shown that if one uses the chain-linked price index for GDP, the formula ensures that the contribution to GDP obtained using the chain-linked CI(Y) is the correct one. Let us prove that.
The starting formula, which we shall call F, is:
CI(Y) chained linked = CI(Y – 1) chained linked + [CI(Y) in previous year prices – CI(Y – 1) at current price]/Price index of GDP(Y – 1).
This is equivalent to:
CI(Y) chained linked = CI(Y-1) chained linked + [CI(Y) in previous year prices – CI(Y-1) at current price]/[GDP(Y – 1) at current price/GDP(Y – 1) chained linked].
From this, one can derive:
[CI(Y) chained linked – CI(Y – 1) chained linked]/ GDP(Y – 1) chained linked
= [CI(Y) in previous year prices – CI(Y – 1) at current price]/[GDP(Y – 1) at current price.

The second term of the above equation is precisely the correct formula for calculating the contribution to GDP growth of CI(Y), because accounts in previous year prices are additive. Thus, formula F (applied as if the volume series were additive) ensures that the chain-linked series CI(Y) can be used to derive easily the correct contribution to growth. It is interesting to note that formula F shows that chain-linked changes in inventories can be compiled as the accumulation of change in inventory changes expressed in previous year prices, with each link being deflated by the chain-linked price index of GDP. This presentation of the chain-linked series of changes in inventories is intellectually satisfying because it presents a sensible relation between the change in the volume of changes in inventories expressed at previous year's prices and the change in inventory changes expressed in chain-linked volume level.

Formula F can be used as an alternative to the one illustrated in Exercise 7. In fact, the two are exactly equivalent and both give a time series from which one can derive the correct contribution to growth. Two final points before we close this box. First, formula F can be used for variables other than changes in inventories, for example net exports. Second, there are reasons why the first formula in this box gives extreme results. Mathematically, the reason is that because changes in inventories can be positive or negative and also very close to zero, the second term of the first equation can be massively positive or negative and extremely sensitive to minuscule revisions. Statistically, the reason is that chain linking is not suitable for measuring changes in inventories in volume terms. Indeed, it can be proven that chain linking should only be used when the price structure is changing regularly among the different goods or services being aggregated. A good example of this is the regular price decreases in computer prices relative to the pricing of other machinery. However, because inventories can comprise extremely heterogeneous goods from one period to another, they are not suitable for chain linking.

Exercises

Answers at www.SourceOECD.org/understandingnationalaccounts

Exercise 1. Using deflation to derive volume

Deflation is a fairly easy concept to apply. Let us suppose that a seller of lollipops has a turnover of € 1 200 in October. He raises the prices of his lollipops by 12% on 1 November. His turnover in November is € 1 680. Calculate via deflation the increase in lollipop sales volume. Check your result using quantities, given that the price of a lollipop before the increase was € 1.25. Now suppose that instead of increasing his price by 12% he in fact reduced it by 12%, while maintaining the same turnover. What will the increase in volume be now?

Exercise 2. Calculation of volume at various price levels

Let us take three products, A, B and C, with the following series of quantities and prices in each of three periods:

	Period 1		Period 2		Period 3	
	Quantity	Price	Quantity	Price	Quantity	Price
A	20	5	40	3	60	2
B	150	0.2	145	0.25	160	0.25
C	12	25	6	40	5	35

Calculate, for each period, the amount at current prices, the volume at constant period 1 prices, the volume at constant period 2 prices and the growth rates 2/1 and 3/2 of the aggregate constituted by the totality of the three products. Comment on the results.

Exercise 3. Calculation of a Laspeyres index and equivalence of calculation methods

The aim of this exercise is to show the equivalence between the two Laspeyres formulas presented in section 4 of this chapter. Formula (1) corresponds to the calculation of a weighted index; formula (2) corresponds to the calculation of growth rates for accounts at constant prices.

Take the case of two types of car, small and large, and the respective quantities sold in two periods at various prices, as shown in the following table. First, use Formula (2) to calculate the volume growth rate for all the cars at constant prices, and then use Formula (1), to calculate a weighted quantity index. Check against the theoretical result.

	Period 1		Period 2	
	Quantity	Price	Quantity	Price
Small cars	1 000	10.0	600	10.5
Large cars	200	20.0	600	21.0

Exercise 4. Calculation of Laspeyres indices, Paasche indices and deflation

Let us again consider the table used in Exercise 3. Calculate the index for the change in current prices. Calculate the Paasche price index. Obtain the Laspeyres volume index by deflation. Verify that the result is the same as that given by Exercise 3.

Exercise 5. Calculation of " chained accounts " (chained Laspeyres indices)

The following table gives a sequence of prices and quantities for three products A, B and C. The aim of this exercise is to calculate the volume for the aggregate consisting of the set A + B + C adopting the method used in the French national accounts known as "accounts at previous year's prices, chained, base 2000". For this purpose, use the structure of the table. First, calculate the account for A + B + C at current prices for all four years. Then calculate the volumes of the last three years at the previous years' prices. After that, calculate the growth rates of these volumes (watch out for the trap). Finally, chain these growth rates using the year 2000 as base. The result is the accounts at previous year's prices, chained, base 2000. Is there a difference between the growth rates in this series and the growth rates in volume at previous year's prices?

	1999		2000		2001		2002	
	Quantity	Price	Quantity	Price	Quantity	Price	Quantity	Price
A	20.00	5.00	40.00	4.00	60.00	2.00	90.00	1.00
B	150.00	0.20	145.00	0.25	160.00	0.25	175.00	0.30
C	12.00	25.00	6.00	40.00	5.00	40.00	7.00	36.00
Aggregate A +B +C	1999		2000		2001		2002	
Accounts at current prices								
Accounts at previous year's prices								
Growth rates								
Accounts at previous year's prices, chained, base 2000								
Accounts at 2000 prices								
Growth rates								

Next, compare these results with those obtained by using constant prices (*i.e.* "accounts at 2000 prices") to derive absolute levels and growth rates.

Exercise 6. Chained accounts and the loss of additivity

The table below is an old official one taken from the French national accounts, listing annual GDP in volume (at previous year's prices, chained, base 1995), imports and the sum of the two, known as total resources. Since this table was drawn up, the French national accounts have changed to base year 2000, but this makes no difference in this exercise, which could just as well use a 2000 base with figures for years 2004, 2005, 2006 and 2007.

For each of the aggregates below, the year-to-year changes are also shown, with a high degree of precision (three decimal places). Make your own calculation of total resources by summing GDP and imports and comparing the result with the total given by INSEE, the French statistical office. Do you conclude that INSEE is no longer capable of simple addition? If not, where does the problem lie? Try to reconstitute the INSEE growth rate for between 2002 and 2001, using the accounts at the previous year's prices and knowing that for 2001, at current prices, GDP = 1 475 584 and imports = 388 709. What are your conclusions?

(million 1995 euros)	1999	2000	2001	2002
Gross domestic product	1299 510	1348 801	1377 067	1393 687
Evolution (%)		*3.793*	*2.096*	*1.207*
Imports	321 320	368 220	372 984	375 228
Evolution (%)		*14.596*	*1.294*	*0.602*
Total resources	1620 958	1715 964	1748 974	1767 876
Evolution (%)		*5.861*	*1.924*	*1.081*

Source: INSEE, National Accounts.

Exercise 7. Volume changes in inventories: levels or contributions to GDP?

Let us suppose GDP is broken down as final demand minus changes in inventories (FDLI) and changes in inventories (I). Here are the accounts, expressed in prices of year 1:

At prices of year 1	Year 1	Year 2
FDLI	1 430	1 468
I	–43	69
GDP	1 387	1 537

Is it correct to say that the accounts of year 1 are in current prices? Is it correct to say that the accounts for year 2 are in volume terms? Why are these accounts additive (*e.g.* GDP = FDLI + I)? Calculate growth rates for year 2. Why is it not possible to calculate a growth rate for I? Calculate contributions to change in GDP for both FDLI and I.

Below are the volume accounts for year 3, expressed in prices of year 2. Calculate growth rates and contributions to GDP growth.

At prices of year 2	Year 2	Year 3
FDLI	1 490	1 363
I	123	148
GDP	1 613	1 511

How would the OECD economics department present a table including the three years? Explain why it is not possible, because of changes in inventories, to easily present the same table but with all variables expressed in chain-linked levels (*i.e.* where year 1 is the reference year). Propose a solution whereby the levels of changes in inventories correspond exactly to those from which one can derive exact contributions to change of GDP.

Exercise 8. The US approach: forecasting using chained accounts

As explained in this chapter, the disadvantage of using chain-linked volume accounts is their lack of additivity, a feature that makes the life of forecasters quite uncomfortable. This exercise, largely inspired from a paper by the US Bureau of Economic Analysis (BEA), proposes a simple way to derive a very good approximation of BEA's results, which are based on sophisticated chained Fisher indices. The simplified approach uses additive accounts at prices of the "previous quarter".

The table below shows the situation in the beginning of 2002. The first two columns are data published by the BEA at that time. The first column contains data at current prices ("current dollar level"). The second column contains data in "chained-dollar levels". The third column shows a set of forecasts by an unknown forecaster for the second quarter of 2002 (2002Q2). These forecasts are expressed as growth rates (of course in volume terms). *Important notice:* in US accounts, quarterly growth is traditionally expressed at "annual rates". This means that quarter-to-quarter growth is raised by an exponent of 4. For example, 2.0 is the forecast growth rate for durable goods in the second quarter. In fact, this means the quarter-to-quarter growth is equal to $(1-(1 + 0.02)^{1/4}) = +0.496\%$. Only these quarter-to-quarter growth rates should be applied to previous quarter's levels.

Using the data of the first three columns, calculate GDP growth for 2002Q2 at an annual rate in two ways. First, using the correct approach, apply quarter-to-quarter growth to each component of GDP in 2002Q1 *at current dollar levels* to obtain the fourth column, which will therefore be in billions of dollars at prices of 2002Q1, or "2002Q1 dollar levels". You can now sum up these numbers to obtain GDP, from which the annual growth rate can be compiled. Indeed, because they represent accounts at prices of the preceding period, they are additive. The result should be a forecasted GDP growth of 1.3% at an annual rate. Second, using an incorrect solution, apply quarter-to-quarter growth to each component of GDP in 2002Q1 at *chained-dollar levels*. Obtain

GDP growth using these data. Comment on the difference between the two ways to measure GDP. How can we then create a forecast for 2002Q3?

				Correct solution	Wrong solution
	2002Q1		2002Q2		
	Current dollar level	Chained dollar levels	**Forecasted growth at annual rate**	"2002Q1 dollars" levels	Chained dollars levels
Personal consumption expenditures					
Durable goods	859	976	**2.0**	**?**	**?**
Nondurable goods	2 085	1 921	**–0.1**	**?**	**?**
Services	4 230	3 642	**2.7**	**?**	**?**
Gross private domestic investment	1 559	1 551	**7.9**	**?**	**?**
Fixed investment					
Non residential					
Structures	288	243	**–17.6**	**?**	**?**
Equipment and software	838	954	**3.3**	**?**	**?**
Residential	463	384	**2.7**	**?**	**?**
Change in private inventories		–29		**?**	**?**
Net export of goods and services					
Exports					
Goods	680	738	**15.9**	**?**	**?**
Services	298	292	**10.7**	**?**	**?**
Imports					
Goods	1 102	1 250	**27.9**	**?**	**?**
Services	235	226	**–2.1**	**?**	**?**
Government consumption and investment					
Federal	672	598	**7.5**	**?**	**?**
State and local	1 267	1 099	**–1.7**	**?**	**?**
Gross domestic product before residual		9 343			**?**
Residual		20			**?**
Gross domestic product	10 313	9 363		**?**	**?**
Forecasted growth				**??**	**??**

Chapter 3

INTERNATIONAL COMPARISONS

1. Comparison of growth rates
2. Comparison of ratios: the example of the saving ratio
3. Comparison of levels of variables: GDP per head in volume
4. The spatial volume/price breakdown: purchasing power parities
5. Comparison of variables in absolute terms: household consumption

In Chapter 2, we examined the comparability of data over time for the national accounts *of a given country*. We saw how to separate changes in volume from changes in prices. In this chapter, we shall examine the comparison of data *among several countries*. Inter-country comparisons are more difficult for at least three reasons: 1) despite the efforts to achieve international synchronization, the statistical methods for estimating national accounts variables can vary from one country to another; 2) individual countries' institutions can be different; and (3) countries do not have the same currency and the same price levels.

Despite these difficulties, it is part of the OECD's mission to make international comparisons in order to be able to recommend economic policies that have been successful. These international comparisons take place at three levels. The first and simplest consists of comparing the growth rates of certain variables, such as GDP in volume. In this case, the fact that countries have different currencies or institutions is not of great concern. On the other hand, differences in the statistical methods used can have a negative effect on comparability, although the extent of this is limited, as we shall see in the first section of this chapter. The second level, to be examined in the second section, consists of the inter-country comparison of ratios, for example the household saving ratio. In this case, differences in statistical methods as well as in institutions can have a negative effect on comparisons, but the existence of different currencies still has no effect. The third level consists of comparing the absolute levels of certain national variables among several countries, such as the level of GDP per head or the level of household consumption per head. This final type of comparison is the most problematic. That is because on top of the two factors already mentioned, there is the added problem of currency conversion, which has to be solved by using "**purchasing power parities**". These allow for a *spatial* volume/price breakdown (*i.e.* a volume/price breakdown among countries for a given point in time rather than a breakdown between different time periods for a given country).

1. Comparison of growth rates

The *OECD Economic Outlook*, a bi-annual survey of OECD countries, opens with the following Table 1 comparing GDP growth rates in volume for three major countries or areas.

This table shows what appears to be a quasi-structural difference in growth for these three major areas. Between 1992 and 2001, average annual growth in the United States was 2.2 percentage points higher than Japanese annual average growth and 1.4 points higher than that of the euro area. A difference of as little as 1 point, if it were to persist

Table 1. **GDP annual volume growth rate in percentage**

	1992-2001 average	2002	2003	2004	2005	2006
USA	3.4	1.9	3.0	4.4	3.3	3.6
Japan	1.2	–0.3	2.5	4.0	2.1	2.3
Euro area*	2.0	0.9	0.6	1.8	1.9	2.5

* The euro area comprises the 12 European countries that have adopted the euro as their common currency.

Source: OECD (2004), *OECD Economic Outlook: December No. 76, Volume 2004, Issue 2,* OECD, Paris. The figures for 2004, 2005 and 2006 are forecasts.

StatLink: *http://dx.doi.org/10.1787/507518331806*

systematically in the future would result in the relative economic power of the United States rapidly becoming even more substantial than it already is. In the space of 10 years, the United States would outstrip the others by 1.0110, *i.e.* +10.5 points! This is an enormous difference and should be cause for serious reflection by the other countries.

The above international comparison is not completely convincing, however. There is in fact a fundamental difference between the United States, Europe and Japan that is often overlooked: the population of the United States is structurally more dynamic, rising by 1.2% a year, compared with only around 0.3% growth for the euro area and Japan. This means that it is better to compare growth in *GDP per inhabitant* rather than in GDP itself, if valid long-term conclusions are to be drawn. Using this adjusted yardstick, the difference between the growth rates per head was only 1.3 points in the case of Japan (instead of 2.2), and 0.4 points for the euro area (instead of 1.4 points).

The differences remain appreciable, nevertheless, especially for Japan. For the euro area, the difference appears to be smaller, but this masks more substantial disparities within the area itself, with dynamic countries like Spain, Finland and the Netherlands compensating for weaker growth in less dynamic countries like France, Italy and Germany. The OECD's principal concern at the present time is therefore to use these results to

Table 2. **Growth in real GDP and in real GDP per inhabitant**

1992-2001, average annual growth rate in percentage

	Real GDP	Difference *vis-à-vis* the USA	Real GDP per inhabitant	Difference *vis-à-vis* the USA
USA	3.4		2.2	
Japan	1.2	–2.2	0.9	–1.3
Euro Zone	2.0	–1.4	1.8	–0.4

Source: OECD (2005), *Annual National Accounts, Main aggregates, Volume I, 1992-2005, 2005 Edition,* OECD, Paris.

StatLink: *http://dx.doi.org/10.1787/878022557032*

persuade the less dynamic countries to carry out structural reform in order to re-stimulate their growth and reduce their unemployment rates.

But is this comparison of GDP growth rates statistically valid? It is to the extent that through the adoption of international manuals for statistics and national accounts, the international community of statisticians uses definitions and conventions common to all countries. In the case of national accounts, the basic reference manual is the 1993 version of the System of National Accounts (SNA 93). Its European counterpart, the 1995 version of the European System of Accounts (ESA 95) has the weight of European law that EU members are obligated to apply. ▶ I. This is therefore reassuring for users. As a first approximation, there is indeed a high degree of comparability between OECD countries in regard to definitions and conventions. This is what enables the OECD to compile an international database of national accounts that constitutes the best source for making inter-country comparisons (see Box 1, "The OECD's International Database").

I. See Box 1 "The reference manuals" in Chapter 1 and also Chapter 15.

Box 1. **The OECD's International Database**

The OECD collects from each of its member countries several thousand series relating to annual and quarterly national accounts. The annual series are more detailed. Access to this unique database takes two forms: hard-copy publications and electronic access. The hard-copy publications are as follows:

- Every quarter: Quarterly National Accounts
- Once a year (January): National Accounts: Volume I, Main Aggregates
- Once a year (July): National Accounts: Volumes IIa and IIb, Detailed Tables
- Once a year (November): National Accounts: Volume IIIa, Financial accounts – Flows; Volume IIIb: Financial Accounts – Stocks; Volume IV: General Government Accounts.

Access to the corresponding electronic data is through SourceOECD: *www.SourceOECD.org*. This online library is available free of charge to students at subscribing institutions.

The OECD also provides access to extracts from the national accounts database: *www.oecd.org/statistics/national-accounts*.

Extracts from the OECD's forecasting database are disseminated under the name of *OECD Economic Outlook Statistical Annex Tables*, published at the same time as the *OECD Economic Outlook*, *i.e.* twice a year (May and November for the text; July and January for the statistical tables): *www.oecd.org/eco/economic_outlook*.

Even so, is it possible to say that the comparability of national accounts data among countries is perfect? The answer is No. Although all countries refer to SNA 93, in practice they may not observe all the recommendations in the manual, they may use different statistical methods and the quality of their statistical systems varies. Moreover, the United

States constitutes a special case because even though its statistical system is of high quality and adheres to the substance of the recommendations in SNA 93, its presentation of the national accounts tables is different from that of other countries. This explains why this book contains a special chapter on the United States (Chapter 12).

It would be pretentious to claim to know all the sources of non-comparability between countries, despite the numerous contacts between statisticians at the international level. However, a recent OECD study has listed several significant factors liable to affect the international comparability of GDP growth in volume between Europe, Japan and the United States. Some of these are set to disappear, but four have still not yet been completely resolved.

First, there is the treatment of spending on weapons systems (tanks, fighter-bombers, warships), which is recorded as investment in the United States but as current expenditure in the other countries. The result is to raise "statistically" the level of United States GDP by around 0.6%. That is because investment generates consumption of fixed capital, which is included in the estimation of the value added of government, and thus in GDP. However, the study showed that the impact of this difference on the GDP growth rate was minimal (0.03% per year). ▶ II.

II. This difference should disappear in the 2010s, since the new SNA (planned for 2008) has opted for the method applied in the United States.

Second, the study pointed out that spending on software is treated as investment expenditure in the national accounts, whereas in company accounts it is normally treated as current expenditure. This situation has led the US national accountants to make estimates that are independent of software spending as recorded in company accounts, resulting in high recorded levels of investment in software. The other countries, by contrast, have been recording much lower levels of investment spending, in line with the figures in company accounts. Since investment spending is included in GDP and current expenditure is excluded, the level of United States GDP is accordingly "statistically" higher by around 1% to 2%. Here again, however, the impact on the growth rate remained limited, at around 0.1% per year.

Third, the study noted differences in the deflator used for purchases of computers. The United States uses the so-called "hedonic" method (see Chapter 2) to estimate the evolution in the price of computers. In the US national accounts, this has led to a sharp decline in the estimated price index for computers, amounting to roughly 10% per year. Most other countries had not yet adopted the same method. The result of using a steeply falling price index as the deflator is a strongly rising volume index. Many people have therefore concluded that United States growth is overstated in relation to European or Japanese growth. However, the OECD study showed that the impact of this difference in statistical methodology on GDP growth in volume is not as great as one might think, since only computers produced in the national territory are affected, and European countries are importers of computers rather than producers. All in all, the impact on GDP growth of this

difference in statistical methodology is also estimated to be around 0.1% per year and should gradually disappear with the introduction of hedonic indices in all countries.

Fourth, the study raised the difficult question of the measurement of services, especially non-market services like education and healthcare. In addition to the OECD study, a recent United Kingdom study has drawn attention to the difference results obtained depending on whether the volume of output of education or healthcare is derived from "inputs" or "outputs" (see Box 2, "The Atkinson Report"). In the case of the United Kingdom, the difference could have an impact of 0.25% on annual GDP growth, given the importance of these sectors. In fact, some countries use the "input" method and others the "output" method. This difference is therefore capable of generating a substantial degree of international non-comparability, but it is not possible at the present time to evaluate the impact of this difference in the method of calculating output in volume between the United States, Europe and Japan.

Box 2. **The Atkinson Report**

Amid vivid political debate, the Atkinson report was commissioned by the UK National Statistician in December 2003 to review the changes introduced by the UK Office of National Statistics (ONS) to measure the output of government. The revised estimates showed falling productivity trends in government within the current UK national accounts. The ONS had progressively abandoned "input" methods (described in Chapter 2) and developed direct measures of output (more than most other OECD countries). The output methods were accused of underestimating growth. This independent report confirmed that the approach taken by the ONS was correct but made 54 recommendations on how to improve the measurement of public services, which in the UK, like in other OECD countries, account for about one fifth of total GDP.

The report showed that the method used to measure the volume of government output can make a considerable difference to the recorded growth rate of the economy. The UK growth rate 1995-2003 would have been about one-quarter per cent a year higher if the old input method had been used, and this would have halved the gap between the UK and the USA, which does not use output measures. Here are the two key points of the report:

The traditional Output = Input convention, which the ONS has rightly abandoned in recent years, does not capture the complex workings of the public sector, and the UK should not return to using this convention.

Direct measures of output should be used. For the sake of public accountability, an intrinsic case can be made for seeking to measure what is achieved by spending on public services. One cannot simply assume that outputs equal inputs in such a major part of the economy. Failing to measure the output would be to miss the essential connection between public services and private economic growth. Measurement of government output, should, as far as is possible, follow methodology parallel to that appropriate for the private sector.

The full report is available on the website of the ONS.

Taking as a starting point what is known and approximately measurable, the OECD concluded that the impact of measurement differences on growth rates of GDP in volume was most probably less than 0.3% per year during the period under review. Therefore, if the United States annual growth rate exceeds those of other countries by less than 0.3 point, the difference is not considered significant. On the other hand, if the difference is greater than 0.3 points, solid conclusions can be drawn. As we have seen, United States growth, at least in the 1990s, was significantly higher than that of other countries. There are therefore good reasons for the other countries to ask themselves probing questions regarding their growth gap *vis-à-vis* the United States.

2. Comparison of ratios: the example of the saving ratio

The household saving ratio is one of the key variables in the national accounts (see Chapter 1). It equals saving divided by disposable income (and multiplied by 100 ▶ III.), and it represents the allocation of income between consumption and saving, an essential item of information in economic analysis. It turns out that the saving ratio is very significantly lower in the United States and in other countries like Australia (where it is even negative), than in Germany or Italy. Japan is estimated to be somewhere between the two extremes.

III. In calculating the saving ratio, the "net adjustment to the equity of pension schemes (D8)" should be added to the disposable income in the denominator of the ratio (see Chapter 6).

Table 3. **Household saving ratio in percentage**

Net saving, unless otherwise indicated

	2000	2001	2002	2003
Australia	2.9	0.8	–2.9	–3.2
Finland	0.2	–0.2	0.3	0.9
Germany	9.7	10.2	10.5	10.7
Italy	9.1	10.1	10.4	10.6
Japan	9.5	6.5	6.3	
United Kingdom*	5.0	6.5	5.3	5.8
United States	2.4	1.8	2.1	1.4

* For the United Kingdom, the gross saving ratio.

Source: *National Accounts of OECD Countries, Volume I, Main Aggregates, 1993-2004*, 2006 Edition.

StatLink: *http://dx.doi.org/10.1787/734511327772*

Table 3 shows that US households, on average, hardly save at all, allocating almost their entire incomes to consumption. Only 1.4% of net disposable income was saved in 2003. This demonstrates, on the one hand, the strong confidence in the future shown by

US households and, on the other, their lack of concern regarding the financing of their country's investment. In fact, it is not US households that finance this investment but foreign investors who, having confidence in the US economy, continue to buy large amounts of US Treasury bonds. Some people worry about the dramatic impact on the world economy that could result from erosion of foreign investor confidence, while others think that this imbalance will gradually be reabsorbed without producing a crisis. One should note that the dramatic fall of the saving ratio in the US masks the fact that the potential wealth of households has been increasing given the impressive price increase of dwellings in the recent period. This automatic "saving" is not captured by the saving ratio, which excludes holding gains. Note that this self-confidence is not confined to North America, but is shared also by countries such as Australia or Finland, both of which have posted firm economic growth in recent years.

In contrast, it is striking to note the very different behaviour of German and Italian households, who save more than 10% of their net incomes. Many economists, in the OECD and elsewhere, are trying to find explanations for such wide differences among countries that are basically quite similar. Some economists believe households in Germany and Italy lack confidence in the ability of their economy to guarantee them a job and a good pension. But other possible explanations have also been put forward, and one of these is based purely on statistics. It is in fact possible to wonder whether differences in statistical methodology or purely institutional differences might explain these wide differences in the saving ratio. On this point, too, the OECD has carried out several studies, including one published quite recently that lists several sources of non-comparability.

The first source of non-comparability relates to the calculation of the saving ratio, which can be calculated in two different ways: 1) the "net" approach deducts households' consumption of fixed capital (CFC) from both the numerator (saving, denoted as S) and also from the denominator (disposable income, denoted as DI); or 2) the "gross" approach, in which the consumption of fixed capital is not deducted from neither the numerator nor the denominator. The first approach gives a "net" saving ratio equal to: (S – CFC)/(DI – CFC); the second gives a "gross" ratio: S/DI. The first result is mathematically lower than the second. Table 3 above shows "net" ratios except for the United Kingdom.

While many countries publish "net" ratios, which are preferred by the OECD, the United Kingdom and some others have opted for the "gross" saving ratio. There are reasons for preferring a gross ratio. First, it corresponds more closely to the observed financial flows, whereas the net ratio is artificial in that it incorporates an imputed flow, *i.e.* the consumption of fixed capital. Second, it is probable that net ratios are less comparable between countries than gross ratios because of the differing methods used to calculate the consumption of fixed capital. In all cases, however, one must avoid improper comparison of a gross ratio with a net ratio. This is nevertheless the error that might be made by looking at Table 3, since in that table (as indicated in the footnote), the ratio for the United Kingdom is gross while for the other countries it is net.

Table 4 below rectifies this error by showing net ratios for all countries, including the United Kingdom. As can be seen from this corrected table, saving behaviour in the United Kingdom turns out in to be comparable to that of the United States, and not, as Table 3 incorrectly indicated, somewhere between that of the United States and Germany. The lesson here is that when presented with international comparisons it is necessary to look closely at all the footnotes in order to avoid errors.

Table 4. **Household net saving ratios in percentage**

	2000	2001	2002	2003
Australia	2.9	0.8	–2.9	–3.2
Finland	0.2	–0.2	0.3	0.9
Germany	9.7	10.2	10.5	10.7
Italy	9.1	10.1	10.4	10.6
Japan	9.5	6.5	6.3	
United Kingdom	0.5	2.0	0.4	1.1
United States	2.4	1.8	2.1	1.4

Source: National Accounts of OECD Countries, Volume I, Main Aggregates, 1993-2004, 2006 Edition.

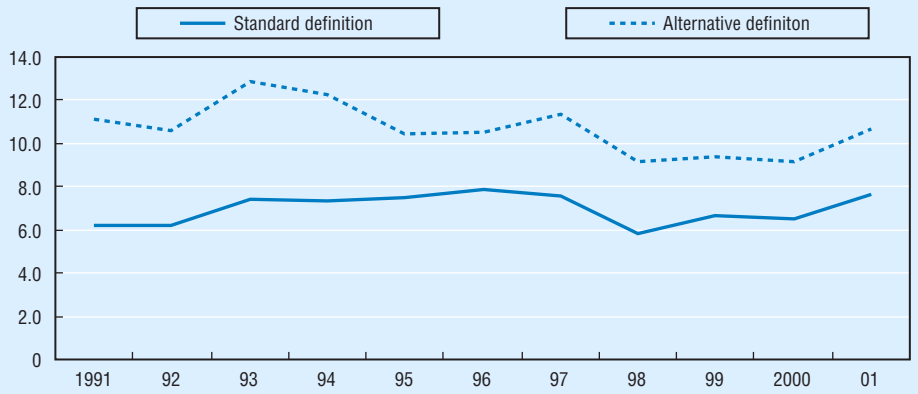
StatLink: *http://dx.doi.org/10.1787/337551341040*

A strictly comparable definition of the saving ratio is clearly a necessary condition for grasping differences between countries, but it is not a sufficient one. Relatively minor institutional differences can result in significantly different measures of saving. One example is the financing of retirement pensions. For the sake of simplicity, let us consider two cases: financing retirement pensions on a pay-as-you-go basis and on a capitalisation basis. In pay-as-you-go, the contributions of today's workers pay for the pensions of today's retirees. In the capitalization approach, the contributions by today's workers go into a fund that belongs to them and out of which their pensions will be paid in the future. In the first case, the national accounts record the contributions as deductions from the income of working households and pension benefits as additions to the income of retired households. In the second case, the contributions are saving (by today's workers), and the pensions paid are "dis-saving" (or "negative" saving) by pensioners.

For historical and cultural reasons, certain countries (continental Europe, Japan) prefer the pay-as-you-go systems, whereas in others capitalisation systems predominate. The saving ratio calculated by national accountants will therefore differ depending on the institutional approach used to account for pension financing. It is therefore interesting to see to what extent this explains the observed differences in saving ratios. The OECD has made such a calculation for the euro area and the United States. In this alternative calculation, it is assumed that all systems are pay-as-you-go. The following chart shows the result of this calculation. The continuous line shows the difference between the saving ratio

Figure 1. **Household saving rates**

Difference Euro zone – USA



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in the euro area and in the United States according to the "standard" definition in the national accounts. The result is a European saving ratio that is systematically greater, by around seven percentage points, than that of the United States. The dotted line shows the results using an alternative definition of the saving ratio in which the capitalisation systems (used in the United States) are treated as being pay-as-you-go systems. It can be seen that the difference *vis-à-vis* the United States is even larger than with the standard definition, amounting to almost 12 points near the beginning of the period to 10 at the end.

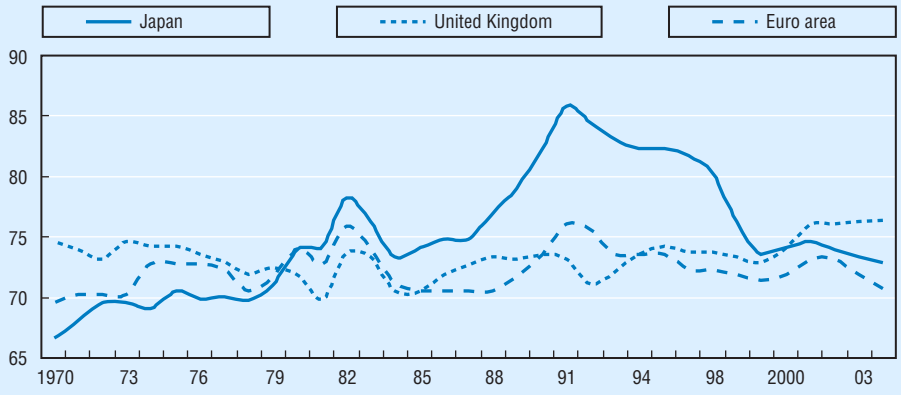
The conclusion to be drawn from the chart is that saving behaviour is even more different between the countries of the euro area and the United States than previously thought. The OECD has carried out other calculations of the same type to explain this wide difference in saving behaviour. For example, studies were carried out to see whether differences in the definition of consumption, in the respective shares of direct and indirect taxes or in the degrees of possession of durable goods could be explanations. So far, all these calculations have tended to confirm that there is indeed a fundamental difference in behaviour and not a statistical aberration. This is a reassuring conclusion in a way, but it illustrates the fact that in making international comparisons it is necessary to examine all possibilities of statistical non-comparability before drawing conclusions.

3. Comparison of levels of variables: GDP per head in volume

The Figure 2 below is very simple but telling. It shows the evolution in the volume levels of GDP per head for Japan, the euro area and the United Kingdom relative to the United

Figure 2. **Real GDP per head relative to the United States**

Indices, based on 2000 PPPs and 2000 prices (USA = 100)



Source: OECD (2006), *National Accounts of OECD Countries, Main Aggregates, 1970-2004, 2006 Edition,* OECD, Paris.
StatLink: *http://dx.doi.org/10.1787/888324203845*

States, which has been set to equal 100. The chart shows that GDP per capita in Japan and the euro area, as well as the UK, is between 70% to 80% of GDP per capita in the USA. It also reveals that around 1980 the relative levels of GDP per head for Japan, the euro area and the UK were roughly equal at 72.5% of the United States level. What happened in the 25 following years?

Between 1980 and 1994, Japan's economic growth was much faster than that of the United States, and, as a consequence, its GDP per head tended to approach that of the United States. However, its relative level peaked in 1991, at roughly 85%. From then on, Japan suffered a period of severe "deflation" (economic stagnation and falling prices) and lost in 10 years what it had gained *vis-à-vis* the United States in the previous 10. Therefore, between 1980 and 2003 Japan gained only 2.5 percentage points in relation to the United States.

Prior to 1980, the euro area had also shown some relative growth compared with the United States, and this had raised hopes of convergence at some point. But the euro area also started to stagnate by comparison between 1980 and 1994 and then to show a relative decline. In relation to the United States, the euro area's level of GDP per head for 2003 was 2.5 percentage points below what it had been in 1980. This was caused mainly by the large continental countries (Germany, France, and Italy) and not the smaller ones. Results for the United Kingdom, which is not part of the euro area, shows that this dismal picture is not true of all European countries. On the contrary, the United Kingdom, which had shown a relative decline in the 1970s, rebounded strongly in the early 1980s and has gained 2.5 percentage points in relative terms over the past 25 years.

Box 3. **GDP and the measurement of welfare***

Criticisms are often voiced concerning the shortcomings of GDP per head as a measure of welfare, as more or less implied by international comparisons of GDP per head. In a way, these criticisms are justified. GDP per head is not a measure of economic and social "welfare". It is not even a measure of wealth. It is merely an overall measure of the production of goods and services. However, it should not be forgotten that this production is itself an important dimension of welfare. We are all consumers of goods and services, and we are all glad to have more of both. Strong GDP growth also goes along with a decline in unemployment. However, it is indisputable that there are dimensions of welfare that are not reflected in GDP, such as choice of leisure activities, social inequality, security of goods and persons, and quality of the environment. It is therefore reasonable to raise probing questions as to how best to guide economic development so that it serves human development and welfare.

How can these alternative factors be considered? Official statisticians (in national statistical offices) are inclined to tell users that instead of trying to say everything via a single indicator, such as GDP, they might consider using a set of indicators that enable them to make inter-country comparisons for some or all these factors, with GDP merely one of the indicators. This is in fact what the OECD does.

However, some economists (mainly in universities) advocate the construction of a single indicator, a sort of super-GDP, covering not only the production of goods and services but also social and environmental factors. This indicator, for example, would show a decline given deterioration in the environment, an increase in violence or a widening of socio-economic inequalities. It would then be a simple matter to rank countries according to their success at all these levels. Some organisations have created an index of this type, an example being the United Nations' "human development index", which has three components: standard of living, level of education and health standard. Many economists have also proposed indicators of this kind.

But the problem with a "super-GDP" indicator is that it is not clear how to combine social and environmental dimensions with the production of goods and services. In other words, what "prices" can be used to weight the environment or social inequalities, in relation to the production of milk or machinery? The weights being proposed remain fairly arbitrary, and this diminishes the credibility of such indices. In fact, it can be shown that varying the weights for the hard-to-quantify factors leads to a substantial change in country rankings. Therefore, until a genuine consensus is reached regarding the method of calculation, there is little chance that a super-GDP index will be calculated by official statisticians.

* Readers interested in alternative measures of well-being should read the recent OECD Economics Department Working Paper: *Alternative Measures of Well-Being, http://dx.doi.org/10.1787/832614168015.*

The above chart gives a striking picture of the evolution in the relative economic situations of the euro area, Japan and the UK. The OECD has concluded that the convergence of GDP per head between the United States and other OECD countries, which had been a feature of the postwar period, has come to a halt. It has therefore been sounding the alarm that large-scale structural reforms are needed in the leading European countries

and in Japan in order to prevent further widening of the gulf between a thriving United States economy and lagging economies elsewhere in the OECD. This conclusion may be open to discussion (see Box 3, "GDP and the measurement of welfare"), but it is based on data that cannot be ignored.

In purely statistical terms, Figure 2 is an ingenious comparison of absolute levels of GDP per head in certain countries with that of the United States, as well as a comparison of growth rates in GDP per head over time. It is important to understand that what is being compared here is *volumes* of GDP per head, and not monetary values of GDP per head. To compare GDP in volume for countries with different currencies – and different purchasing power for those currencies – it is necessary to calculate a spatial volume/price breakdown using a method known as "purchasing power parities" (PPP).

4. The spatial volume/price breakdown: purchasing power parities

The objective here is to compare absolute levels of GDP per head (or other variables such as consumption) among different countries or regions *in volume*, for a given period (usually one year). Why in volume? Because the aim is to compare the quantities of goods and services produced in each country and not the monetary value of this output. The monetary value will in fact be affected by the differences among price levels. How can this spatial (*i.e.* among countries, regions or zones) comparison in volume be done?*

Recall that when analysing growth over time for a given country, GDP in volume is calculated by dividing GDP at current prices by a price index that is equal to 100 for a set base period. Exactly the same approach is used for spatial comparisons. A figure for GDP in volume is obtained by dividing GDP at current prices by a "purchasing power parity" index, set to equal 100 for a given country. Thus, as in the case of a temporal price index, there is a "base" used as reference (and for which the index value is 100), but in the case of a spatial index the base is a country or a region, and not a time period. For the base in spatial comparisons, the OECD usually uses either the average level of prices for OECD countries, or more simply, the level of prices in the United States. For this reason, "purchasing power parities" presented by the OECD have USA = 1 (or 100).

For a simplified illustration of the purchasing power parities (PPP) method, let us consider first the case of countries with the same currency, thus avoiding having to manipulate exchange rates. Also for simplicity, there is only a single product – the hamburger. Let us suppose that the GDPs are expressed at current prices in the same currency (for example the euro) and equal to 1000 for country A and 1200 for country B during the

* For a complete presentation, readers should refer to: OECD (2005), *Purchasing Power Parities and Real Expenditures: 2002 Benchmark Year, 2004 Edition,* OECD, Paris.

specified period. This can be written as GDP_a = 1 000, GDP_b = 1 200. Furthermore, since there is only one product, the hamburger, the respective GDPs can be written as $P_a \times H_a$ *and* $P_b \times H_b$, where P_a is the price in euros of a hamburger in country A, and H_a is the number of hamburgers produced in country A (similarly for country B).

Our objective is to compare the volumes, *i.e.* the quantities H_a and H_b. To do this, we shall calculate the price ratio *PPP*, called "the purchasing power parity of B with respect to A", as: $PPP = P_b/P_a$. By deflating the GDP of B by this *PPP*, in other words dividing GDP_b by *PPP*, we obtain $P_a \times H_b$. This results in the GDP in volume of country B expressed "in country A prices". By then dividing this volume by GDP_a, we obtain H_b/H_a, which is exactly the relative valuation in volume that we are after. It can be seen that: (1) PPP is a ratio of the price levels of identical products in the two countries; (2) the volume obtained by deflating a country's GDP by its PPP is a valuation of its GDP *at the base country's prices*, thus eliminating the difference between *price levels* in the two countries; and (3) the value of this GDP in volume in relation to the GDP at current prices of the base country gives a comparison *in volume*, which is our aim.

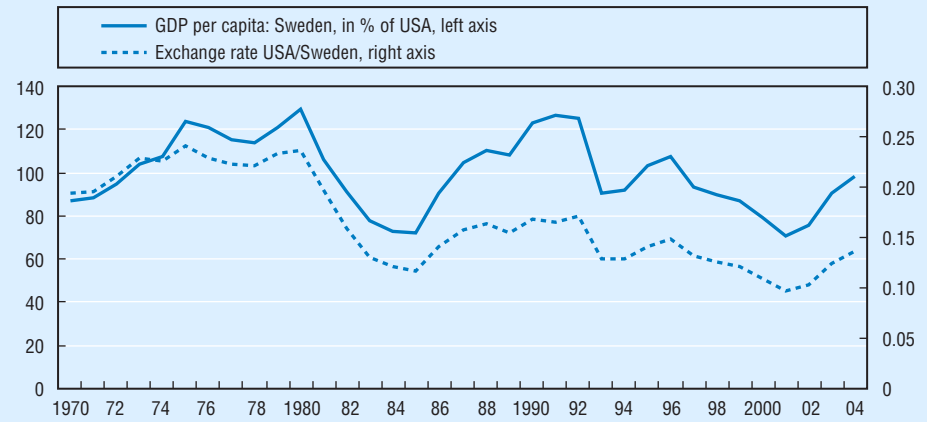
Now suppose the two countries do not have the same currency. Country A (the United States, for example) has the dollar, while country B has the euro. If the price of a hamburger in country A is P_a, in dollars, and the price of a hamburger in country B is P_b, in euros, the *PPP* of a hamburger between country A and country B will still be equal to P_b/P_a. In this case, however, the PPP is expressed as a currency ratio, since it equates to an amount in euros per dollar. How should it then be interpreted? It is the amount in euros that has to be spent in country B to obtain the same quantity of hamburgers that can be bought with a dollar in country A. The *PPP* is therefore equal to the conversion rate that equalises the purchasing power of the two currencies. When we divide the GDP of country B by the *PPP*, we kill two birds with one stone: we eliminate the differences between the price levels in the two countries; and we express the two amounts in the same currency unit, that of the base country.

Why not simply use the actual exchange rate seen on the currency markets? Because the market rate does not properly adjust for the difference in price levels between two countries and therefore does not provide a true comparison of the volume of goods and services produced per head. Let us try to compare GDP per head in Sweden and in the United States using just the exchange rate. First, divide GDP per head in Sweden expressed in Swedish kronor by the krona/dollar exchange rate. What we get is the Swedish GDP per head expressed in dollars. For a direct comparison with United States GDP, this magnitude (now expressed in dollars) is divided by the GDP per head in dollars of the United States (and multiplied by 100). This gives the continuous curve in Figure 3, which is a percentage index giving the size of Swedish GDP per head relative to that of the United States (which, by convention, is equal to 100). The value of this index can be read on the left hand axis of the chart.

The shape of the curve clearly shows that this calculation is not a proper indicator of relative GDP in volume. It is definitely not true that Swedish GDP per head in volume was 90% of that of the United States around 1970, before briskly rising to 120% in the latter part

Figure 3. **GDP per capita using exchange rate**

Sweden GDP per capita as a percentage of USA GDP per capita and US dollar per Swedish krona



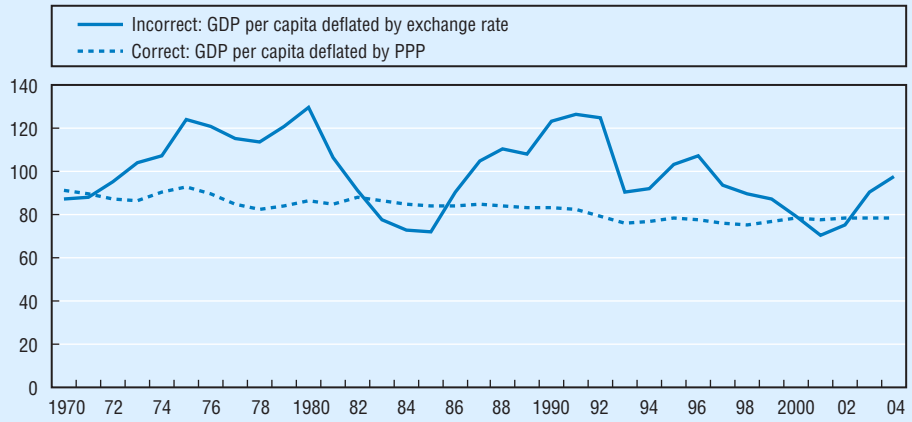
Source: OECD (2006), *National Accounts of OECD Countries, Main Aggregates, 1970-2004, 2006 Edition,* OECD, Paris.
StatLink: *http://dx.doi.org/10.1787/564115504232*

of the 1970s and then falling back to 70% in the mid-1980s. Where does this volatility come from? Clearly, from the exchange rate, shown by the dotted curve (values on the right-hand axis). The correlation between the two curves shows that the volatility of the first (Swedish GDP per head in volume) stems essentially from the volatility of the second (the exchange rate), and therefore the currency exchange rate is not a good relative deflator.

So it is not possible to use market exchange rates. Instead, it is necessary to construct specific indices for the spatial volume/price breakdown, or purchasing power parity (PPP). These PPP indices are price ratios for identical products, the basic building block being the ratio discussed earlier. Indices of this kind can be calculated for each of the major items in GDP (final consumption, GFCF, exports, imports). The overall mean of these PPP indices constitutes the purchasing power parity of GDP. Therefore, PPP is a spatial deflator of GDP, making it possible to compare absolute volumes between countries by eliminating the difference in national price levels. As we have seen, such a deflator is not restricted to countries with different currencies. It is equally valid for use between countries with the same currency (for example between countries in the euro area) or even between regions within a country, quite simply because price levels can differ appreciably between geographic regions, even if they have the same currency unit. To take the case of France, the same wage in euros is worth more in the French provinces than in Paris, simply because the cost of housing is much higher in Paris.

Figure 4. **Correct and incorrect GDP per capita**

Sweden GDP per capita as a percentage of USA GDP per capita, deflated by exchange rate and by PPPs



Source: OECD(2006), *National Accounts of OECD Countries, Main Aggregates, 1970-2004, 2006 Edition,* OECD, Paris.

StatLink: *http://dx.doi.org/10.1787/850318061264*

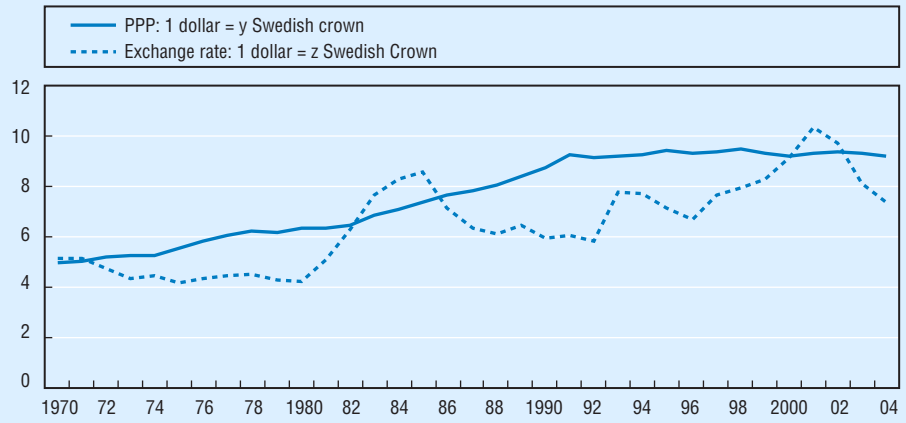
Figure 4 shows the Swedish GDP per head in relation to that of the United States using two different methods. The first, shown by the continuous line, is the one already seen in Figure 3. This is the incorrect method, consisting of dividing Swedish GDP per head by the exchange rate. The second, shown by the dotted line, consists of dividing the same figures by the PPP for Swedish GDP, with USA = 1. This method – the correct one – makes it possible to conclude that Swedish GDP per head in volume has remained quite stable at around 80% that of the United States, showing a slight tendency to decline over the period 1970-2003.

The question might be asked: what is the relationship between the PPP and the exchange rate? In Figure 5 below, Sweden's PPP relative to the United States is shown by the continuous line, and the exchange rate between the US dollar and the Swedish krona by the broken line. ▶ **IV.** Both are expressed in the same unit, *i.e.* an amount of Swedish kronor per United States dollar. However, the PPP represents the amount in kronor that has to be spent in Sweden to obtain the same quantity of goods and services that a dollar will obtain in the United States, whereas the exchange rate is the result of supply and demand between Swedish kronor and dollars on the currency market. It has been sometimes argued that the PPP is a sort of equilibrium exchange rate. One could even say that if the exchange rate seen on the currency markets is below the PPP, the exchange rate can be expected to rise (and *vice versa*), since in that case holders of dollars would have an interest in going and spending them in Sweden, or *vice versa*.

IV. The exchange rates shown in this chart are the inverse (1/x) of those in Figure 3

Figure 5. **PPPs and exchange rates**

Swedish kronor per US dollar using PPPs and exchange rates



Source: OECD (2006), *National Accounts of OECD Countries, Main Aggregates, 1970-2004, 2006 Edition,* OECD, Paris.

StatLink: *http://dx.doi.org/10.1787/521380101166*

However, even though the graph shows that the exchange rate has been fluctuating around the PPP, it is necessary to guard against a simplistic interpretation of this comparison. Fluctuations on currency markets depend on many other factors. It would therefore be most imprudent to speculate ("take a position") on a currency solely on the basis of its comparison with the PPP calculated by the OECD. Furthermore, trade in currencies is dominated by exports and imports and capital movements, whereas the PPP is calculated for all goods and services, including those that are neither imported nor exported.

In real life, calculating PPP is a complex matter. It is initially based on surveys to ascertain prices for a representative sample of comparable products in each country. The main difficulty lies in the choice of products. They must be both comparable and representative (*i.e.* the kind that are commonly purchased in each country). This is easy for a certain type of hamburger but more difficult for other goods and services, which are often different from one country to another. Next, price ratios have to be compiled for a large number of products and several regions or countries. If there are multiple products and regions, the overall purchasing power parity is a weighted mean of the price ratios among several countries (zones or regions) for a basket of comparable goods and services. This basket covers all the components of final demand (consumption, investment, net exports). Also, the formula for deriving PPP is more complex than that used to calculate the volume/price breakdown over time. That is because one wants to arrive at a measure that is both "symmetrical" and "transitive". Symmetrical means the relative volume for country B with respect to country A equals the inverse: that of country A with respect to B. Transitivity

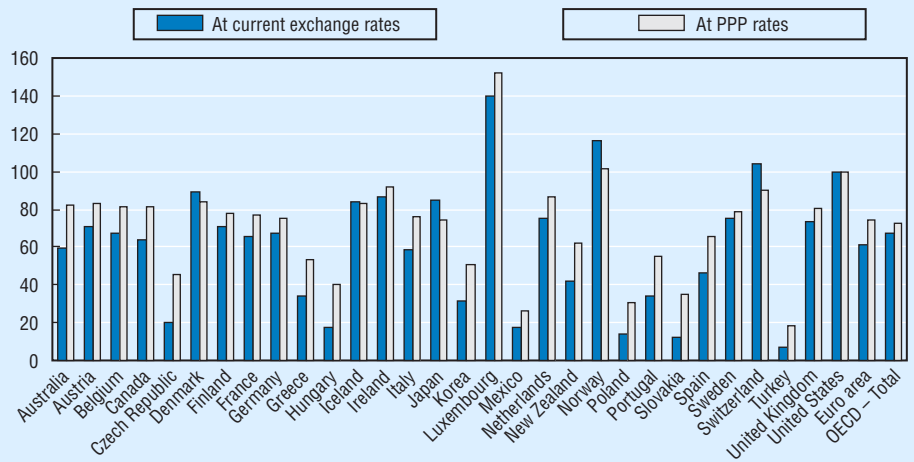
means that if country C is equivalent to 80% of B, and B is 75% of A, one should be able to calculate directly that C is equal to (0.8 x 0.75) x A.

Despite the complexity of deriving PPP, we can ascertain the following general principles extrapolating from the earlier example of the single hamburger: 1) PPP is a price ratio; 2) PPP is the exchange rate that equalises the price of the selected basket of goods and services; 3) to derive PPP, one always uses a reference country or group of countries, and magnitudes expressed in PPP are therefore always relative magnitudes. For PPP calculations, the OECD often uses the United States as the reference country, and this is why in OECD tables one often sees "United States = 100". But this should not be interpreted as anything but a simple choice for purposes of presentation. Indeed, OECD tables sometimes use the OECD average as the reference, setting it equal to 100. Once again, it must be stressed that like any figure in volume, the level of the variable expressed in PPP has no meaning in and of itself. Only the *relative* levels are meaningful, and the relative levels do not depend on the choice of reference country. Whether one sets the USA as equal to 100, or the OECD average to 100, makes no difference to the relative levels.

Figure 6 below illustrates the difference between GDPs expressed at current exchange rates and GDPs expressed in purchasing power parities for a group of OECD countries for the year 2002. It can be seen that the main effect of using PPPs rather than exchange rates is to increase the relative GDPs of poorer countries like Hungary, Mexico,

Figure 6. **GDP per capita using exchange rates and PPPs**

As a percentage of USA GDP per capita, 2002



Source: OECD (2006), *National Accounts of OECD Countries: Main Aggregates, 1970-2004, 2006 Edition*, OECD, Paris.
StatLink: *http://dx.doi.org/10.1787/872753671351*

Poland and Turkey. Why is this? Because the relative level of prices in poorer countries is below that in rich countries, and this difference is not fully incorporated into market exchange rates. Another factor is that PPP covers all goods, including those that are not internationally traded, such as housing. And housing in poor countries is cheaper than in rich countries. Using PPP as the deflator therefore gives a better picture of each country's actual income, especially in the case of the poorer countries.

Although PPPs are more suitable than exchange rates for purposes of international volume comparison, they are a statistical construct rather than a precise measure. In particular, it is more difficult to calculate PPPs than to calculate price indices over time. It is relatively easy to calculate rent increases over time, but how is one to compare the rent of an apartment in London with that of apartments in Warsaw or Madrid? Another difficulty is that the budgets allocated to the price inquiries needed for PPP calculations are limited, with the result that the number of observations is small compared with those done for the calculation of a price index over time. Generally speaking, the variance from one year to another in the PPP calculations is quite large. Therefore, for temporal comparisons of volume GDP, the OECD recommends not deflating the GDP per head series by the "current" PPP series. The results lack homogeneity over time, even though theoretically they have the advantage of using a price structure that is constantly updated.

It is better to use the national series for GDP in volume at the prices of a common base year (for example 2000) and to deflate these by the PPP for a fixed year (for example 2000), although it is not necessary to use the same year. In this way, one obtains series that are doubly in volume: volume over time and spatial volume. These have the precise advantage of presenting the volume growth of GDP per head in each country, while at the same time making it possible to make inter-country comparisons of volume levels. ▶ **V.** It is this method, sometimes known as "constant PPP", which is used in Figure 2 of this chapter, and hence the title of the chart includes the phrase "based on 2000 PPPs". In fact, although the chart shows the series for GDP per head relative to that of the United States for the period from 1970 to 2003, the PPP used is only for the year 2000. The figures for other years are obtained by applying to the levels for 2000 the changes in GDP per head in volume for the country concerned. Exercise 1, at the end of this chapter, explains how to use this method. More details can be found in the following documents: *Purchasing power parities – measurement and use*, Statistics brief n°3, *www.oecd.org/std/statisticsbrief*, *and GDP per capita volume indices based on constant and on current PPPs* in OECD's *Main Economic Indicators,found in the sources and methods section of www.oecd.org/std/mei*.

V. On the other hand, they have the disadvantage of using fixed price indices. For example, they overstate the most recent relative GDP in volume of countries that are large producers of computers, whose prices tend to fall over time. By relying on price indices based on a time period in the past, they therefore tend to attribute a larger weighting to computers than the use of more recent time periods does.

5. Comparison of variables in absolute terms: household consumption

In addition to the problem of finding a suitable spatial price index to use as a deflator, the inter-country comparison of absolute levels of variables poses other difficulties, related to institutional differences between countries. For example, inter-country comparisons of absolute levels of household consumption contain a trap into which it is all too easy to fall. As explained in Chapter 5, there are two possible definitions of household consumption in national accounts:

- *Household final consumption expenditure* corresponds to the purchase of goods and services by households.
- *Household actual individual consumption*. This equals household consumption expenditure (above) plus "individual consumption", which is the amount spent by general government and the NPISHs (non-profit institutions serving households) on things that directly benefit households, such as healthcare and education. Households do not pay directly for these services (they pay for them indirectly through taxes), but they benefit from them.

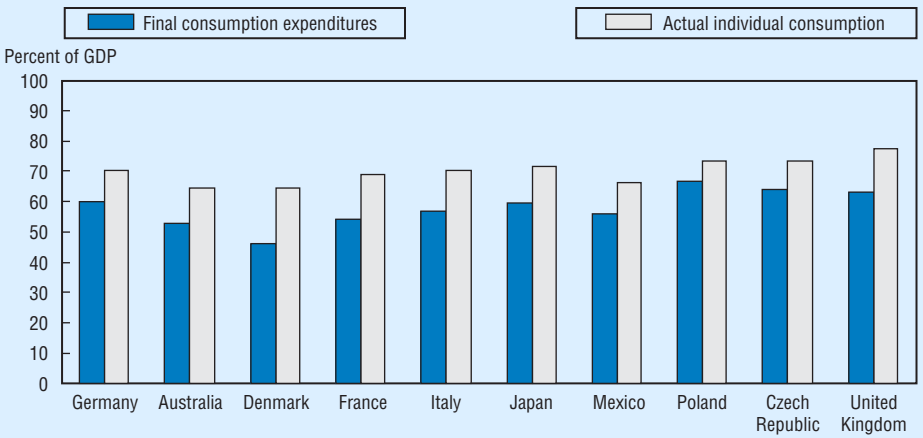
International comparisons of consumption per head are meaningful only if based on actual individual consumption and not consumption expenditure. This is because there are significant differences between countries regarding the proportion of expenditure carried out directly by households for healthcare and education and the proportion carried out on their behalf by government. If one uses expenditure and not actual consumption, one falls into the trap of understating consumption per head in countries that "socialise" this type of expenditure to a greater extent (the countries of western Europe in particular) compared with countries that leave this expenditure more to the private sector (United States). This is why in its volume series in national accounts, the OECD publishes a comparative series of actual *individual consumption* per head deflated by a suitable PPP.

Figure 7 shows the percentage of GDP accounted for by consumption expenditure and actual individual consumption for 10 countries in 2002 (current prices, in national currencies). For these 10 countries, household final consumption expenditure ranges from 45% to 60% of GDP, whereas actual individual consumption is roughly 70%. The largest differences are for France and Denmark, two countries that have to a greater extent "socialised" their expenditure on healthcare and education.

Generally speaking, therefore, international comparisons of absolute levels of variables in the national accounts are problematic. For one thing, countries do not all use exactly the same conventions. As was shown in the first section of this chapter, this has little impact on comparisons of growth rates but can affect comparisons of absolute levels to the tune of several GDP percentage points. In addition to these differences, there are wide variations in the quality of the underlying statistical systems. Some statistical offices have very

Figure 7. **Households: final consumption expenditure *versus* actual individual consumption**

As a percentage of GDP, 2002



StatLink: *http://dx.doi.org/10.1787/665527077310*

comprehensive listings of firms and/or access to exhaustive tax declarations by firms (by agreement with their tax authorities). These statistical offices therefore have statistics covering most parts of their economies. Other countries, by contrast, do not have such exhaustive basic data at their disposal. In principle, countries are expected to adjust their GDPs to take account of this "**non-observed**" economy (see Chapter 4). However, it would be pretentious to claim that these adjustments are based on exactly the same methods in each country. All things considered, it would be an illusion to think that the degree of precision regarding GDP levels is less than several percentage points.

In addition to these problems, when one takes into account the lack of precision in the calculation of purchasing power parities, the conclusion is that it is not possible to have unlimited confidence in comparisons of absolute levels. At the OECD, for example, a difference of less than 5% between the GDP per head of two different countries is not considered really significant. Remember, however, that a difference between *growth rates in volume* of 0.2%, for its part, is indeed significant. One often sees journalists making great play of the fact that a given country's GDP per head has exceeded that of another by even less than a single percentage point. Information of this kind has to be treated with caution, and if the difference remains very small, one should check whether the volume growth trends confirm this result. If they do not, it would be more reasonable to say that the GDPs per head of the two countries are "approximately the same".

Key Points

- The definitions and conventions used in national accounts are international. In principle, therefore, it is possible to compare national accounts data among countries.
- In practice, the methods used are not exactly the same and countries' institutions are different. In the final analysis, the growth rates of the variables in national accounts are more comparable than their absolute levels.
- It is necessary in the case of certain variables to carry out appropriate transformations: for example, dividing by the size of the population (resulting in aggregates "per head") or taking institutional differences into account.
- In order to compare levels of GDP per head among several countries or regions in volume, it is essential to deflate them by the purchasing power parities (PPP) for GDP, and not by actual market exchange rates.
- By dividing GDP (or another variable) by the suitable PPP, one eliminates differences in price levels between two countries, making it possible to compare the variables in volume.
- PPP is also calculated between different countries with the same currency (or between regions in the same country), since the same currency does not necessarily have the same purchasing power in different geographical regions.

Exercises

Answers at www.SourceOECD.org/understandingnationalaccounts

Exercise 1: Calculations of GDP per head in constant PPP and comparison with current PPP

Question 1: Table 1 below shows PPP for the United States, Sweden and Japan; Table 2 shows GDP in volume (at 2000 prices) for the same countries; and Table 3 shows their populations. Using data from these three tables, create a new table of relative indices of *GDP per head in volume (USA = 100), at constant 2000 PPP also called "at constant prices and PPPs of 2000"*. Based on the results, draw a chart similar to Figure 2 in this chapter.

Question 2: Table 4 presents the GDP of these same countries but this time at current prices. Calculate a series for GDP per head deflated by *current PPP*. Compare the results with the table you created to Question 1. Comment on the differences.

Table 1. **Purchasing power parities of GDP**

	1995	1996	1997	1998	1999	2000	2001	2002	2003
Japan	175.49	170.87	168.68	166.54	162.04	154.82	149.22	143.67	139.14
Sweden	9.41	9.3	9.38	9.48	9.34	9.19	9.34	9.36	9.39
USA	1	1	1	1	1	1	1	1	1

Table 2. **GDP in volume, at 2000 prices, billion units of national currency**

	1995	1996	1997	1998	1999	2000	2001	2002	2003
Japan	480 223	496 718	505 517	500 224	499 546	511 462	512 501	510 949	517 619
Sweden	1 870.72	1 894.87	1 941.06	2 011.82	2 103.93	2 194.97	2 217.95	2 261.77	2 294.94
USA	7 972.80	8 271.40	8 647.60	9 012.50	9 417.10	9 764.80	9 838.90	10 023.50	10 330.00

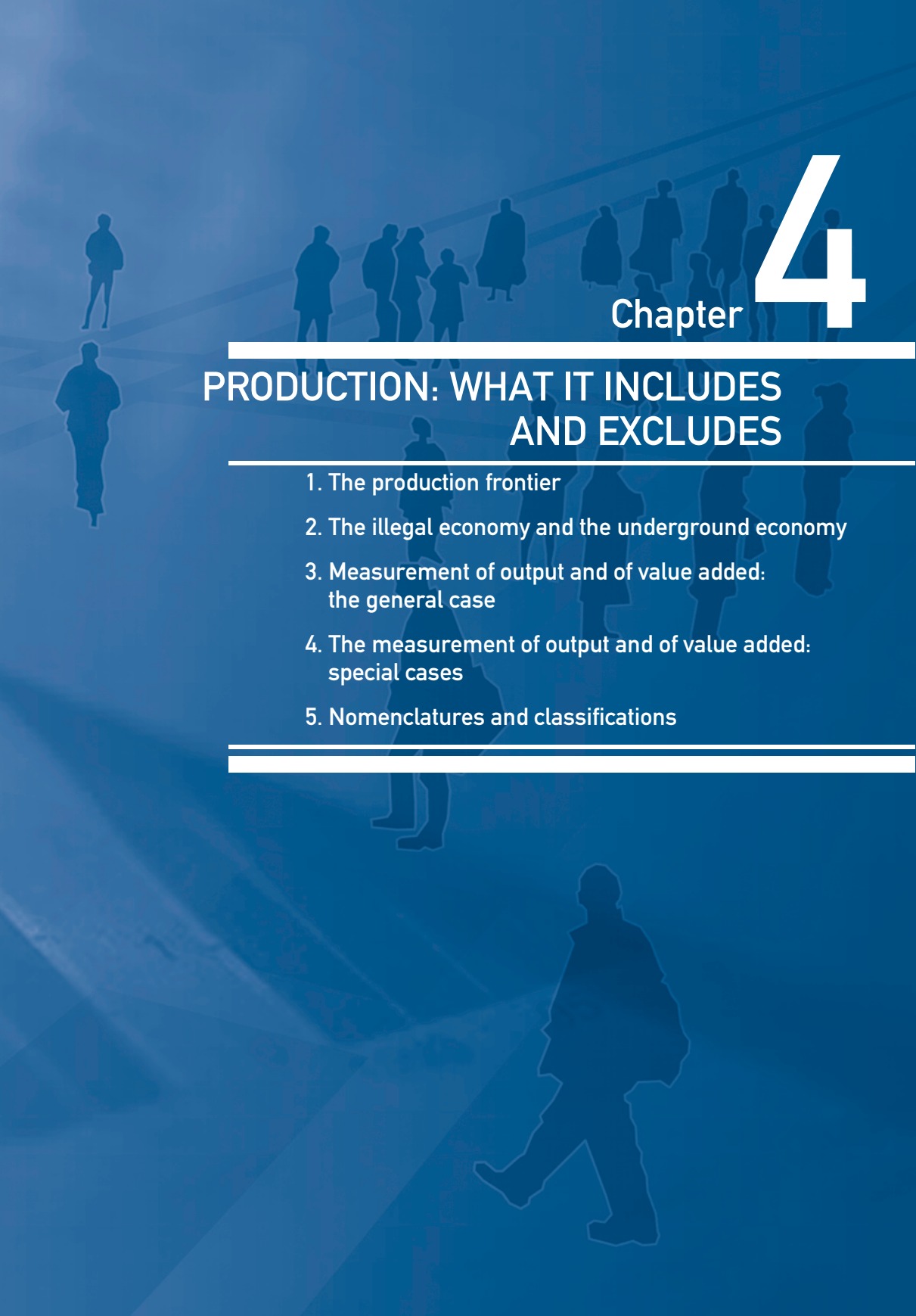
Table 3. **Population, in thousands**

	1995	1996	1997	1998	1999	2000	2001	2002	2003
Japan	125 570	125 864	126 166	126 486	126 686	126 926	127 291	127 435	127 619
Sweden	8 827	8 841	8 846	8 851	8 858	8 872	8 896	8 925	8 958
USA	266 588	269 714	272 958	276 154	279 328	282 429	285 366	288 217	291 073

Table 4. **GDP at current prices, billion units of national currency**

	1995	1996	1997	1998	1999	2000	2001	2002	2003
Japan	496 922	509 983	520 939	514 595	507 224	511 462	505 847	497 896	497 485
Sweden	1 770.25	1 815.14	1 888.23	1 971.87	2 076.53	2 194.97	2 269.15	2 352.94	2 438.45
USA	7 342.30	7 762.30	8 250.90	8 694.60	9 216.20	9 764.80	10 075.90	10 434.80	10 951.30

StatLink: *http://dx.doi.org/10.1787/154437888722*



Chapter 4

PRODUCTION: WHAT IT INCLUDES AND EXCLUDES

1. The production frontier
2. The illegal economy and the underground economy
3. Measurement of output and of value added: the general case
4. The measurement of output and of value added: special cases
5. Nomenclatures and classifications

4 PRODUCTION: WHAT IT INCLUDES AND EXCLUDES

Production is what leads to "output" (as it is termed in the national accounts), creating jobs, generating income for workers and owners of capital, and resulting in the goods and services found in our stores. Output is a central concept in economics. It is essentially used by economists *in volume* terms (*i.e.* not at current prices).

Output results from the three *factors of production:* labour, capital and intermediate consumption (inputs). Standard macroeconomic presentations often use a measure based on value added (rather than output) making it possible to dispense with intermediate consumption and hence show only labour and capital as the factors of production. When modelling the growth of output in volume (or, rather, the growth of value added when intermediate consumption has been deducted from both sides of the equation), OECD economists use the following formula:

$$Y' = [f(L, K) \times MFP]',$$

Y' is the growth rate of value added; L stands for labour and K for capital; f is the production function; and the sign ' means the derivative. The term "MFP" stands for "multifactor productivity", which is that part of the change in value added that cannot be attributed to changes in the volume of labour or to capital inputs in production. Its rate of change represents the contribution to value added growth of a more productive combination of labour and capital (for example, improved organisation of work or new techniques). MFP is sometimes called "disembodied technological progress", since it is the result of technical progress that is not reflected in the measurement of capital and labour. MFP is not directly measurable and can only be obtained as a residual from the above formula. Despite its elusive nature, MFP provides the main driving force behind long-term increases in the standard of living. In recent years, numerous studies have shown that MFP has been growing faster in the United States, Canada, Australia and nordic European countries compared with France, Germany and Italy. Within continental Europe, this has triggered an awareness of the need to invest in new technologies and R&D and to carry out structural reform.

OECD economists also use output statistics, again in volume terms, to estimate the "output gap". They do so as part of the regular monitoring of the economic situation in member countries. The basic idea is simple. Given the quantity of labour and capital available at a given moment, what is the maximum growth rate of GDP in volume that can be obtained without fuelling inflation? The corresponding level is known as "potential GDP". When the demand for goods and services exceeds potential GDP, various constraints emerge in the economy: firms have to offer higher wages to attract or retain the workers they need, higher consumption and investment pushes up prices of goods and services,

and competition between borrowers forces up interest rates, which constitute part of the price of capital. Potential GDP is compared with observed GDP. If observed GDP is lower than potential GDP, there is said to be a "negative output gap". In this situation, governments often resort try to stimulate demand, either by tax cuts or by additional public spending (major infrastructure projects, and/or recruitment of civil servants, for example). The Central Bank, for its part, may decide to reduce its key interest rates. If there is a "positive output gap" – actual growth exceeds potential growth – it may then be difficult to raise public spending or lower taxes without automatically generating inflation, and the most common response is for the Central Bank to raise its key interest rates.

Although the idea itself is simple, the calculation of potential GDP is a complex matter, since it requires measuring the stock of capital and the value of the services provided by this capital, as well as measuring the labour factor. The latter is not simply the number of workers but rather the number of hours worked, adjusted for the qualitative composition (skill levels) of the workforce. Next, it is necessary to estimate the macroeconomic production function that relates these production factors to output. Despite these difficulties, the OECD evaluates the potential GDP growth rate for its members and regularly publishes the resulting "output gaps". For example, in 2005, OECD economists thought that the United States output gap was almost nil (meaning that growth was at its potential level), whereas it was negative in France (–1.4 points), Germany (–2.1 points) and Japan (–0.4 of a point).* These figures vary according to the current phase of the economic cycle. ▶ **I.** Non-inflationary growth above potential GDP can only be obtained by increasing the apparent productivity of capital and labour (see Box 1), and one of the ways to achieve this is via structural reforms.

I. It turns out that growth is not steady but follows "economic cycles". Following a recession (a decline in GDP), the economy driven by corporate investment picks up again, reaches a peak and then declines, falling back again into a recession. The whole cycle lasts between 6 and 10 years. And then a new cycle starts again.

Box 1. **Apparent labour productivity**

Apparent labour productivity is defined as the ratio of output to labour. If Y denotes the volume of output and L the volume of labour, labour productivity is equal to Y/L, *i.e.* the quantity of output per unit of labour. For macroeconomic work, economists prefer to use value added in volume (*i.e.* GDP) as the numerator rather than output. The denominator used is the volume of labour, measured by the number of workers multiplied by average working hours (ideally adjusted for the skill level). In practice, one is usually more interested in growth in labour productivity than in its absolute level. This means calculating Y'-L' (rather than Y/L), where Y' is the growth in volume of value added, and L' is the growth in the volume of labour.

* *Source: OECD Economic Outlook*, N°78, November 2005.

Studies published by the OECD systematically include major sections on the progress made by member countries in regard to "structural reforms". This expression often arouses suspicion on the part of the trade unions, who see it as a code word for attacks on acquired social rights, such as guaranteed minimum wages, employment-protection legislation and the entitlement to unemployment benefits following the loss of a job. However, this is a one-sided view of the matter, since structural reform involves deregulating markets for goods and services in addition to the labour market. Structural reform of product markets involves increased competition between producers through, for example, the opening up of markets to foreign competitors, the abolition of cartels and other anti-competitive arrangements, and the abandonment of state monopolies, especially in such fields as rail and air transport, telecommunications, electricity, gas and water.

In order to identify which sectors of the economy are particularly in need of structural reform, OECD economists compare the productivity of various industries in different member countries. They pay particular attention to the growth of certain sectors, such as carmakers, airlines and electricity companies. They then try to ascertain the institutional structures in countries with the fastest growth. What apparently works in these countries can be tried in others. All these analyses are largely based on the data for output, or value added in volume, provided by national accounts.

1. The production frontier

II. However the concept of output is foreign to business accounting.

Output is therefore a central concept for national accountants aiming to compile useful data. ▶ **II.** But it remains to be seen precisely what output covers. To do that, we need to trace the "production frontier," deciding what to *include* in GDP and what to *exclude*. Most of what to include in GDP is non-controversial. For a start, output as measured in the national accounts includes what creates the goods and services that households buy for their everyday needs and that firms buy to be able to produce these goods and services. The important word in this last sentence is "buy", implying that all transactions that are "monetised" are included in GDP. But what about the activity of civil servants and members of the armed forces? Nobody buys the output of ministries or of the army. Another grey area is that of household services rendered free of charge. If one person pays another to clean his windows, this is output, since a service has been sold. But what if people clean their own windows? Does this lie within the production frontier?

As we shall see later, there is general consensus favouring the inclusion in GDP of the services provided by general government. Although these services are not sold, they are included as output (value added) in the national accounts and called non-market services produced by general government. This value added is very substantial, since it represents roughly 15% to 20% of GDP, depending on the OECD country concerned. By contrast, the "non-traded output" of households – cooking, cleaning, childcare, etc. – is, with one

exception, not included in the national accounts. The exception consists of the housing that homeowners implicitly provide for themselves. The national accounts act *as if* the owner-occupiers provided housing services (a dwelling to live in) to themselves. These notional, or in national accounts jargon "imputed" transactions, are estimated to be equal to the rents that homeowners would have paid to live in dwellings of the same type, in the same district and with the same service facilities. These imputed rents are added to actual rents to calculate the total output of "housing services".

Imputations are carried out only when they are absolutely necessary for the analysis of changes over time in macroeconomic aggregates or for comparisons between several countries. This is the case for these imputed rents of owner-occupiers. If this output were not included by imputation, the result would be a structural decline over time in GDP, because the long-term upwards trend in home ownership would automatically produce a downward trend in the total value of actual rents (and thus in GDP, all things being equal). It would also make it difficult to compare the GDPs of different countries because the rate of home ownership varies markedly among countries.

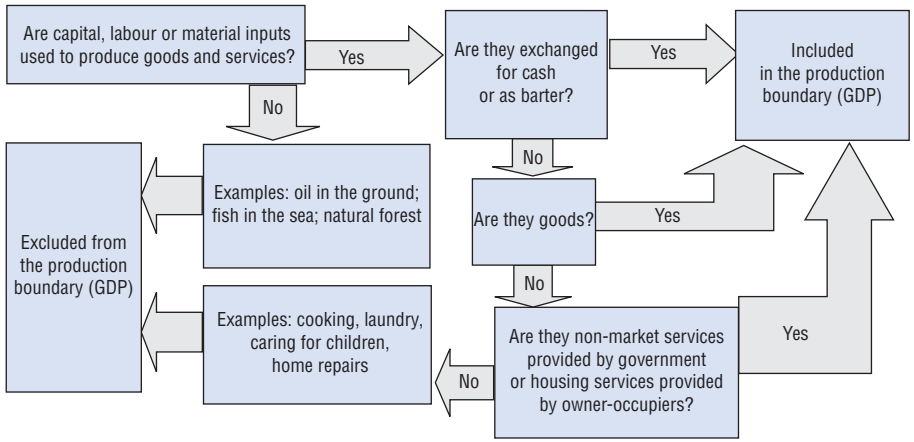
Another example of imputation in national accounts is that of goods (mainly food) that some households produce for their own consumption. This represents only a very small part of output in OECD countries, but in developing countries, where farmers consume much of their own production, the proportion is very much higher. In some countries, farmers and other households even produce their tools, houses, outbuildings or their own clothes. As a result, the convention adopted in national accounts has been to impute in the calculation of GDP the output of all **goods** going into households' own consumption, attributing to them the market price of an identical good. On the other hand, as we saw earlier, the **services** households produce for themselves are not imputed in the national accounts, with the notable exception of housing services in the case of owner-occupiers. Nor is any account taken of the services some households provide to others free of charge (repairing a neighbour's dripping tap for nothing). ▶ **III.** Such exclusions may seem arbitrary, but they at least have the merit of avoiding having to make too many imputations, some of them extremely hazardous (see "Household Services" in the Section "Going further").

III. When services between households are provided for payment, attempts are made to include them in output by estimating, for example, the value of paid lessons or paid baby-sitting services.

In conclusion, national accounts define output as the result of the utilisation of one, or more, of the three factors of production: labour, capital and intermediate consumption (material inputs). This necessary condition leads to a very broad definition of output. However, this is later narrowed down by the imposition of other criteria, as the following "decision tree" shows (start reading the diagram from the top left-hand corner). The most important arrow in the diagram, which one could regard as the heart of national accounts, is in the top right-hand corner. It indicates that output consists essentially of the value of goods and services produced by certain economic agents *for sale* to other economic agents (monetary exchange, or in exceptional cases, barter). In the economies of the OECD

countries, this constitutes the bulk of output. However, one must not overlook the non-market services produced by general government and the imputed housing services enjoyed by owner-occupiers.

The production decision tree



Before going into more detail, it is important to note that output in the national accounts is the output of productive activity *during* a period, which can be a year or a quarter. It is described as a "flow variable" as opposed a "stock variable", which measures a stock, such as the stock of finished products on the 31 December of a given year. Flow variables can be summed; in other words the output for a given year is the sum of the output of the individual quarters. This is not true of stock variables.

2. The illegal economy and the underground economy

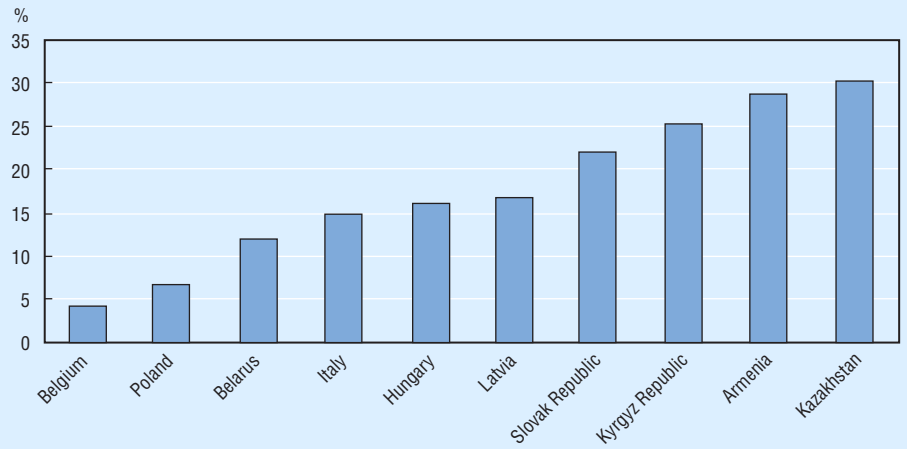
In the diagram shown above, there is no distinction made between legal and illegal production. One can therefore conclude that illegal activities are within the production frontier and are hence included in GDP. Such activities are of two types: 1) illegal, such as trading in stolen goods, organised prostitution (in countries where it is illegal) and drug production and drug-dealing; and 2) legal but illegally conducted, such as plumbing or repair work paid in cash and not declared to the tax authorities.

In the OECD countries, illegal activities are marginal in macroeconomic terms. Most estimates have put them at less than 1% of GDP. Although theoretically included in GDP, in practice they are often not estimated and can therefore be considered not to figure in GDP. However, an increasing number of EU countries are now including them. On the other hand,

legal activities carried out illegally (in order to avoid paying taxes and social contributions) constitute what is known as the "**underground**" or "black" or "hidden" economy and are estimated to be anywhere from 2% to 15% of GDP in OECD countries. This proportion is so large that national accountants have had to develop special techniques to ensure they are included in GDP estimates. Figure 1 shows the share of GDP generated by hidden or underground activities. In the chart, these are referred to as the "non-observed" economy because they cannot be observed by the usual types of surveys. In Hungary, for example, the non-observed economy represented at that time 16% of official GDP. This is the share of value added that has been added to the official statistical sources using these special techniques. It is therefore not true to say that the national accounts do not include the "underground" economy. For a concrete example of how this is done, see "The adjustments for the underground economy in the case of France" in the section "Going further".

Figure 1. **Non-observed activities included in GDP of selected countries**

Percentage share of current GDP, years around 1998



Source: Inventory of National Practices in Estimating Hidden and Informal Activities for National Accounts, United nations, Genova, 2002.

3. Measurement of output and of value added: the general case

As we saw earlier, output in the national accounts mainly consists of the value of goods and services produced in order to be *sold* to other agents (output not intended for sale is not recorded, with certain exceptions). As pointed out in Chapter 1, this poses a problem of aggregation, in that the sum of output measured in this way can change over

time, not because more goods and services are produced but because firms are able to outsource certain activities previously carried out in-house (see Box 2 "The trap of internalisation and externalisation"). National accountants have therefore created the concept of **value added**. We shall be returning to this later.

Box 2. **The trap of internalisation and externalisation**

In the measurement of output, national accounts do not include "own-account" production – that is, the intermediate goods and services produced and consumed by companies internally. National accounts record own-account production of firms only when the goods are intended for investment. For example, if a company makes cars, the national accounts will not record the production of the engines that power these cars, if they are manufactured by the same company. Similarly, national accounts will not include the personnel services of this carmaker, if these services are provided internally. Recording the "own-account" output of intermediate goods and services would result in unduly inflating the figure for total output. On the other hand, if personnel services and the manufacture of engines are outsourced, in other words if the carmaker purchases these goods and services from another company, then this output will be recorded. A move from one form of organisation to another will therefore inflate total output, although in reality no new good or service has been created. Hence the attraction of the concept of value added (see Chapter 1), whose total is independent of a change in how firms are organised.

It is important to note that own-account output of capital goods, such as machines or software, is recorded in the national accounts. But why then is own-account output of intermediate goods not recorded? Because intermediate goods and services have no impact on GDP, since by definition they will be consumed during the production process. Capital goods, on the other hand, are used over longer periods of time.

But even if value added is preferred to output, the concept of **output** is widely used in national accounts. How is it measured? Output at current prices is generally measured by sales. But an adjustment is necessary. In the case of goods, at least part of the output produced in the designated period may not be sold, and so it is stocked as inventory. Similarly, some of the goods sold in the current period may have come out of inventory (and not produced during the period). Finally, part of the output during the period may not have been completely finished and is stocked as work in progress. In the end, output at current prices is measured as: sales plus the change (positive or negative) in inventories of finished products or work in progress. This formula is regularly used to calculate output, since the data required exist in company accounts, albeit not always in easily usable form (see Box 3 "The problem of changes in the value of inventories").

IV. An exception among OECD countries is the USA, which calculates its output and value added at market prices (*i.e.* including taxes on products). See Chapter 12.

As for the prices at which output is measured, these are the "basic prices" corresponding to the revenue per unit of products sold that remain in the hands of the producer. ▶ **IV.** Basic price therefore does not

Box 3. **The problem of changes in the value of inventories**

One might think it a simple matter to use data in company accounts to determine inventory changes. However, in practice it is not so easy, because inventories generate holding gains when prices are rising and holding losses when they are falling. It is a fundamental principle of national accounts to exclude holding gains and losses in the measurement of output. Indeed, if a firm makes a holding gain by merely keeping products in inventories, this does not constitute a productive process and therefore cannot be included in GDP.* As a result, it is necessary to adjust the figures for inventory changes obtained from company accounts in order to eliminate holding gains and losses on inventories.

* The fact that holding gains and losses do not form part of output and GDP does not mean that they are ignored in the national accounts. They certainly exist and represent an important economic development when prices of goods rise or fall. Expectations of holding gains or losses and their realization can have a major impact on the behaviour of producers and consumers. For this reason, the national accounts record them in the revaluation account (see Chapter 8), but they are not an element of GDP.

include taxes on products (for example, value-added taxes or special taxes on petroleum products or alcoholic beverages), because these amounts do not remain with the producer but are paid to the tax authorities. On the other hand, the basic price includes the subsidies received on products. Therefore, in the national accounts, the prices for exported agricultural products are not the low prices made possible by the export subsidies granted to farmers of OECD countries but the actual sales prices plus the subsidies, thus a price that is closer to the real costs of production. Finally, output in volume is compiled as output at current prices deflated by the appropriate price index.

Intermediate consumption represents the value of the basic materials, components and semi-manufactured goods going into the product, as well as the value of the electricity, the cost of rents, IT services, insurance, legal and accounting services, etc., used in the production of a good or a service. In short, intermediate consumption consists of everything needed to produce other goods and services intended for sale, other than the labour of the workforce and the services provided by plant and machinery, offices and factory buildings.

Just as output is not equal to sales, intermediate consumption is not equal to the purchases of goods and services intended to be intermediately consumed. This is because certain intermediate goods used in the production during the period may have been bought and stocked in a previous period. Similarly, some purchases during the period may be consumed after it has ended, having been stocked in the meantime. In the end, intermediate consumption is equal to the purchases during the period *minus* the change (positive or negative) in the value of the inventories of goods and services for intermediate consumption. Firms often refer to these inventories as "materials inventories". Like output, intermediate consumption is a flow, corresponding to what has been consumed *during* a period (a year or a quarter). This leads to the exclusion from the definition of intermediate consumption of the goods used for production but not entirely consumed during the period, such as machinery or software. These capital goods are classified as "gross fixed capital formation" or GFCF.

Value added, as its name implies, measures the value the firm adds to the products used to manufacture the output and is equal to: output *minus* intermediate consumption. It can be deduced, using the definitions given earlier for the measurement of output and intermediate consumption, that value added at current prices is equal to: sales *minus* purchases *plus* total inventory changes (finished products, work in progress and materials). Value added is a central concept in national accounts. However, because it is defined as a difference between two monetary values (output *minus* intermediate consumption), it is not clear at first sight exactly what it represents. A useful way of defining valued added at current prices is to consider it as the amount of money generated by production that remains available to pay:

- wages and salaries and social contributions (*compensation of employees*);
- production taxes (other than that on products) net of operating subsidies;
- replacement of equipment gradually worn out during production (*consumption of fixed capital*);
- interest payments on loans;
- dividends paid to shareholders;
- purchase of new equipment; and
- financial saving – or the firms' investment in financial products.

It is sometimes this approach that is used in practice to measure firms' value added at current prices in the national accounts (see "The data sources for the value added of non-financial enterprises in France" in the Section "Going further"). Value added in volume is the difference in output in volume and intermediate consumption in volume.

4. The measurement of output and of value added: special cases

The definition of output at current prices as equal to sales + changes in inventories of finished products and work in progress is applicable to virtually the totality of the business sector in the national accounts. This sector is also known as the **market sector**, for which there exists a market with recorded sales, transactions and prices that permit the direct measurement of output. Note however that, even in the market sector, there are activities whose output is difficult to measure or even identify such as banks, insurance companies and retail distributors for which the definition of output based on sales does not work very well. They are all market activities, but their output is mainly purchased indirectly. Therefore an alternative measure of output is needed. Furthermore, there are large activities for which the notion of sales is non-existent, and these constitute the **non-market sector**, covering

mainly services provided by general government. The organisations concerned do not sell their services, and it is therefore necessary to find a different measure of their output.

Non-market producers are those that provide services, and in some cases goods, either free of charge or at prices that are not economically significant, meaning in practice prices that cover less than half the cost of production. General government bodies constitute the bulk of the non-market producers, but there are others, like the non-profit institutions (see Chapter 5). Most of the services provided by general government – defence, economic policy, foreign policy, public education and public health care – are provided to the general public without charge. These services are obviously financed through taxation and social contributions, but there is no direct link between the payment of the tax and the level of services received. Citizens or firms are not entitled, for example, to vary their taxes based on the amount of defence or policing they want to consume. A tax is a compulsory transfer to general government and is not the price of a public service.

Certain services provided by general government, like education and healthcare, are provided to households on an individualised basis, meaning that it is possible to know who consumes them. For instance, a family sends its children to the state school, and one therefore knows that it is a consumer of these services. Other services are provided only on a collective basis, meaning it is impossible to know who consumes what. An example is policing: all economic agents, households and firms consume part of the services of the police, but it is impossible to know how much each consumes. In the case of the individualised services, government can sometimes charge part of the price to the consumer (for example, the contribution to the cost of a hospital bed), but this price is usually well below the production costs of the services consumed, and the services are therefore considered non-market.

Whether individual or collective, as there are practically no sales, non-market output at current prices is conventionally measured as equal to the sum of its production costs, including: *a)* the intermediate consumption; *b)* the compensation of employees; *c)* the consumption of fixed capital, which is the utilisation cost of the equipment used by non-market producers (see Box 4); and, in rare cases *d)* the other taxes paid on production. Exercise 4, at the end of this chapter, shows that measurement of non-market output in the national accounts basically assumes that these are non-profit activities, a very reasonable assumption.

The general formula for measuring output from sales cannot be used to measure the *output of banks*, because banks invoice directly only a very limited portion of their services (for example, foreign exchange commissions, cheque-handling fees, stock-market transaction fees, separately-charged financial advice), but not the bulk of their service, which is making loans. Measurement using the general formula would result in their value added being very small, if not negative; in other words, their intermediate consumption would be greater than their sales! Because banks are obviously profit-making enterprises, there is something wrong here. The fact is that banks make the bulk of their profits by borrowing at low interest rates from depositors and then lending the proceeds to other

Box 4. **Is the output of general government understated?**

Before a firm decides to buy capital goods, it calculates the return, or yield, on the funds it will be investing. This return must be sufficient to cover wear and tear (the consumption of fixed capital) plus a net income that is at least equal to the interest that could be obtained by investing the funds in financial products (bonds, for example). If the return is not sufficient to cover these two elements, a rational entrepreneur will buy the financial products rather than the physical capital. The sum of the consumption of fixed capital and this net return is known as services from capital.

In the case of general government, the production costs used to evaluate output include consumption of fixed capital, but they omit the net return. For a firm, the net return is close to its net operating surplus (see Chapter 7). Because government services are not sold (or only to a marginal extent), it is not possible to calculate the net operating surplus, but the net return could be estimated by applying an appropriate rate of interest to the value of the general government's capital. Views may differ regarding the appropriate interest rate, but it can be said that the present method of valuing non-market output significantly understates the contribution of general government to GDP. For example, the present method implies that scanners or x-ray machines produce no net return when they are used in a public hospital but do so when used in a private clinic. The new national accounts system (SNA 2008), to be introduced starting around 2010-2012, will most probably recommend taking into account the totality of the cost of capital services to evaluate the output of general government. It should result in an increase of several percentage points in the GDP level of all OECD countries, but it will probably not have much impact on growth rates.

borrowers at a higher interest rate. The difference between these two interest rates, which provides the essential part of banks' remuneration, is interpreted in national accounts as their **financial intermediation** service. The banks are in fact intermediaries between those who want to save – mainly households – and those who want to borrow – mainly firms. Without the banks, these agents would have greater difficulty in coming together. The national accounts therefore measure the output at current prices of banks as the sum of their sales *plus*, approximately, the difference between the interest received from borrowers and the interest paid to lenders. This difference, which forms the bulk of the total, is known as **financial intermediation services indirectly measured**, or FISIM (see "Going further: FISIM").

Measuring the output of *insurance companies* is even more problematical than in the case of the banks. For the sake of simplicity, we shall deal here only with non-life (property) insurance (automobile insurance, home insurance, etc.). The money received by these non-life insurers in the form of premiums does not only constitute payment for an insurance service but instead mainly goes into a fund from which indemnities will be paid in the event of claims. This being said, insurance premiums cover these indemnities *plus* claim management expenses *plus* the profits of insurance firms. The output at current prices of insurance companies corresponds to these two last items: management expenses and profits. The output will therefore be measured in the national accounts as *the difference between premiums received and indemnities paid out*, this being mathematically equal to

management expenses plus profits. Things are in fact slightly more complicated than this, because insurance companies immediately invest the premiums received and leave them invested until such time as they are paid out in the form of indemnities. They therefore derive incomes which, economically speaking, belong to the insured and not to the insurance companies. Therefore, the national accountants impute a repayment of this income from the insurance companies to the insured (households or firms), which then pay them back to the insurance companies, the sums involved still being imputed. It is as if households paid not only premiums but also the investment income. In the end, the output at current prices of insurance companies is equal to the premiums *plus* the investment income *minus* the indemnities.

When measuring output for the national accounts, **distribution** (both wholesale and retail) also constitutes a special category. This is because if the general formula were applied the results would significantly overestimate total output, since sales in the distribution channel are already recorded as the value of the goods created by the actual producers. Therefore, the output for distribution is measured as the margin obtained on the products sold. So the output at current prices of distributors is equal to the value of their sales minus the value of the products bought for resale. ▶ **V.** This is known as their distribution margin. The intermediate consumption of distributors therefore excludes their purchases for resale; it consists only of rent, electricity, advertising, packaging and other operating expenses. Their value added is calculated in the usual way, by deducting their intermediate consumption from their output.

V. This is made on the assumption that inflation is low and hence that there are no significant rises in market prices between the time of purchase and the time of resale. If this assumption does not hold, the rises must be taken into account and the sums involved deducted from the margin. Remember that holding gains or losses are not included in the measure of output in national accounts.

5. Nomenclatures and classifications

The broad nature of the production frontier used in national accounts has several advantages. It provides a useful, albeit approximate, measure of total production (or rather total value added) that is reasonably comparable between countries and over time. However, it is too global for certain economists, who would prefer to concentrate on more narrowly defined parts of the economy. For example, studies of productivity normally concentrate solely on the market sector, excluding the output of general government and eliminating imputations such as the output of housing services by owner-occupiers. In other cases, the economic researcher will want to focus on, for example, agriculture, the metalworking industries or business services.

To meet these specific needs, national accountants have compiled classifications (sometimes known as nomenclatures) of *industries.* ▶ **VI.** (also called *branches*). A branch of activity is defined as a grouping of homogeneous production units. Branches are identified by reference to a product classification, so that a branch produces only the goods or services described under a given heading of the product classification. The international reference classification for branches is the ISIC Revision 3 (International Standard Industry Classification, soon to be replaced by ISIC Rev 4). ▶ **VII.**

Table 1 shows percentages of total value added for major branches in four OECD countries. The classification used is the international industry classification in the national accounts (which is based on the ISIC) at the so-called A6 level (6 major branches shown in bold type in the table), and at the A17 level (the branches lettered from A to Q). For example, the A6 level "Industry" is broken down into three A17 levels: C Mining and quarrying; D Manufacturing; E Electricity, gas, and water supply. Firms often operate in several branches, since many of them are diversified. In this case, they are broken down into virtual units producing a homogeneous good. For example, the "Industry" branch includes all productive units producing industrial goods, whether these units be entire firms or parts of firms, known as "establishments". Differences in structure can be seen between highly developed countries, such as the United States and France, where services are very substantial, and less advanced countries like Korea where industry is still very important. Note that the total of values added is not called GDP in the table. This is not an omission; GDP is not equal to the sum of gross values added. GDP is equal to the sum of gross value added plus taxes net of subsidies on products (see Chapters 1 and 10).

For a yet more detailed picture, look at Table 2, based on the "A31" level of the international classification. This gives output, intermediate consumption and value added for Belgium in 2002, broken down by sub-branches of manufacturing.

VI. Note that the term "industry" is used either as a synonym of branch (as it is here) or to indicate the entire grouping of industrial branches – as opposed to agriculture and services.

VII. The reference product classification at international level is the CPC (Central Product Classification) and is described in Chapter 11.

Table 1. **Value added by industry at current prices**

As a percentage of total value added

Industry code and title		France	Korea	Portugal	USA
	Agriculture and fishing	**2.7**	**4.1**	**3.6**	**0.9**
A	Agriculture, hunting and forestry	2.6	3.8	3.2	0.9
B	Fishing	0.1	0.3	0.4	0.0
	Industry	**16.6**	**29.9**	**19.7**	**17.0**
C	Mining and quarrying	0.2	0.3	0.3	1.0
D	Manufacturing	14.7	26.9	16.8	14.0
E	Electricity, gas and water supply	1.7	2.6	2.6	2.0
F	**Construction**	**5.3**	**8.6**	**7.6**	**4.6**
	Trade	**19.5**	**18.3**	**23.9**	**22.0**
G	Wholesale and retail trade; repair of motor vehicles and household goods	10.8	7.8	14.3	13.1
H	Hotels and restaurants	2.3	3.0	3.0	2.7
I	Transport, storage and communication	6.4	7.5	6.6	6.2
	Business activities	**30.7**	**21.9**	**19.0**	**32.2**
J	Financial intermediation	4.8	9.1	6.0	7.8
K	Real estate, renting and business activities	26.0	12.8	13.0	24.3
	Other services	**25.2**	**17.3**	**26.3**	**23.3**
L	Public administration and defence; compulsory social security	7.6	5.9	9.3	7.4
M	Education	5.6	5.4	7.3	5.1
N	Health and social work	7.9	2.9	6.1	6.8
O	Other community, social and personal service activities	3.4	3.0	3.0	3.9
P	Private households with employed persons	0.5	0.1	0.7	0.1
Q	Extra-territorial organisations and bodies	0.0	0.0	0.0	0.0
	Total value added	**100.0**	**100.0**	**100.0**	**100.0**

Source: OECD (2006), *National Accounts of OECD Countries, Main Aggregates, 1970-2004, 2006 Edition,* OECD, Paris.

StatLink: *http://dx.doi.org/10.1787/417223344147*

Table 2. **Output, intermediate consumption and value added of manufacturing branches**

Belgium, 2002, current prices, million euros.

Industry code		Output	Intermediate consumption	Gross value added
D	Manufacturing	171 163	127 135	44 028
DA	Manufacture of food products, beverages and tobacco	26 541	20 672	5 868
DB	Manufacture of textiles and textile products	8 364	6 125	2 239
DC	Manufacture of leather and leather products	313	217	96
DD	Manufacture of wood and wood products	2 780	2 042	737
DE	Manufacture of pulp, paper and paper products; publishing and printing	10 166	6 784	3 382
DF	Manufacture of coke, refined petroleum products and nuclear fuel	12 955	11 776	1 179
DG	Manufacture of chemicals, chemical products and man-made fibres	28 893	20 183	8 710
DH	Manufacture of rubber and plastic products	5 186	3 373	1 813
DI	Manufacture of other non-metallic mineral products	6 917	4 513	2 405
DJ	Manufacture of basic metals and fabricated metal products	24 006	17 797	6 209
DK	Manufacture of machinery and equipment n.e.c.	8 016	5 183	2 833
DL	Manufacture of electrical and optical equipment	9 537	6 264	3 273
DM	Manufacture of transport equipment	22 340	18 430	3 910
DN	Manufacturing n.e.c.	5 150	3 775	1 375

Source: OECD (2006), *National Accounts of OECD Countries, Main Aggregates, 1970-2004, 2006 Edition,* OECD, Paris.

StatLink: *http://dx.doi.org/10.1787/547506450686*

Key Points

The production frontier used for national accounts includes:

- The production of goods and services intended to be sold, known as market output.
- Unsold production, known as non-market output, of general government and non profit institutions.
- Production of goods by households for their own consumption, and the own-account production of capital goods by businesses.
- The housing services (imputed rents) of homeowner-occupiers, not including the other services produced by households for their own account.

Market output at current prices is measured as: sales plus changes in inventories of finished products and work in progress.

Output is measured at the basic price, which equals the per-unit revenue received by the producer, excluding taxes on products but including subsidies on products.

Non-market output (that of general government and non-profit organisations) is measured by the sum of its costs, including intermediate consumption, compensation of employees, consumption of fixed capital and other taxes on production.

Housing services provided by homeowner-occupiers are imputed as being equal to the rents they would have paid for comparable housing.

The output of banks is measured, for simplification, as the difference between interest received and interest paid, plus the sales of directly invoiced services.

The output of insurance companies is measured as the difference between premiums and indemnities, plus investment income.

The output of the distribution sector is measured by the distribution margin.

Going further

Household services

Official national accounts do not include the domestic and personal services provided by members of a household for their own consumption. This means that activities like cooking, housecleaning, washing clothes and looking after children or elderly people are excluded from GDP unless these activities are carried out by people paid for doing so. This had led John Hicks, the famous economist and national accounts pioneer, to remark that it was possible to reduce GDP by marrying one's cook.

National accountants have rejected the idea of including these services in GDP for practical reasons: the difficulty of imputing values to such services, and to the consequences this would have for the analysis of variations in GDP, which would then contain a substantial portion that is completely "invented". How indeed can one value the service provided by a mother making meals for her family? At the price of an employee in a fast-food preparing a hamburger or at the price of a chef in a three-star restaurant? Some people have suggested estimating the price of the imputed salary at its "opportunity cost", in other words what the mother would have earned had she been working outside the household. This estimation method would produce widely differing results. For example, if the mother is a senior executive, the opportunity cost will be much higher than if she is a cashier in a supermarket. Another difficulty is how to distinguish between activities when there is joint production. A father is simultaneously peeling vegetables for the family meal, keeping an eye on the baby and helping another child with homework. How much time should one allocate to the cooking, to looking after the baby and to the education of the other child? Should the value of these activities be reduced because they are being carried out at the same time?

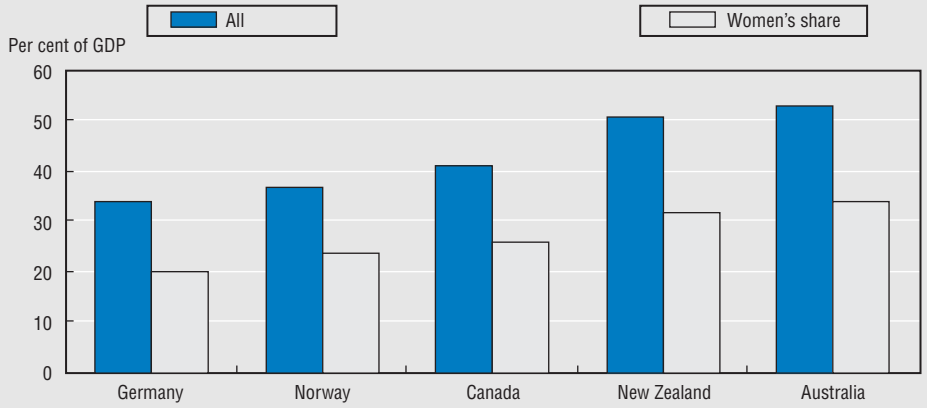
The decision to place unpaid domestic services outside the production frontier of the national accounts has been quasi-controversial. In most countries, these unpaid services are mainly carried out by women and are manifestly just as important for the general welfare as many of the paid services that are within the production frontier. Looking after children or elderly parents, housecleaning and feeding the family are activities with as much value added (if not more) as those of professional footballers or casino-managers, which are placed within the production frontier. Some people have even gone as far as to accuse national accounts of being the product of a macho conspiracy, aimed at reinforcing the idea that women's work in the home is of no value.

Nothing could be further from the truth; it is purely for practical reasons that the activities are excluded. Moreover, in order to provide the public with better information,

several statistical offices compile so-called satellite accounts containing an estimate of this unpaid domestic work. These statistics, forming an annex to the national accounts, show what GDP would have been had unpaid domestic work been included. Figure 2 shows estimates for five countries. These are for 1990 and taken from an OECD report titled *Measurement of Unpaid Household Production. Paris, 1997*. The estimates of the total value of unpaid services range from around 35% of GDP in Germany to more than 50% of GDP in Australia. In any case, women produce almost two thirds of the unpaid domestic work. Clearly, women are worth a lot.

Figure 2. **Unpaid household production**

As per cent of GDP



The adjustments for the underground economy in the case of France

To account for the underground economy, all OECD countries make substantial adjustments to the officially obtained GDP. In the case of France, this adjustment amounts to around +4%. It must be made clear, however, that this figure is just an approximation. What INSEE (the French statistical office) calls the underground economy comprises three sub-groupings: illegal activities (drug dealing, organised prostitution, etc.); black labour (clandestine enterprises); and tax fraud. INSEE, like other statistical institutes, does not try to evaluate illicit activities. To account for black labour, it adjusts GDP by roughly +1%. The approach adopted is highly empirical: on the basis of official investigations and socio-economic research, INSEE has picked out sectors where there is a strong presumption of underground work and then estimated, very crudely, sector by sector, the scale of this activity, based on expert opinion.

In the case of tax fraud and tax evasion, INSEE adjusts the accounts by around +3%, of which 2.5% is for dissimulation of receipts and 0.5% for unpaid VAT (Value-Added Tax).

As regards the dissimulation of receipts, the sources used are official figures from the tax authorities compiled on the basis of sample tax investigations. For VAT, the source is a comparison between the theoretical VAT amount calculated on recorded taxable transactions, and the VAT actually recovered by the government, together with several minor adjustments. In addition to these adjustments, there are accounting adjustments for undeclared gratuities and benefits in kind. Each of these represents roughly 0.5% of GDP.

Data sources for the value added of non-financial enterprises: the example of France

One of the drivers that enhances the quality of national accounts is that they are based on the extensive aggregation of individual firms' accounts. In the case of France (but this is applicable to other countries) INSEE has access, albeit after a certain delay, to all the accounts sent by firms to the tax authorities as part of their declarations for profits tax. This source is virtually exhaustive as regards firms and individual entrepreneurships. It is therefore from this source that the largest part of GDP is estimated. Sales of non-financial enterprises as shown in company accounts constitute an essential source for the calculation of the output of the non-financial market sector in the national accounts. However, this is not as simple as it might seem, since there are numerous adjustments to be made to the company accounts, which do not use exactly the same definitions as the national accounts. Adjustments also have to be made to allow for the underground economy and to take into account other sources of an even more reliable nature, such as those derived from the government budget. For example, the national accountants have to make sure that the taxes paid by enterprises are equal to the taxes received by the authorities. When this is not the case, it is the government accounts that are considered as taking precedence, and the data from the company accounts are altered accordingly. This adjustment clearly modifies the measurement of company profits (the gross operating surplus). Onto these figures have to be added the results of INSEE's direct surveys of enterprises (the EAE, or Enquête Annuelle d'Entreprise), whose results are mainly used to make a detailed breakdown of sales by branch.

FISIM

FISIM (financial intermediation services indirectly measured) is the term used to describe the services that banks provide to their customers but which are not invoiced. For bank depositors, these services generally include the management of current accounts, the sending out of bank statements and fund transfers between accounts. Instead of directly invoicing these services, the banks reduce the interest paid to depositors. This interest is in fact lower than the one customers could have obtained by lending their money directly to borrowers. For bank borrowers, these services include the monitoring of their creditworthiness, financial advice, the smoothing over time of repayments and the

recording of these repayments for accounting purposes. The cost of these services is an inseparable part of the interest rate that the bank charges to these borrowers.

FISIM at current prices is calculated using the following (simplified) formula:
(rl – rr) x L + (rr-rd) x D.

In the formula above, rl is the observed interest rate on loans, rr is the so-called reference rate, rd is the reference rate of deposits, L is the amount of loans, and D is the amount of deposits. The reference rate rr is an estimate of a pure interest rate, involving no risk element, thus corresponding to economics agents' preference for the present. The difference between the interest rate paid by borrowers (rl) and the reference interest rate (rr) is used to measure the price of FISIM for the borrowers. The difference between the reference interest rate (rr) and the rate of interest received on bank deposits (rd) is used as the price of FISIM for depositors. These prices are then multiplied by total borrowing, and by total deposits, in order to arrive at the total FISIM consumed by the various economic agents.

The logic of national accounts requires that if FISIM is counted in the measurement of output it must also be recorded as consumption on the part of those using these services. For a firm borrowing from a bank, FISIM will therefore be intermediate consumption. For a household depositing money with a bank or obtaining a loan from a bank, FISIM will be an element in final consumption expenditure. For a long time, national accountants had found no convincing way of allocating this output to consumers and, except in the United States, Canada and Australia, FISIM was conventionally regarded as intermediate consumption at the level of the economy as a whole. Fortunately, a solution has recently been found and adopted by all OECD countries starting in 2005. This still leaves the problem of the choice of reference interest rate. European countries have chosen a rate that is an average of the short-term inter-bank rate and certain longer-term rates, while the United States has chosen the rate on US Treasury Bonds. The allocation between households and enterprises is made pro rata, based on the respective shares of loans and deposits of these two groups.

Exercises

Answers at www.SourceOECD.org/understandingnationalaccounts

Exercise 1. Change in the structure of production

This exercise is based on the Table 3 taken from Austrian national accounts at current prices. Show that the Austrian economy has increasingly become a service economy. Illustrate the result by a graph. In which branches are non-market activities to be found? Which branch contains the imputation of rents for homeowner/occupiers? What difference is there between the sum of the values added in this table and GDP? Which of the large branches has grown most since 1980? Express the result as an annual average growth rate. Which of the large branches has grown the least? Is this result in current prices totally convincing?

Exercise 2. Branches and products

Table 2 in this chapter shows output, intermediate consumption and value added by the manufacturing branch for Belgium. Using examples from this table, reconstitute the fundamental relationship linking these three magnitudes. Illustrate for certain branches the differences in their so-called outsourcing rates (externalisation rates). What differences would have been made to this table if one had wanted to present the data by product, and not by branch?

Exercise 3. Calculation of output

The following are the simplified data for a firm producing cars. Sales of cars: 1 353 500. Purchases: raw materials: 540 000; temporary employment services: 350 500; machine tools: 264 000. Inventories of finished products at the start of the period: 245 000; at the end of the period: 346 700. Inventories of raw materials at the beginning of the period: 73 200; at the end of the period: 43 000. Calculate the output, the intermediate consumption and the value added at current prices, assuming no change in prices during the period. Why is this last condition important?

Exercice 1. Table 3. **Austria: gross value added by branch**

Million current euros	1980	1995	2002
Agriculture and fishing	**3 861**	**4 245**	**4 041**
Agriculture, hunting and forestry	3 858	4 239	4 035
Fishing	3	6	6
Industry	**18 986**	**35 577**	**45 218**
Mining and quarrying	925	575	913
Manufacturing	16 047	30 540	39 644
Electricity, gas and water supply	2 014	4 462	4 661
Construction	**5 544**	**12 383**	**14 653**
Trade	**17 712**	**38 284**	**49 305**
Wholesale and retail trade; repair of motor vehicles and household goods	9 849	20 451	25 975
Hotels and restaurants	2 749	6 148	8 827
Transport, storage and communication	5 114	11 685	14 503
Business services	**8 345**	**31 353**	**44 767**
Financial intermediation	3 390	9 622	11 098
Real estate, renting and business activities	4 955	21 731	33 669
Other services	**13 387**	**36 059**	**39 399**
Public administration and defence; compulsory social security	4 008	10 802	11 888
Education	3 986	8 876	10 599
Health and social work	3 240	9 852	9 148
Other community, social and personal service activities	1 965	6 163	7 285
Private households with employed persons	188	366	479
Total value added	**67 835**	**157 901**	**197 383**
GDP	**76 325**	**175 526**	**220 688**

Exercise 4. Calculation of output: the non-market case

The following are simplified data for a unit of general government. Civil servants' gross wages and salaries: 562 980; employers' social contributions: 65 450; purchases of materials: 85 340; tax revenue: 485 770; depreciation: 124 320. Calculate output, intermediate consumption and value added. Verify that the measure of output corresponds to the assumption that this administrative body is non-profit.

Exercise 5. Calculation of output: the case of banks

The following are the simplified data for a bank: foreign exchange commissions: 32 980; stock-market trading commissions: 23 430; interest received: 357 850; interest

paid: 204 650; purchases of materials: 34 520; purchases of IT consultancy services: 32 890; purchases of software: 12 590; inventory of materials at the start of the period: 7 420; inventory of materials at the end of the period: 3 860. Calculate the output, the intermediate consumption and the value added. Assume the figure for FISIM is interest received minus interest paid.

Exercise 6. Calculation of output: the case of distributors

The following are the simplified data for a retail chain: sales: 4 567 800; total purchases: 4 120 500 (of which, goods for resale: 3 987 350); inventories of goods for resale at start of period: 476 000; at end of period: 548 400; inventories of materials at start of period: 120; at end of period: 3 250. Calculate the output, the intermediate consumption and the value added. Inflation is assumed to be negligible.

Exercise 7. Calculation of output: the case of insurance companies

The following are the simplified data for an insurance company: premiums received: 210 400; indemnities paid out on claims: 187 500; income from the investment of reserves: 34 270; purchases of consumables: 24 320; inventories of materials at the start of the period: 5 630; at the end of the period: 20. Calculate the output, the intermediate consumption and the value added. Now suppose that an exceptional claim raises the amount of indemnities for this same period to 245 000. Recalculate the output. How is this result to be interpreted?

Chapter 5

DEFINING FINAL USES OF GDP

1. Final uses in the national accounts
2. Households' final consumption expenditure
3. Final consumption expenditure by general government
4. Final consumption expenditure of the NPISHs
5. Moving from consumption expenditure to actual consumption
6. Gross fixed capital formation
7. Changes in inventories
8. Net acquisitions of valuables
9. Exports and imports of goods and services

5 DEFINING FINAL USES OF GDP

Changes in the **final uses** of GDP, or **demand** to use the economists' term, determine the growth of real GDP in the short term. This chapter gives the definition of the components of this demand.

The authors of the OECD *Economic Outlook* for 2005, commenting on recent economic developments in the United Kingdom (the country chosen for illustration in this chapter), wrote: "*UK GDP grew by over 3% in 2004 underpinned by* ***fixed investment*** *and* ***government consumption****, which were up by 5.5% and 4.75%, respectively. On the other hand, the contribution from* ***consumers' expenditure*** *is diminishing, with growth of just over 1% at an annualised rate in the fourth quarter of 2004, the lowest growth rate since early 2003 when consumer confidence was affected by concerns about Iraq. With growth stronger than in the main European trading partners,* ***net exports*** *have remained a drag on growth in 2004.*"

There are three target variables that governments try to influence in order to maintain growth at a rate that keeps inflation and employment at the desired levels: 1) demand from households (or, in the national accounts, "households' consumption expenditure"); 2) public consumption (or "general government consumption expenditure"); and 3) investment (or "gross fixed capital formation"). To influence these variables, governments use fiscal and monetary policy instruments (see "How do monetary and fiscal policies operate?" in the Section "Going further").

The total of these three variables is known as **domestic demand**. Exports are also a major component of final demand, but in this case **external demand**. It is conventional to show external demand as being equal to exports *minus* imports, the result being known as **net exports**.

These are the variables that economists look at when trying to predict future economic developments. At first, macroeconomic forecasts are made by estimating final uses based on their recent movements, taking into account recent and expected changes in monetary and fiscal policy. Once these forecasts have been prepared for each member country, the OECD economists then exploit their knowledge of the financial and trading links between OECD countries to see whether the forecasts for each country are consistent for the OECD area as a whole. This leads to an iterative process in which the individual country forecasts are adjusted to produce a consistent set of forecasts taking into account the probable impact of the monetary and fiscal policies of each country on all the others.

This chapter will look at what is contained in each of the components of final uses. It is essential to bear in mind throughout the chapter, even though we do not always repeat

the point, that what interests economists most is the variations in the volume for these variables, and not their movements at current prices. Some tables in this chapter use data at current prices, but the proper definition of the variable in the context of macroeconomic forecasting is the corresponding variable in volume (*i.e.* after deflation of the variable in current prices by the appropriate price index). Exercise 1 at the end of this chapter illustrates how a table of final uses at current prices is converted into volume terms.

1. Final uses in the national accounts

Table 1 shows the principal components of final uses and their importance in relation to GDP for the United Kingdom. An obvious feature is the importance of the item "households' final consumption expenditure". This accounts now for more than 60% of GDP in the United Kingdom, and the percentage is similar in other OECD countries.

Table 1. **United Kingdom: Share of final uses in GDP**

As a percentage of GDP, current prices

SNA Codes		1980	1990	2000	2004
P3-S14	Households' final consumption expenditure	57.5	60.6	63.3	62.9
P3-S13	General government final consumption expenditure	21.5	19.8	18.8	21.1
P3-S15	NPISHs' final consumption expenditure	1.4	2.0	2.4	2.5
P51	Gross fixed capital formation	18.7	20.5	17.0	16.3
P52	Changes in inventories	–1.1	–0.3	0.6	0.4
P53	Acquisition less disposal of valuables	0.0	0.0	0.0	0.0
P6	Exports	27.1	24.0	28.0	25.0
P7	*Minus* Imports	–24.9	–26.6	–30.1	–28.4
	Statistical discrepancy*	–0.3	0.0	0.0	0.1
GDP	Gross domestic product	100.0	100.0	100.0	100.0

* This row is explained in Chapter 11.

Source: OECD (2006), *National Accounts of OECD Countries: Volume I, Main Aggregates,* 1993-2004, 2006 Edition, OECD, Paris.

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What does "final uses" mean?

First of all, why "uses"? Quite simply because we are dealing with the use of resources placed on the market, these resources being output, imports and withdrawals from inventories. In large part, these uses consist of *purchases* by economic agents, and this is why one speaks of *final expenditure* as well as *final uses*: these two terms mean the same thing.

And then, why "final"? In the national accounts, the uses of resources are described either as *intermediate* or *final*. Intermediate uses consist of goods and services that are consumed (one could also say used-up or transformed) in a production process within the economic territory and during the accounting period (one year); final uses comprises all other goods and services. Note that it is not the nature of the good or service that determines whether it is intermediate or final. A steak bought by household is "final", but if a restaurant buys the same steak, it is "intermediate". Similarly, a steel sheet will generally be an intermediate good, but it can also become final if it is stocked during the current period to be consumed in a later period, or if it is exported. "Final" therefore simply refers to all the goods and services used during the period that are not entirely consumed (used-up or transformed) in a production process in the course of that same accounting period. It will be seen later that several conventions have had to be introduced in order to distinguish "final" from "intermediate" in practice.

In the case of households, apart from their activities as individual entrepreneurs and excluding the special case of dwellings, all the goods and services they buy are final, because despite the fact that they are in large part consumed during the accounting period, they are not used in a production process. It is necessary to remember the definition of output given in Chapter 4: preparing meals and washing clothes in the home are not considered as output in the national accounts. As a result, a raw steak is not considered as intermediate consumption in the production of a meal by a member of a household. The objection can be raised that certain goods purchased by households are not entirely consumed during the accounting period: wine and tinned preserves, for example, can be stocked for several years, while durable goods like cars, computers and household electronics provide services for their owners over many years. The response to these objections is that *by convention*, all goods and services apart from dwellings are considered to have been entirely consumed once they have been acquired by households.

Another important point is that expenditure by general government and non-profit institutions is classified *by convention* as final, either as final consumption expenditure or as gross capital formation (GCF). It may be asked whether some of these services should not be treated as intermediate. While there is little difficulty in accepting that education and healthcare are of a "final" nature, many public services – ranging from defence and policing to street lighting and road maintenance – have some of the characteristics of the "intermediate" category. They clearly contribute to production, since there would be much less output if the government failed to defend the country against a foreign invasion, to maintain law and order and to keep the road system in good condition. Indeed, the absence of such services can lead to catastrophic slumps in output, as the experience of numerous developing countries can testify.

The problem is that it is not possible to say just how much of these services provided by general government contributes to the output of firms and how much to the general well-being of the population. Both households and firms benefit from public security, the road

network and the many other contributions to civilised living provided by general government. And even if it were possible to separate out that part of general government services that contributes to production, one would then be obliged to allocate the production costs in a very arbitrary fashion among the producers. These are the reasons that have led national accountants to treat all services provided by general government as "final".

Conversely, all spending by firms on goods and services is "intermediate" apart from investment (GFCF) and changes in inventories. Purchases of investment goods are recorded as *final* and not intermediate expenditure because the consumption of these goods (referred to as *consumption of fixed capital* by the national accountants and as *depreciation* by economists) takes place over a period of more than one year. Changes in inventories also form part of final uses because inventories remain in existence for many accounting periods – usually for the entire lifetime of the enterprise.

Exports – the goods or services sold abroad – are considered as "final" (even though they may be used in a production process by the importing country) because they are final sales from the point of view of the exporting country. From the point of view of the importing country, the value of these imported goods and services is included either in final goods and services or in intermediate goods and services and has to be subtracted from the total of final goods and services to obtain Gross *Domestic* Product. This is why imports carry a negative sign in Table 1.

To sum up, the definition of "final" goods and services is based on several conventions. Purists may find this unsatisfactory since a different set of conventions would give a different set of national accounts. However, it can definitely be said of the current conventions that they result in a set of statistics that have, over many years, proved useful in describing and managing countries' economies.

2. Households' final consumption expenditure

Households' final consumption expenditure is the largest component of final uses. It includes:

1. *Purchases of the goods and services used by households to meet their everyday needs:* clothing, household durables, rent, transport, personal services and so on. These purchases represent by far the largest part of household consumption expenditure. There are three points to note:

   – Some of these purchases are made on credit. In this case, the national accountant has to break the transaction down into three parts: the price of the good itself (for example, a car); the administrative expenses of the financial company making the loan; and the payment of interest. The first part is assigned to household expenditure in the "cars" category; the second to household expenditure in the "financial services" category, but the third is excluded from household consumption expenditure and

counted as an interest payment in the household primary income account (see Chapter 6 which deals with the household account). Note that the expenditure on cars is recorded in its entirety the moment the purchasers take possession of them, and not according to the timing of the loan repayments, even when the purchase is made under a financial lease or hire-purchase arrangement.

- Purchases of dwellings are final uses but are included, not in consumption expenditure, but in gross fixed capital formation. National accountants regard the owners of dwellings as producing housing services either for themselves or for tenants. These households invest (by buying the house) and carry out intermediate expenditure, for example on the purchase of building materials or the services of plumbers and electricians needed to keep the dwelling in good condition. Both the purchase of the dwelling (capital formation) and expenditures for repair and maintenance (intermediate consumption) are excluded from households' final consumption expenditure. The former remains a final use, while the latter is an intermediate use.
- In the national accounts, the household sector includes individual entrepreneurs, also called unincorporated enterprises (see Chapter 6). However, spending by households on goods and services intended for consumption in the production process of the enterprise does not form part of households' final consumption but is considered intermediate consumption by the unincorporated enterprise.

2. *Partial payments for goods and services provided by general government.* This covers cases in which the households have to pay a part of the public services provided – for example, a ticket for entry to a public museum, the price of which covers only a small part of the services provided. If prescription medicines and medical services are partly reimbursed by government, the part actually paid by households is included here.[1] The portion that is reimbursed forms part of expenditure by general government, and of households' *actual* consumption, as will be shown later.

3. Payments to general government for various types of licences and permits, when these are made in exchange for a genuine service. Payments designed merely to produce income for general government are treated as taxes and therefore excluded from households' consumption expenditure. The borderline between the two categories is somewhat arbitrary: licences for owning vehicles, boats or aircraft are treated as taxes, while fees for issuing passports and driving licenses are usually regarded as payments for services. In some countries, licence fees for public service television are treated as household final consumption expenditure, but in the United Kingdom the television licence fee is recorded as a tax. (See "Limitations of national accounts: consumption of television").

Households' consumption expenditure also includes a certain number of **imputed expenditures**. These are items of expenditure that have not really taken place but for which

values are assigned – or "imputed" – in order to improve comparability over time and between countries. The main imputed items of expenditure are:

- *Owner-occupiers' imputed rents.* People living in dwellings they own are considered to be selling housing services to themselves. The rents recorded in the national accounts therefore include both the actual rents paid by tenants and imputed rents in the case of owner-occupiers. In most countries, this is the largest imputed item in households' consumption. The amount of the imputed rent is measured by the rents paid for comparable housing in a similar part of the country.
- *Own-account consumption.* Consumption expenditure includes the value (estimated using the corresponding market prices) of the consumption of goods produced by people for themselves. The most important examples are agricultural products produced by farmers for themselves and their families. Note that imputations are made only for goods. With the exception of the housing services of owner-occupiers, no imputation is made for other services such as cooking, looking after children and cleaning when these are produced and consumed within households.
- *Income in kind.* Employees may receive goods and services either free of charge or at very low prices as part of their wages. For example, railway employees are often entitled to travel by train more or less free of charge, members of the armed forces frequently obtain free meals, etc. In the national accounts, these benefits in kind are valued at their cost to the employer. They are then added to compensation of employees and also appear in households' consumption expenditure.
- *Financial intermediation services indirectly measured (FISIM).* Banks commonly provide their customers with certain services free of charge or at prices that are below the cost of production. In some countries, the handling of cheques, for example, is still free. They cover their production costs by charging higher interest rates on the loans they make than on the deposits they receive. FISIM (see Chapter 4) is essentially measured by the difference between the interest received and the interest paid. Some of this FISIM is consumed by households and so must be included in household final consumption expenditure.

Consumption made outside the home territory

Households' final consumption expenditure must include all consumption expenditure made by households resident in the United Kingdom (to take the country illustrating this chapter), whether this expenditure takes place on UK territory or elsewhere. ▶ I. This means having to add to the consumption carried out on home territory the consumption by UK tourists abroad. Since the national accountants do not know what products tourists have consumed abroad, they record a total amount under "tourist services", which is recorded as an import and added to consumption on home territory (which for its part is available in great

I. For the definitions of "residence" and "economic territory", see Section 9 of this chapter.

detail). Conversely, the consumption recorded on home territory must be reduced by the value of purchases by foreign tourists in the United Kingdom.

The price system applied to final uses

The general rule applied in national accounts is that final uses are valued at the prices agreed to by the parties to the transaction. These prices are described as *market prices* or *acquisition prices*. In the case of payments by households, they correspond to the price paid in stores. Points to note:

- The prices of final uses include non-deductible VAT and other taxes on products, such as sales taxes, specific duties on tobacco, alcoholic beverages or motor fuels. The Box 1 "Typology of taxes" explains the distinction between *taxes on products*, such as sales taxes and VAT, which are included in household consumption expenditure, and *current taxes on income and wealth*, which are excluded.
- The prices of final uses include transport and marketing costs.
- The prices of final uses are net of rebates, meaning that they can be lower than the stated prices (or the "catalogue prices"), whether the reduction was obtained by bargaining or having been spontaneously offered by the seller in order to encourage sales.
- The prices of final uses include the tips paid over and above the stated prices. The most common examples are the tips paid in restaurants, taxis and hairdressers.

Classification of household expenditure

The main classification used for household expenditure is described as a classification according to *purpose* and is known as COICOP – *Classification of Individual Consumption by Purpose*. In this case, the products are classified under major headings that are better suited to the analysis of consumption than the standard classification of products, which is better suited to the analysis of production. Table 2 illustrates the changes in consumption expenditure in the United Kingdom on the basis of this classification by purpose. It shows the spectacular decline in just 25 years in the share of expenditure allocated to everyday purposes (food, alcoholic beverages and tobacco, clothing) in favour of leisure and services in general. This phenomenon is true of all countries where real incomes have been increasing. Economists say that "the income elasticity of the demand for basic goods tends to be lower than the income elasticity of the demand for services". The *elasticity* of one variable in relation to another is measured by the ratio between the index of the growth rate of the first and the index of the growth rate of the second. In this case, the elasticity of the demand for services in relation to income is therefore equal to: (100 + the growth rate in the demand for services)/(100 + the growth rate in income).

Table 2 also illustrates a major problem in looking only at expenditures made directly by households. The shares of healthcare (row 06) and education (row 10) are very small,

Box 1. **Typology of taxes**

National accountants separate the taxes paid by households and other agents into four groups: taxes on products (D21); current taxes on income and wealth (D5); other taxes on production (D29); and capital taxes (D91). Only the first two groups, which are the largest, will be dealt with here. Taxes in the first group are often called "indirect taxes" and those in the second "direct taxes".

In the OECD countries, taxes on products consist mainly of VAT, sales taxes and other specific taxes such as duties on petroleum products, tobacco or alcoholic beverages. To these can be added certain other minor taxes and customs duties. These taxes are collected at the time of the sale of the goods and services concerned and are therefore an integral part of the prices the buyer has to pay to acquire them. Prices "including taxes on product" are the most appropriate from the point of view of the economic analysis of consumption and are therefore the ones used by the national accounts. Sales to foreign tourists that are made free of VAT or sales taxes are recorded excluding these taxes, even if the purchaser initially pays them and is subsequently reimbursed. These taxes are said to be "deductible". Only non-deductible taxes are included in the prices used in the national accounts.

Current taxes on income and wealth for households consist mainly of taxes on incomes and profits of unincorporated enterprises, but also include local taxes, property taxes, other wealth taxes and some less important taxes. These "direct" taxes are not included in consumption expenditure but are treated as **transfers**, *i.e.* a payment for which nothing is directly received in return. These taxes are recorded in the secondary income distribution account, as explained in Chapter 6 on the household account.

since what we have here is only the portions of these services that are directly paid by households. In fact, the bulk of these services are free of charge, albeit financed indirectly by taxes or social contributions. The true consumption by households of health and education services is therefore much larger, but the part provided by government is recorded as *individual consumption of general government* and not as *household consumption expenditure*. We shall return to this point in Section 5.

A final point to note in this table is that the second and third rows from the bottom concern tourist expenditure. As explained earlier, it is necessary to add to consumption on home territory consumption by UK tourists abroad, and deduct the consumption of foreign tourists in the United Kingdom (hence the negative sign in this line) in order to obtain the final consumption expenditure by resident households.

3. Final consumption expenditure by general government

This is the second largest final use after household consumption. Expenditures by general government are considered *by convention* as forming part of the final uses (consumption or GFCF) of general government itself. For example, current expenditure on police and education is regarded as consumption by general government. What lies behind this strange convention,

Table 2. **United Kingdom: share of households' expenditures in classification by purpose**

As a percentage of total final consumption expenditure, current prices

SNA code		1980	2004
P31-S14-01	Food and non-alcoholic beverages	17.8	8.8
P31-S14-02	Alcoholic beverages, tobacco and narcotics	5.7	3.8
P31-S14-03	Clothing and footwear	7.7	6.0
P31-S14-04	Housing, water, electricity, gas and other fuels	16.0	18.5
P31-S14-05	Furnishings, household equipment	6.9	6.3
P31-S14-06	Health	0.9	1.7
P31-S14-07	Transport	15.0	14.8
P31-S14-08	Communications	1.7	2.3
P31-S14-09	Recreation and culture	9.9	12.5
P31-S14-10	Education	0.9	1.4
P31-S14-11	Restaurants and hotels	10.7	11.2
P31-S14-12	Miscellaneous goods and services	7.4	11.2
P33-S14	Final consumption expenditure of resident households abroad	2.0	3.8
P34-S14	Final consumption expenditure of non-resident households on the territory	–2.6	–2.1
P31-S14	Total final consumption expenditure of households	100.0	100.0

Source: OECD (2006), *National Accounts of OECD Countries: Volume I, Main Aggregates*, 1993-2004, 2006 Edition, OECD, Paris.

StatLink: *http://dx.doi.org/10.1787/354836586211*

given that these services benefit households and enterprises? Essentially, it is because no one knows how to attribute this expenditure precisely to the beneficiaries, since they do not buy them, even though they pay the taxes that finance them. It has therefore been agreed not to attempt to allocate these expenditures to their beneficiaries but to attribute all these expenditures to general government itself, by convention. Among other advantages, this makes it possible to remain closer to the actual monetary flows.

In accounting terms, final consumption expenditure by government is equal to its cost, defined by the following sum:

- compensation of employees of the government,
- *plus* purchases by government of materials and other intermediate consumption items,
- *plus* consumption of government fixed capital, ▶ II.
- *plus* the purchases of goods and services by the government for the benefit of households (for example, reimbursement of healthcare services, housing allowances, etc.),
- *plus* other taxes on production (a very small item for government),
- *minus* partial payments by households or firms for services provided by government (entry to museums, sales of government publications, etc.).

II. The new SNA, which will be implemented around 2012, could recommend including here "capital services" rather than only consumption of fixed capital. Capital services cover consumption of fixed capital plus an estimate of the return to capital (see Chapter 4).

Although this expenditure is all recorded as final consumption or GFCF by general government in the standard national accounts tables, national accountants have for some years been distinguishing, within general government consumption expenditure, the part that is "collective" from the part that is "individual". *Individual consumption expenditure* is expenditure that is clearly carried out for the benefit of households. Table 3 shows that individual expenditure now represents more than 60% of total expenditure in the UK, following an appreciable rise in this percentage in the past 25 years. This expenditure mainly covers public education and public healthcare. It is this expenditure that was missing from Table 2 but which is required in order to show the true picture of the goods and services consumed by households. Individual expenditure of government also includes spending on aid for social housing, the operating expenses of museums and other government services to households.

Collective consumption expenditure comprises expenditure related to the activities of general government that are not attributable uniquely to households but also benefit enterprises. This includes expenditure on Congress, National Assemblies, Parliaments, etc., on ministries of foreign affairs, safety and order, defence, home affairs, economic affairs and the protection of the environment, as well as government R&D activities.

There is an important economic distinction between these two categories of expenditure. In the case of individual consumption expenditure, the cost to general government of supplying the services depends more or less directly on the number of households making use of the services. It will cost almost twice as much to teach 10 000 children as 5 000. The cost of collective services, on the other hand, depends much less on the number of "customers". Defence services are available to anyone living in the country. The large countries may need to have larger armies than small countries but there is no direct link between the number of people benefiting from the collective service and the cost of supplying them.

Table 3. **United Kingdom: Breakdown of final consumption expenditure of general government**

As a percentage of final consumption expenditure of general government, current prices

SNA codes		1980	2004
P31-S13	Individual consumption expenditure of general government	51.7	61.4
P32-S13	Collective consumption expenditure of general government	48.3	38.6
P3-S13	Final consumption expenditure of general government	100.0	100.0

Source: OECD (2006), *National Accounts of OECD Countries: Volume I, Main Aggregates,* 1993-2004, 2006 Edition, OECD, Paris.
StatLink: *http://dx.doi.org/10.1787/753878315638*

4. Final consumption expenditure of the NPISHs

Non-profit institutions serving households (NPISHs) are units formed by groups of households in order to supply services to themselves or to other households on a non-commercial basis. NPISHs include political parties, trade unions, religious organisations, sports and bridge clubs, cultural associations, charities and associations with philanthropic aims (Red Cross, etc.), and certain charitable foundations. In some countries, a number of universities are also classified in this sector. It has to be noted, however, that NPISHs do not include all institutions with non-commercial aims – far from it. This is because in order to be defined as NPISHs they have to be mainly financed by households' donations or regular subscriptions. Those non-profit institutions that are not directly financed by households but are, for example, controlled or financed by enterprises (Chambers of Commerce, professional associations, mutual insurance companies, etc.) are classified as being in the enterprise sector. Those controlled or financed by general government are classified in the general government sector. In the end, the NPISHs constitute only a small sector in the national accounts.

Like general government, the NPISHs provide "non-market" services. For this reason, their treatment in the accounts is similar to that of general government. The output of services by NPISHs is valued at cost, and by convention the NPISHs "consume" the services they produce. Final consumption expenditure of the NPISHs is therefore equal to their operating costs. Note that donations to charitable organisations are not payments for services. They are regarded as transfers and are recorded in the household account in the *secondary distribution of income* account (see Chapter 6).

We saw earlier how the consumption expenditure of general government was divided between individual expenditure and collective expenditure. This distinction does not have to be made for the NPISHs, since these organisations are at the service of households and all their expenditure is therefore considered as individual.

5. Moving from consumption expenditure to actual consumption

To improve the analysis of households' consumption by incorporating the individual consumption financed by general government or the NPISHs, the national accountants have invented the concept of **actual consumption**. Households' actual consumption is equal to households' consumption expenditure plus the *individual consumption expenditure* of general government and NPISHs. This individual consumption expenditure is also known as "transfers in kind". Table 4 illustrates this move from the notion of "who spends" to that of "who consumes".

Table 4. **United Kingdom: Moving from "who spends" to "who consumes"**
2004

	(P3) Final consumption expenditure (Who spends?)	*(P4) Actual final consumption* (Who consumes?)
(S14) Households	(P3-S14) £732.3 billion = final consumption expenditure of households.	(P4-S14) £912.3 billion = (P3-S14) final consumption expenditure of households (£732.3 billion); *plus* (P3-S15) final consumption expenditure of the NPISHs (£28.9 billion); *plus* (P31-S13) individual consumption expenditure of general government (£151.1 billion).
(S15) NPISH	(P3-S15) £28.9 billion = final consumption expenditure of the NPISHs.	None (0).
(S13) General government	£246.0 billion = (P31-S13) Individual consumption expenditure of general government (£151.1 billion) also known as "transfers in kind"; *plus* (P32-S13) Collective consumption expenditure of general government (£94.9 billion).	(P42-S13) £94.9 billion = collective consumption expenditure of general government.

However, probably because the series go back only a short time, the statistics of **actual consumption** are little used by economists, despite having two analytical advantages. First, it is a measure that comes closer to households' welfare. To analyse the consumption of healthcare and education, it is not sufficient to use only the *direct* expenditure of households on healthcare or education and omit the expenditure for these purposes made by government for the benefit of households. The use of *actual final consumption by households* makes it possible to circumvent this omission. The second advantage is that international comparisons of households' consumption are meaningful only when they are based on *actual* consumption and not on consumption *expenditures*, as was shown in Chapter 3.

6. Gross fixed capital formation

Investment, or to be more precise, gross fixed capital formation (GFCF), is an essential variable for the purpose of economic analysis of demand. The GFCF of "pure" households (in other words, excluding unincorporated enterprises) consists of the purchase of dwellings. This is a good indicator of households' confidence in the future and can be used to predict movements in consumption expenditure. The GFCF of general government consists mainly of road infrastructure but also of office buildings, schools, hospitals, etc. ▶ III.

However, what economists are mainly interested in is the gross fixed capital formation of the business sector (non-financial and financial corporations and unincorporated enterprises). This is the largest single component of investment and its movements trigger off the beginning and the end of economic cycles. It also determines the growth in apparent labour productivity.

Gross fixed capital formation is precisely defined in the national accounts as the *net acquisition of produced fixed assets*, *i.e.* assets intended for use in the production of other goods and services for a period of more than one year: machinery, vehicles, offices, industrial buildings, software, etc. Some clarification is needed regarding the wording of this definition:

- The word *fixed* is used to indicate that additions to inventories are not included in GFCF. It does not mean that the equipment in question cannot move. ▶ IV. For example, transport equipment (cars, trucks, ships, aircraft) are not "fixed" in the normal meaning of the word, but they are nevertheless included in GFCF. The same is true of livestock (notably milking cows), which are also included in GFCF.
- *Net acquisitions* signifies that GFCF records the *purchases* of fixed assets after deduction of *sales* of fixed assets on the second-hand market. It is therefore not impossible, theoretically, for GFCF to be negative. For example, car rental firms "turn over" their fleets very rapidly. They buy large numbers of cars, making a positive contribution to GFCF, but at the same time they sell them very rapidly, thus making a negative contribution. For a given period, therefore, it is quite possible that the value of their purchases is smaller than that of their sales. However, such a situation is very unlikely to occur at the macroeconomic level, because one firm's sales of second-hand equipment are often another firm's purchases. ▶ V.
- The term *produced assets* signifies that only those assets are included in GFCF that are the result of a production process recognised by the national accounts. The national accounts also record transactions in *non-produced* assets

III. In a few years from now, it will be necessary to add investment in weapons systems (missiles, warships, military aircraft), which for the moment are classified as current expenditure but will be reclassified as investment in the new national accounts system that will come into use around 2012.

IV. The term "fixed" was chosen in contrast to "variable" capital, which consists of inventories. These expressions probably date as far back as Karl Marx, one of the distant sources of inspiration for several of the ideas in the national accounts.

V. This example illustrates the fact that GFCF includes used capital goods. For some developing countries, most GFCF in the form or machinery and equipment consists of second-hand equipment imported from developed countries.

such as land, primary forests and oil and mineral reserves. These *non-produced* assets are included in the balance sheet accounts but are not included in GFCF because they have been produced by nature and not by human activity. Nature is not a producer in the eyes of national accountants.

Box 2. **A special case: financial leasing**

Rather than buy a capital good outright, some firms prefer to use financial leasing arrangements, consisting of regular rental payments followed by a purchase at the end of the rental period. For example, many airlines acquire their aircraft through financial leases. There are financial companies specialising in this type of arrangement. These companies are the legal owners of numerous capital goods that they do not actually use but make available for others to operate. Economically speaking, it makes more sense to treat the airlines as owners of these assets even though this is not legally true. National accountants, who systematically give economic aspects precedence over legal aspects, record these assets as being on the books of the non-financial corporations that are the actual users, *i.e.* the airlines in this example.

The GFCF borderline

Economists, national accountants and company accountants have spent considerable time discussing the definition of fixed assets, because GFCF determines the measurement of their stock of capital (see Chapter 8), which in turn determines growth. In principle, the more capital there is, the greater the growth.

There is general agreement concerning most kinds of capital goods. Transport equipment, machinery, offices, warehouses, factories and major civil engineering works are clearly fixed assets. But there is still disagreement regarding certain types of expenditure (software, trademarks) that are in the "grey area" between GFCF and intermediate consumption. In principle, the difference between these two factors of production is the fact that the former is not entirely consumed in the annual process of production, while the latter is. Where exactly does the borderline run?

Traditionally, only material goods (also called "physical" goods or "tangibles") were considered as fixed assets. These are the items listed at the beginning of the previous paragraph. However, more and more accountants and economists recognise that several expenditures that do not take material form are not entirely consumed in the productive process during the year. Thus, these expenditures should be therefore "capitalised" and are known as "intangible assets".

Expenditure on mineral exploration is an example. Although accountants in mining firms have long regarded this expenditure as capital (GFCF) rather than current use (intermediate consumption), it is only recently that national accountants have agreed to do the same. Their reluctance stemmed from the fact that mineral exploration is entirely an

acquisition of knowledge. (Is there ore in a given geographic area or not?). This change was undertaken, however, in the SNA 1993 and now all expenditure on mineral exploration is regarded as GFCF, *even when the search is unfruitful*. This last point is not as strange as it might seem, because modern exploration technology more or less guarantees a constant success rate: for a given outlay on mineral prospecting, the companies know from experience what percentage will result in exploitable discoveries.

Some other types of intangible asset are now included in GFCF in the national accounts. These are *software, databases* and *entertainment originals* (artistic or literary). The purchase or creation of software is expenditure that is not consumed in the period in which it takes place, since a programme is used for a period of several years. These expenditures, whether on an "in-house" software programme (such as a reservation system for an airline) or original software designed to be reproduced (such as Windows®, owned by Microsoft®), or reproductions (the rights to use Windows® that firms buy from Microsoft®) are all included in GFCF.

The difficulty from the point of view of national accounts is less a question of principle but of practicality, given that they have now diverged from the conventions used in business accounts. In their own accounts, firms treat the purchase or creation of software only partially as capital expenditure, and the firms' accounts are a common statistical source for the national accounts. Why is this? First, because of the application of the cautionary principle by company accountants: when it is not certain that a computer programme will have real value on the market, accounting standards recommend considering the expenditure as Research and Development and therefore not as investment in fixed assets. For this reason, software-producing firms like Microsoft® include no software among the assets on their balance sheets. Second, because firms often have an interest in treating software as a current expenditure so that it can be deducted immediately from their profits, thus reducing their taxes. In the end, national accountants are left with no satisfactory statistical sources for evaluating capital investment in software and are obligated to find substitute sources that are fairly approximate.

Entertainment originals take material form as hard-copy novels, films, CD-ROMs or tapes. But these forms have economic value only when protected by copyright. It is this protection that gives them their value and explains their classification as intangible assets. Their evaluation by the national accountants is even more problematical in practice than for software, and it is reasonable to think that the current national accounts statistics fail to estimate this type of GFCF correctly.

R&D expenditure has not yet been included in GFCF but will most probably be in a few years' time (after 2012), since it has been recommended to capitalise R&D spending in the next national accounts system (see Chapter 8 "The exclusions from the balance sheet accounts").

The GFCF classification

In the national accounts, data on GFCF are presented in several ways. First, GFCF can be broken down by the nature of the product, using the standard product classification. However, this is not the most useful classification, since it is better suited to analysing output than investment. Second, it can be broken down according to the industry or sector making the investment. For example, in the case of the United Kingdom, GFCF (plus changes in inventories) are shown by investing industry in Table 5. As can be seen, manufacturing is far from being the largest investing industry; investment by business services, transport and communications firms, as well as by distribution, hotels and catering businesses were substantially higher in 2003.

Table 5. **United Kingdom: Capital formation (P5) by industry**

Millions of pounds sterling, current prices, 2003

Agriculture, hunting, forestry and fishing	2 578
Mining and quarrying	4 146
Manufacturing	12 605
Electricity, gas and water supply	5 178
Construction	4 727
Distribution, hotels and catering	17 886
Transport, storage and communication	22 053
Business services and finance	29 711
Public administration and defence	10 879
Education, health and social work	9 002
Other services	10 391
Not allocated to industries*	50 956
All industries	180 112

* Investment in dwellings, transfer costs of land and existing buildings, and valuables.

Source: OECD (2006), *National Accounts of OECD Countries: Volume I, Main Aggregates,* 1993-2004, 2006 Edition, OECD, Paris.

StatLink: *http://dx.doi.org/10.1787/170138546481*

But it is also possible to show a matrix combining two categories: by nature of product and by investing sector. Table 6 shows United Kingdom GFCF broken down by institutional sector and by type of asset, using a classification suited to assets and distinguishing between:

- Material fixed assets:
  1. Dwellings (excluding land).
  2. Other buildings and structures.
  3. Machinery and equipment.
  4. Cultivated assets. These are the trees, bushes and vines making it possible to produce fruit, rubber, wine, tea and other products over a period of several years; they also include livestock raised for the production of milk or wool and animals bred for reproduction.
- Intangible fixed assets:
  1. Mineral exploration – spending on the search for oil or mineral deposits.
  2. Software – standard or developed in-house, originals or copies of originals.
  3. Literary and artistic originals, such as films, novels or music. These assets earn royalties.

It is important to note that GFCF in dwellings and other buildings does not include the value of the land on which they are situated. This is because land is not a produced asset. While *non-produced assets* are excluded from GFCF, the costs associated with the transfer of ownership of *non-produced* assets (transport and installation costs), as well as administrative expenses (lawyers' fees or taxes related to the purchase of these goods) are included in GFCF, as a separate category in the United Kingdom accounts. In the case of *produced* assets, these expenses are included in the prices of the assets themselves.

The price system used

Like all final uses, *Gross Fixed Capital Formation* is valued at acquisition prices. In most cases, this amounts to recording it excluding VAT, since VAT is generally entirely deductible in the case of firms' investments. However, the acquisition prices of capital goods include transport and installation charges, as well as all specific taxes associated with the purchase of these goods. For example, lawyers' fees are included in the value of the purchase of a dwelling (but not the value of the land on which it is built).

Table 6. **United Kingdom: Gross fixed capital formation by type of asset and institutional sector**

Millions of pounds sterling, current prices, 2004

	Public non financial corporations	Private non financial corporations	Financial corporations	Central government	Local government	Households and NPISHs	Total
Dwellings, excluding land	0	502	0	122	3 347	40 425	*44 396*
Other buildings and structures	1 274	34 085	1 609	5 978	10 002	2 689	*55 637*
Transport equipment	100	12 392	108	638	315	1 099	*14 652*
Other machinery and cultivated assets	1 006	42 963	2 655	1 715	1 418	4 646	*54 403*
Intangible fixed assets	737	3 726	1 230	0	351	351	*6 395*
Ownership transfer costs on non produced assets	–266	6 706	–1 562	995	–4 226	12 936	*14 583*
Total GFCF (P51)	*2 851*	*100 374*	*4 040*	*9 448*	*11 207*	*62 146*	*190 066*

StatLink: *http://dx.doi.org/10.1787/072364437200*

7. Changes in inventories

The next item appearing in the final uses table is the *change in inventories*, *i.e.* the difference between additions to and withdrawals from inventories. In common economic parlance, one might use the terms "stockbuilding" or "changes in stocks" for this entry, but the official name in the national accounts is "changes in inventories". In principle, only the additions to inventories should be part of final uses, and withdrawals from inventories should be classified as resources. However, in order to have accounts that are more compact, it was decided to count withdrawals from inventories as negative contributions to inventories and to combine the two flows.

First, inventories consist of the stocks of inputs intended to be used later as intermediate consumption in a production process (in companies' accounts these are known as "material inventories"). Second, they include stocks of finished goods that have not yet been sold. Third, they include stocks of merchandise purchased for resale, these being found mainly in wholesale and retail distribution. Fourth, they also comprise the strategic stocks (food, oil, stocks for intervention on agricultural markets) managed by government authorities. Lastly, they can also be "work in progress", which consists of goods being processed but which cannot yet be delivered to the user at the end of the accounting period. The value of these goods is therefore included in inventories. An

important component of work in progress are goods such as ships, oil-drilling platforms and buildings that may take several months or even years to complete.

One might think it would be an easy matter to calculate changes in inventories by taking the value of inventories at the end of the accounting period and subtracting the value at the beginning, this information being available in companies' accounts. In practice, however, evaluating changes in inventories on the basis of companies' accounting data is difficult because inventories generate holding gains or losses as the market prices of the goods held in stock rise or fall. These gains or losses are not the result of a production process and thus cannot contribute to GDP, which is fundamentally an indicator of production. ▶ **VI.**

Let us suppose that prices are rising and that the change in inventories is calculated by taking the value of inventories at the end of the period *minus* the value at the beginning. The value obtained in this way will include a capital gain ("stock appreciation") that has to be eliminated in order to obtain the correct valuation of the changes in inventories for the purposes of the national accounts. ▶ **VII.** If the inventories at the end of the period consisted only of products that were already in inventory at the beginning of the period, in other words, if no new article had been added to the inventories during the period and no article withdrawn, it would be an easy matter to eliminate the holding gain, since it would be equal to the inflation rate times the opening value of the inventory. In reality, goods enter and are withdrawn from inventories at different moments in the accounting period, and it is quite possible that at the end of the period none of the original articles are still present.

When prices change and when products are continually being put into and withdrawn from inventory, there are three ways of evaluating the changes in inventories in the national accounts. The first is theoretically correct but impossible to apply in practice. The second is widely used, although it is in fact a very imperfect approximation. The third is easy, but very indirect and hence should be used with caution.

- The theoretically correct method consists of evaluating the goods coming into inventories at the market prices prevalent at the time of entry, and evaluating the withdrawals from inventories at the market prices ruling at the time of withdrawal. The algebraic sum of these entry and withdrawal values then gives the correct measure of the changes in inventories for the purposes of the national accounts. Unfortunately, this information is simply not available in practice.
- As a result, this theoretical method is replaced by an approximate method consisting of evaluating the value of the changes in

VI. The fact that these holding gains and losses are eliminated from GDP does not mean that they are ignored in the national accounts. They may have an important impact in perceived incomes when the prices of goods rise or fall. Expectations of holding gains or losses and their realization can have a substantial impact on the behaviour of producers and consumers. However, national accountants record them, not as elements of GDP, but instead in a "revaluation account" (see Chapter 8).

VII. This paragraph illustrates the case of an increase in the price of inventories, but there are of course quite common cases of decreases in the price of inventories, which should be treated symmetrically. In this case, it would be more accurate to refer to "holding loss on inventories" and "stock depreciation".

inventories by applying to the quantities held at the beginning and at the end of the period either the average prices for the period or the mid-period prices (see Exercise 3).

- The third method is very indirect, consisting of calculating all the other items in supply-use accounts (see Chapter 10) and arriving at the changes in inventories as a residual of this accounting equation. This method is theoretically exact, but it leads to incorporating into the "changes in inventories" item all the errors contained in the other items.

The economic analysis of changes in inventories

Changes in inventories constitute a highly important indicator of possible changes in the growth rate. Nevertheless, the overall change in inventories remains difficult to interpret, because it includes two different types of goods: inputs and finished products. A positive change in inventories of inputs is a good sign since it signifies that producers are expecting an increase in future production. Conversely, an increase in inventories of finished products may indicate that the producers are having difficulty in selling their output and may therefore be about to cut back production and lay off staff. The interpretation of these figures can usefully be complemented by other information, such as industrial business surveys. Note that changes in inventories expressed in volume terms is always shown in terms of contributions to growth and has therefore become more difficult to manipulate in the context of chain-linked volumes (see Chapter 2).

8. Net acquisitions of valuables

This item is very small (see Table 1) and is therefore no more than a curiosity for the macroeconomist. Valuables are goods that are bought not to be consumed or used in production, but in the expectation that they will increase (or at least at least retain) their value over time. Examples include gem-stones, precious metals and paintings by old masters. In general, transactions in these objects take place between households and are therefore consolidated (in other words, cancel out) in the national accounts, except in cases where the goods cross frontiers. In certain countries – notably the United Kingdom and Hong Kong – commercial banks invest in precious metals and these are also classified as valuables. Note, though, that gold stocks held by central banks are classified as "monetary gold" and are shown as financial assets and not as valuables.

9. Exports and imports of goods and services

Exports and imports are key aggregates in the analysis of a country's economic situation. In today's extremely globalised world, whenever the United States (the world's largest national economy, accounting for more than 20% of world GDP) slows down or accelerates, all other economies are affected. The same relationship applies to all other

countries because they are all exchanging an increasing amount of goods and services. Exchange rates play an important role here. If the pound sterling or the euro appreciates *versus* the dollar, exports from the United Kingdom or the euro area to the dollar countries suffer as a result. (Note however, that the price of their oil imports will decline, since oil is priced in dollars.) As can be seen in Figure 1, the United Kingdom's "degree of openness" reaches 25%, but this is still low compared with that of a small European country such as Belgium, which is even more open to exports and imports. The "degree of openness" is usually calculated as the following ratio: [(Exports + Imports)/GDP] x 100. It measures the extent to which a country is dependent on trade flows with its trading partners. The evolution in the degree of openness in the case of Belgium is a clear reflection of the country's growing openness to foreign trade, especially after 1993, when the single European Market was put in place.

All these remarks point to the analytical importance of exports and imports for users of the national accounts. These flows are traditionally broken down into four parts: foreign trade in goods; foreign trade in services; ▶ **VIII.** direct purchases by non-residents in the economic territory (considered as exports of services); and direct purchases by residents in the rest of the world (considered as imports of services). These two latter items in fact cover, if we continue to use United Kingdom as an illustration, spending by foreign tourists in the UK as well as by UK tourists in foreign countries, as discussed in Section 2 of this chapter. We shall not return to the calculation of exports/imports, but we do need to define three important concepts: *economic territory*, *residence* and the *rest of the world*. These concepts are necessary to a precise definition of exports and imports.

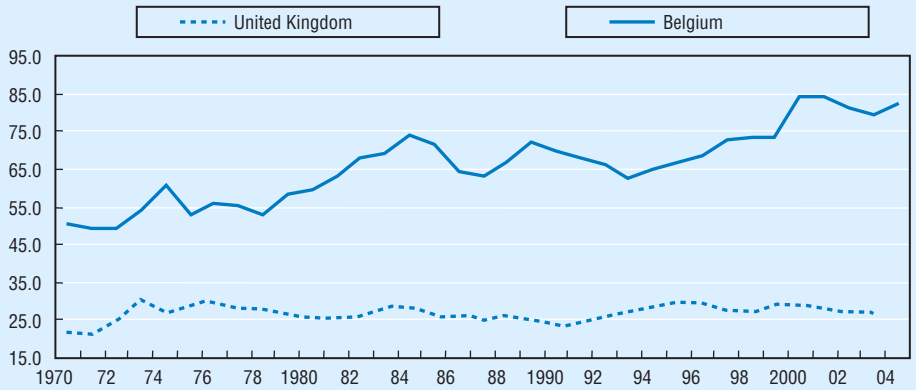
VIII. In the national accounts, "foreign trade" means foreign trade in goods *and* services. However, since figures for foreign trade in goods were available long before figures for foreign trade in services, a tradition – disputable, admittedly – has been built up of sometimes applying the term "foreign trade" solely to trade in goods. Caution is therefore needed. Customs statistics generally do not cover services and therefore foreign trade on a customs basis may cover only goods; external trade figures in the balance of payments or the national accounts include both goods and services.

A country's **economic territory** is the geographic area corresponding to the nation state. It includes its air space, its territorial waters, its territorial enclaves in the rest of the world (UK embassies in foreign countries, to take our current example) and free zones. Conversely, it excludes foreign embassies located in the UK. The definition of economic territory is important because only output taking place within the economic territory is recorded in the national accounts. A foreign subsidiary of a UK multinational is not productive in the sense used to draw up the UK national accounts, and its output is included in the national accounts of the country in which the subsidiary is located.

There have been changes in the economic territory covered in certain national accounts. For example, it is only recently (in 1999) that the French national accounts have included the overseas departments in French economic territory.[2] Previously, the economic territory in the French national accounts had been limited to metropolitan France. Because these departments were not included in the territory, the

Figure 1. **Belgium and United Kingdom: Degree of openness**

Imports + exports as a percentage of GDP



Source: OECD (2006), *National Accounts of OECD Countries: Volume I, Main Aggregates,* 1993-2004, 2006 Edition, OECD, Paris.
StatLink: *http://dx.doi.org/10.1787/348317625874*

national accounts did not include the output of firms situated in these departments, and therefore recorded exports and imports to and from these overseas departments. Now that these departments are included, the French national accounts include the output of firms installed in these departments; therefore, they do not record transactions between these departments and metropolitan France as exports and imports. This type of mismatch between the official definition of a country and its economic definition in the national accounts is quite frequent; for example, the US national accounts do not include Puerto Rico. Generally, however, the quantitative impact on the accounts is negligible.

The concept of **residence** is associated with that of economic territory in the national accounts. A unit is said to be resident in a country when its "centre of economic interest" is situated in that country's economic territory. This is usually taken to mean that the unit has carried out economic activity there for more than one year. Only resident units are included in the institutional sectors of the national accounts. Most firms, including unincorporated enterprises that have an activity in the territory, are regarded as resident. For households, the test is where they spend their income. Only those households that make most of their consumption expenditures on the territory are regarded as resident. Households whose members work in the country but make most of their consumption expenditures abroad are excluded. This means, for example, that seasonal workers coming from another country to work for a few months a year in the United Kingdom are not regarded as resident, and their disposable income is not included in household disposable income in the UK national accounts. Conversely, certain British workers living and consuming in the United Kingdom while working in Ireland or another country are included as resident households. Foreign

tourists who consume in the United Kingdom only for a short period (generally a few weeks) are not counted as resident.

The **rest of the world** is composed of all non-resident units carrying out transactions with the country under review, here the United Kingdom. The rest of the world therefore comprises all non-resident units that sell their products to UK resident units (these sales being imports, seen from the United Kingdom) and the non-resident units that buy products manufactured in the United Kingdom (these purchases being exports, seen from the United Kingdom). Exports and imports of goods and services constitute the principal transactions with the rest of the world, but there are many other categories: payment of wages and salaries to non-resident households; transfers by immigrant workers resident in the United Kingdom of part of their income to their families remaining abroad; subsidies paid to the United Kingdom by Europe; VAT paid by the United Kingdom to Europe, etc. The totality of these transactions appears in the **rest of the world account** included in the "integrated economic account" (see Chapter 10). The balance of payments statistics are the main statistical source for the rest of the world account.

Although flows of services are increasing, exports and imports of goods (also known as "merchandise trade") continue to constitute the core of trade relations between a country and the rest of the world. Statistics of exports and imports of goods were for a long time the best statistics available for the national accounts because customs services needed them for the collection of duties and the monitoring of trade in goods. The quality of these statistics has recently deteriorated in Europe as a result of the introduction of the single market, because there is no longer any legal control by customs services over merchandise moving within the European Union. However, the statistical services or the customs services of individual European countries have introduced surveys of the major exporters and importers in order to be able to continue to monitor these movements. In the absence of these surveys, it would no longer be possible to compile the national accounts in Europe.

These customs statistics show not only the amounts of exports and imports but also give information on the quantities traded – tonnage, number of units, etc. – for a highly detailed list of products (customs classifications typically contain several thousand items). This information is used by national accountants to calculate export and import prices by dividing the values by quantities. These price indices are known as "unit value indices". This procedure is sometimes criticised because, despite being based on quite detailed statistics, it mixes together prices of products of different qualities. In practice, the result is that unit value indices can vary considerably from one period to another, so that the national accountants must apply a smoothing process to make them intelligible. Some countries have developed special price surveys covering exporters and importers to replace these imperfect "unit value indices".

In the national accounts, detailed figures for imports of goods are valued at "cif" prices, meaning that the prices of the goods include "cost, insurance, freight" when they

enter the frontier of the United Kingdom. Exports, for their part, are valued at "fob" prices, a maritime term that stands for "free on board", signifying that the prices of the goods include transport and insurance costs when they arrive at the country's frontier but not the transport and insurance costs further to the frontier. This is why one frequently sees in the national accounts tables that specify "imports cif" or "exports fob". To complicate things further, *total* imports in the national accounts are calculated at fob prices, in other words excluding the cost of transport to the frontier. The conversion to fob prices facilitates comparison with the balance of payments and results in an item called "cif-fob adjustment", which is explained in Chapter 10.

Differences in the movements of import and export prices are used to calculate **terms of trade indices**. The terms of trade are defined as the ratio between the index of export prices and the index of import prices. Exercise 4 gives an example of how these indices are calculated.

The amounts involved in *foreign trade in services* are much smaller than for trade in goods. However, these flows are rising sharply as the result of the increasing outsourcing of service activities. Until recently, exports and imports of services mainly consisted of transport services (sea, air) and insurance (reinsurance is frequently outsourced). It should also be remembered that, conventionally, expenditure by tourists is classified as trade in "tourist services". However, there is now, notably through the Internet, increasing overseas outsourcing of services to businesses and individuals ("call centres", trade in software, data processing). "Medical tourism" is also expanding, with people travelling abroad to receive treatment that is illegal or too expensive in their home countries.

The statistical sources for trade in services are of mediocre quality because this trade is difficult to identify. A very long time ago, the principal source was based on declarations made by banks to their central banks, which monitored all transactions made with the rest of the world in order to keep a check on the country's foreign-currency reserves situation. However, these declarations have been discarded in many countries and it is now necessary to carry out surveys of the principal operators dealing with the rest of the world. Monitoring external trade in services in an increasingly globalized world is a challenge that national accountants will have to face in coming decades.

Notes

1. The portion reimbursed by mutual institutions or private insurance companies is also included in households' consumption expenditure.
2. These are the islands of Guadeloupe, Martinique, La Réunion and Guyane.

Key points

- Economists use the word "demand" to cover what are known as final uses in the national accounts: consumption expenditure by households and general government; investment (GFCF); changes in inventories; and net exports (exports *minus* imports).
- In the case of producing units, uses may be "final" or "intermediate". Final refers to goods and services that are not entirely consumed during the period in a production process – *i.e.* GFCF and change in inventories. Intermediate refers to goods and services that are entirely consumed in a production process during the period.
- By convention, all goods and services bought by households other than dwellings are considered as final consumption, even if they are durable goods and are not entirely consumed during the period. Purchases of dwellings by households are GFCF.
- By convention, general government is considered to consume the services it produces. Final consumption expenditure by general government is equal to the compensation of employees, *plus* intermediate consumption, *plus* consumption of fixed capital, *plus* expenditure on market goods and services by general government on the behalf of households, *minus* partial payments.
- The price applied in the case of final uses is the market (or acquisition) price, including trade and transport margins and also non-deductible VAT and other taxes on products.
- Actual individual consumption is equal to households' consumption expenditure *plus* the individual portion of the consumption expenditures of general government and NPISHs.
- Gross fixed capital formation, often known more briefly as investment, is defined as net purchases of produced fixed assets.
- Changes in inventories are equal to additions to inventories *minus* withdrawals from inventories. Evaluating these variations on the basis of the inventories at the beginning and at the end of firms' accounting periods is problematical because of the existence of holding gains or losses on the inventories. These have to be excluded from the measure of change in inventories in national accounts.
- A distinction is often made between the exports and imports of goods and the exports and imports of services. Detailed imports are valued "cif". Total imports and detailed exports are both valued "fob".

Going further

How do monetary and fiscal policies operate?

Monetary policy consists of the central bank influencing interest rates, either directly or by affecting the money supply. Fiscal policy consists of the government modifying tax rates and increasing or reducing public expenditure.

Concerning monetary policy, a rise in interest rates will tend to reduce consumption expenditure by households because it increases the cost of consumer borrowing and makes saving more attractive. It will also tend to reduce gross fixed capital formation, first because the reduction in household spending reduces firms' incentive to invest in new plant and equipment, and second because it increases their borrowing costs. For equivalent reasons, a decline in interest rates will stimulate household spending and corporate investment.

In the past, many governments tried to encourage exports and reduce imports by means of a different instrument of monetary policy, namely manipulation of exchange rates. More recently, however, most OECD governments have tried to hold their exchange rates stable *versus* their trading partners, with the euro-area countries going so far as to fix exchange rates with each other once and for all.

Fiscal policy operates through two channels: increasing or reducing revenue and increasing or reducing expenditure. Cutting income-tax rates has an immediate impact on household spending and a secondary impact on capital formation (with firms investing more to meet the higher demand). Cutting profit-taxes encourages producers to increase output either by more investment or by higher utilisation of existing capacity.

General government makes both current expenditures (mainly civil service salaries) and expenditures on capital formation (roads, railways, urban development, etc.). Raising these two types of expenditure automatically increases GDP and also produces secondary effects inasmuch as a higher government wage bill will increase household consumption expenditure, and the demand for construction materials stimulates activity in the industries supplying them.

The euro-area countries now have much less freedom in regard to monetary and fiscal policy. They no longer have any possibility of modifying their exchange rates and have very little control over the exchange rate of the euro. Interest rates are set uniquely by the European Central Bank. While fiscal policy is somewhat less restricted, the European Stability and Growth Pact limits the possibilities in this respect by setting a ceiling of 3% of GDP on the difference between revenue and expenditure. Governments

can reduce taxes but are then obliged to make corresponding cuts in expenditure, hence cancelling out the global impact on the economy.

The limitations of the national accounts: Consumption of television or of services financed by advertising

In most countries, consumption of television services in terms of viewing hours is large and rising – especially in households with young children. However, this is very poorly reflected in national accounts statistics on household consumption. These only show the payments made by households for access to cable TV networks, and in some countries, charges levied by government to finance public broadcasting. "Consumption" of television by households in the national accounts does not reflect television services that are financed by advertising. It is true that the cost of advertising is included in the price of the goods or services advertised and thus will "appear" as part of final consumption in the national accounts but not as consumption of television, and especially not in volume terms. In the national accounts, commercial television stations are regarded solely as sellers of advertising media. (Some cynics would maintain that this is fairly close to reality...).

The picture is complicated as regards the fees levied by some governments to finance public television services. France regards these fees as a payment for services, and so they are included in households' consumption expenditure. The UK, on the other hand, regards them as a direct tax and so they are excluded from households' consumption expenditure. In countries, such as France, where governments levy charges for public television, an interesting paradox would occur if the government were to abolish the charge and either replace it by budgetary financing or privatise the public channels. Household consumption of television, and hence GDP, would be reduced despite the fact that the only thing that had changed was the source of finance. To solve the problem of this lack of recording of free television services, it would be necessary to impute a value to the "free" services and include this in household final consumption expenditure. However, national accountants have not gone as far as this, despite the fact that practical solutions have been proposed.* One issue is that this type of free service financed by advertising is expanding, notably in the form of Internet services.

Data sources: How are the figures obtained?

As in the other chapters, the French annual accounts are used as an example of the kinds of sources and methods used to estimate final uses of the GDP. We will start with the easiest case and then go on to the more difficult areas.

* On this point, the reader may be interested to read Box 28 of the monumental work by André Vanoli: *A History of National Accounting*, IOS press, 2005.

The statistics for foreign trade (from the customs service) and for the balance of payments (from the Banque de France, the French Central Bank) provide information not only on exports and imports of goods but also on exports and imports of services. Through their traditional function of controlling all movements of goods at the frontier, the French Customs Service had an excellent information system that was ideal for the national accounts. However, as noted earlier, the introduction of the single European market in 1993 abolished the obligation to declare trade flows within Europe.

In its place a quasi-exhaustive survey is carried out by the customs services of exporting and importing countries. At the European level, a significant "asymmetry" has opened up in the case of trade within the region, in that total recorded exports are now roughly 5% higher than total recorded imports. It has been deduced from this that certain countries must be overstating their exports and/or understating their imports. Some observers have evoked the possibility of export fraud (inflation of export declarations, since exports are not subject to VAT). While the result has been to cast doubt on this source, national accountants continue to rely on it entirely, as it is all that is available, and despite its shortcomings it remains one of the best sources for the national accounts.

Until now, the balance of payments data published by the Banque de France included all transactions with the rest of the world made by the commercial banks and the largest industrial firms. The compulsory collection of this data made it possible to have quasi-exhaustive coverage of all financial transactions with the rest of the world. By then sorting these transactions by type, it was possible to provide statistics on purchases and sales of services, particularly international transport and insurance.

The Banque de France also calculates the tourist balance, *i.e.,* spending by French tourists abroad and by foreign tourists in France. However, as in the case of goods, this information system has been somewhat destabilised by the ending of the compulsory declaration by banks regarding intra-European flows and by the introduction of the euro, which eliminated one of the sources used for the evaluation of the tourist balance – namely statistics on purchases of foreign currencies for francs (the former French national currency) and *vice versa*. Like the Customs Service, the Banque de France has introduced surveys making it possible to ensure the continuity of the data on which national accountants continue to rely, although they also use other sources where they are available.

This shows that it will be increasingly difficult to compile national accounts in a Europe that has become more and more unified and multinational. One day perhaps, the national accounts of each European country will become the regional accounts of the national accounts of a United Europe. But this day is a long way off. In the meantime, the present national accounts will continue to be published, at the cost of a gradual deterioration in their quality, particularly in regard to transactions with the rest of the world

Consumption expenditure by general government is evaluated on the basis of government accounts. These accounts are very complete and of high quality (see Chapter 9). They provide a very good picture of wages and salaries, intermediate consumption and transfers in kind. The evaluation of the consumption of fixed capital of general government, which is an imputed component of government final consumption expenditure, is made using estimates of the stock of government capital to which depreciation rules are applied taking into account the expected lifetimes of these assets. It is obviously much more of an approximation.

The principal source for gross fixed capital formation is additions to fixed capital, *minus* disposals, reported by firms in their tax declarations. As we saw earlier, INSEE (the French statistical office) has access to nearly all tax declarations by firms and these cover the variables required. The source is therefore a good one. However, it has its limitations in the case of intangible assets such as software, for which firms do not follow the requirements of the national accounts.

The same source is used for changes in inventories. However, the problem of "stock appreciation" makes its use somewhat problematical.

In the case of household consumption expenditure, the source is rather indirect. For most goods the starting point is retail sales, from which are deducted, often using somewhat bold assumptions, the portion of sales that go to firms. These will be either intermediate consumption or GFCF. For other products, use is made of various corporate and government sources, such as car registrations, tax data on sales of tobacco and alcoholic beverages, sales by the state-owned quasi-monopoly for gas and electricity, and sales figures for the transport companies. Relatively little use is made of INSEE's survey of households' budget. INSEE has been obliged to reduce the frequency and the sample size of this survey of household income and expenditure, which is extremely costly and not very well received by the respondent households.

These various sources of information are compared with each other in the supply and use tables which reconcile the total supply of goods and services with their final and intermediate uses. This estimation mechanism is described in Chapter 10.

Exercises

Answers at www.SourceOECD.org/understandingnationalaccounts

Exercise 1: Final uses in volume

(This exercise uses the knowledge gained in Chapter 2.)

The following table is the French version in billion euros at current prices of Table 1 in the present Chapter. The second table shows the corresponding price indices. For the analysis of growth, why must preference be given to accounts in volume rather than at current prices?

On the basis of these two tables, calculate the table of final uses in volume at 1995 prices. The sum of final uses in volume in 1995 and 1996 is equal to GDP in volume for 1995 and 1996, but why is this not precisely the case for 1997?

In the remainder of the exercise, the assumption will be made that volumes are additive. Using this assumption, calculate domestic demand and external demand. Calculate the contribution to GDP growth made by final domestic demand and final external demand in 1996 and then in 1997.

Final uses

Billions of euros, current prices

	1995	1996	1997
Household final consumption expenditure	649.03	669.64	679.96
Final consumption expenditure by general government	282.16	293.19	302.89
Final consumption expenditure by non-profit institutions serving households (NPISHs)	7.03	7.30	7.62
Gross fixed capital formation	222.10	223.98	224.59
Net acquisitions of valuables	0.92	0.89	0.99
Changes in inventories	4.41	–2.95	–2.29
Exports	265.97	279.76	319.09
Minus Imports	–249.76	–259.63	–281.68
Gross domestic product	1 181.85	1 212.18	1 251.16

Price indices of final uses

1995 = 100

	1995	1996	1997
Household final consumption expenditure	100.00	101.88	103.30
Final consumption expenditure by general government	100.00	101.61	102.78
Final consumption expenditure by non-profit institutions serving households (NPISHs)	100.00	101.91	103.15
Gross fixed capital formation	100.00	100.86	101.19
Net acquisitions of valuables	100.00	100.68	99.49
Changes in inventories	100.00	114.86	112.07
Exports	100.00	101.65	103.70
Imports	100.00	102.32	103.87
Gross domestic product	100.00	101.45	102.75

Exercise 2: True, false or choose from the list

a) Which of the following are included in household consumption expenditures: fees levied by government for the public television service; the purchase of apartments; interest paid on loans; parking fines; driving licence fees?

b) A farmer produces 300 litres of wine each year. He sells 160 litres to his neighbours and stocks 140 litres for his own consumption. Which figure should be included in household consumption: 160 litres or 300 litres?

c) Total consumption expenditure by households includes expenditure by foreign tourists in France. True or false?

d) Actual household consumption is equal to household consumption expenditure plus that of general government. True or false?

e) Actual consumption of general government is equal to its collective consumption expenditure. True or false?

f) Which of the following items of expenditure are "collective" and which are "individual"; primary education; medical research; reimbursement of medicines; police and fire brigades; operating costs of pension funds; cost of free concerts in municipal parks; expenses of troops serving with United Nations forces.

g) Fixed capital formation excludes transport equipment and live cattle. True or false?

Exercise 3: Evaluation of changes in inventories excluding stock appreciation

The first row of the following table shows the price of an item held in inventories in each of six sub-periods. The following rows show the quantities. Fill in the shaded cells/

rows, remembering that the *correct method* consists of evaluating each addition to, and withdrawal from, inventories at the price of the sub-period concerned. The *approximate method* consists of using the average price for the totality of the sub-periods and applying this to the changes in inventories expressed in quantities. The *wrong method* consists of calculating the difference between the values at the beginning and end of the whole period. Comment on the differences. Calculate the "stock appreciation".

Sub-period	1	2	3	4	5	6
Price	4	5	5	7	6	9
Quantities:						
Inventory at the beginning of the sub-period	10					
Additions to inventories during the sub-period (+)	3			1	6	3
Withdrawals from inventories during the sub-period (–)		2	7		4	
Inventory at the end of the sub-period						
Value of additions (prices x quantities)						
Value of withdrawals (prices x quantities)						

Average price over the totality of the sub-periods:

Wrong method

a) Value of inventory at the beginning of the period in current prices:

b) Value of inventory at the end of the period in current prices:

c) Difference (b) – (a), including stock appreciation:

Correct method

a) Total value of additions:

b) Total value of withdrawals:

c) Correct measurement of the changes in inventories (excluding stock appreciation):

Approximate method

d) Quantity at the beginning of the period:

e) Quantity at the end of the period:

f) Approximate measure of the change in inventories (excluding stock appreciation):

Exercise 4: The terms of trade

Using the following tables (showing French imports and exports of goods and services at current prices and in volume), you are asked to:

a) Derive the export price index for the period 1995-2002.

b) Derive the import price index for the period 1995-2002.

c) From these, deduce the terms of trade for the period.

Imports and exports at current prices

Billions of euros

	1995	1996	1997	1998	1999	2000	2001	2002
Imports	249.8	259.6	281.7	306.4	320.8	387.8	388.7	380.2
Exports	266.0	279.8	319.1	341.0	351.6	405.4	412.1	411.6

Source: INSEE, National Accounts.

Imports and exports in volume

	1995	1996	1997	1998	1999	2000	2001	2002
Imports	249.8	253.8	271.2	302.6	321.3	368.2	373.0	375.2
Exports	266.0	275.2	307.7	333.3	347.6	391.3	397.7	403.7

Source: INSEE, National Accounts.

1. The supply-and-use tables (SUTs)

In the national accounts, the first set of global tables is known as the "supply-and-use tables" (SUTs). A table of this kind applies to each product of the classification, for instance software. The equilibrium for this product can be stated as follows:

Equation 1: Output + Imports = Supply = Uses = Intermediate consumption + Final consumption + GFCF + Changes in inventories + Exports

First, let us interpret this equation in terms of *numbers*. The equation then signifies that the *number* of software programmes produced plus the *number* of software programmes imported is *necessarily* equal to the sum of the *numbers* of software programmes purchased by the user firms. The software is either for: 1) intermediate consumption (the small "disposable" programmes); 2) investment (the large professional programmes); 3) consumption by households (games software, in particular); 4) stocked as inventories by the software-producing firms in the form of work in progress; or 5) exported.

This is an absolute equality: the resources (another name for "supply") are *necessarily* equal to the uses, by definition. This explains why national accountants also refer to this equation as an ***accounting identity***. They make constant use of it, mainly to derive one item based on results for the others. For example, suppose there were no statistics concerning changes in inventories of software programmes. No matter: if statistics are available for the other items, the "change in inventories" item can be obtained by making intelligent use of the accounting identity and deriving it as the balance of the other items:

Change in inventories = Supply – Intermediate consumption – Final consumption – GFCF – Exports

In this way, we kill two birds with one stone: we obtain an estimate of the changes in inventories, and at the same time we verify the accounting identity. This example was not chosen at random because in certain countries, like France, this is the way changes in inventories are obtained. Incidentally, this illustrates a paradox of the national accounts, namely that those compiling them are not necessarily anxious to have statistics on every single item in the supply-and-use tables. For one thing, it is certain that in this case the statistics will not spontaneously "tie up". It will be necessary to choose which of the figures to trim, and this is no easy exercise.

Therefore, it should not be thought that the accounting identity method is perfect. If changes in inventories are calculated as the balance between resources and other uses, all the errors of evaluation in any of these items will find their way into the change in inventories, with possibly pernicious results. It is therefore better in this case to have direct statistics in order to make corrections "by hand" of the supply-use balance. As can be seen, while in theory the equilibrium between resources and uses is indisputable, its verification in practice forms part of the "art" of the national accountant. Box 1 explains the statistical sources of the SUTs.

Box 1. **Sources for the supply-and-use tables**

Chapters 1, 3 and 4 have already described the sources for each of the items in the supply and use tables in the case of France. We shall therefore give here only a brief reminder of what these are, still in the case of France. Market output is derived principally from sales statistics. Figures for merchandise imports and exports are taken from customs figures. Imports and exports of services mainly come from the Balance of Payments statistics of the Banque de France. Non-market output and consumption by general government come from the public accounts.

The allocation of uses on the "domestic market" (defined as output + imports – exports) depends on the nature of the product. When the product is an investment, the use will be GFCF. When it is not an investment good, it is either household consumption or intermediate consumption. The nature of the product generally makes it possible to decide whether the sales constitute solely or mainly household consumption, or, by contrast, intermediate consumption. However, in cases where the nature of the product is not a sufficient criterion, bold assumptions have to be made to allocate the sales between final consumption and intermediate consumption. It is the intermediate consumption that is the most difficult to identify. This is because systematic surveys of firms – making it possible to know the nature of their purchases – are no longer done in France. Many of the cells in the intermediate consumption matrix are therefore estimated on the basis of information regarding the past. This is why INSEE, the French statistical office, is reluctant to publish intermediate use tables at detailed level. The changes in inventories are sometimes calculated as the difference between other items.

The estimates are compiled, product by product, at the 472 level of the product classification, meaning that there are 472 SUTs. These are then aggregated and compared with the global estimates derived from statistical processing of the company accounts transmitted by firms to the tax authorities. The art of the national accountant then lies in matching the global estimates and the detailed estimates to obtain the high degree of consistency shown by tables in the national accounts. This operation is known as "arbitration" (see Chapter 11).

Interpreting the accounting identity in terms of the *number* of software programmes was clearly simplistic. In practice, SUTs are drawn up in monetary terms, *i.e.* the amount of software programmes bought or sold *in millions of national currency* – in other words, the quantities multiplied by the prices. When these prices are those of the current period, one speaks of a supply-and-use table at current prices; when they are valued at the prices of a different period (often the previous year), one speaks of a supply-and-use table at constant prices. We saw in Chapter 2 the importance of constant-price data in the national accounts, since they are fundamental to the calculation of GDP growth in volume.

II. The accounting identity holds only in volume based on constant prices. It does not hold using chain-linked volumes, which lead to non-additivity (see Chapter 2).

In both cases, whether at current prices or constant prices, the accounting identity still holds. ▶ **II.** However, the introduction of prices complicates the equilibrium somewhat, because the different

transactions are not carried out at the same prices. The following is a more complete version of the full supply-use equilibrium, this time expressed in monetary aggregates:

> **Equation 2:** Output + Imports + non-deductible VAT + Other taxes on products – Subsidies on products + Trade margins + Transport margins = Supply = Uses = Intermediate consumption + Final consumption + GFCF + Changes in inventories + Exports.

Analysis of the complete equation

Compare this second equation with the first. It is in the resources that the differences are to be found. The additions include non-deductible VAT (see section "Going a step further: the treatment of VAT in the national accounts"), other taxes (*minus* subsidies) on products, trade and transport margins. Why these additions? The answer is because of the conventions used to evaluate the price of each transaction. The most important of these conventions are as follows:

1. On the resources side: a unit of output is evaluated at the "basic price", defined as the amount the producer can obtain from the production of this unit. This definition therefore excludes taxes on products invoiced by the producers but then passed on to the government. Imports are valued "cif", in other words, at the price paid for them at the frontier, including cost, insurance and freight (*i.e.* transport) from the country of origin to the importing country's frontier.

2. On the uses side: all domestic uses are valued at their market price, also known as the purchase price, including non-deductible Value-Added Tax (VAT) and other taxes as well as transport and trade margins. Exports are valued "fob" (free on board), meaning the price paid by the customer to have the merchandise loaded on a ship (or a plane or a truck) at the frontier.

It can therefore be seen that the difference between prices applied to resources and prices applied to uses includes the taxes payable on the products. (VAT is one of the most important taxes, but there are also in certain countries specific taxes on petroleum products, alcohol or cigarettes.) In addition to taxes, prices on the resources side include the corresponding subsidies (treated as negative taxes) and the trade and transport margins. For a better understanding, here are some examples:

1. Taxes on products. An oil company produces motor fuel. Its basic price per litre is the proceeds received as refiner, say 20 cents. The purchase price to the consumer will be its market price, which is the refiner's receipts, plus VAT and the specific petroleum-products tax payable to the government on this litre. These taxes amount to 80 cents, meaning that the pump price is 100 cents. The supply-use equilibrium is therefore (per litre): 20 (basic price) + 80 (taxes on products) = 100 (price to the consumer). The taxes are not counted in the basic price, since the producer merely collects them for passing on to government.

2. Trade margins. First, note that by convention national accounts do not consider retail and wholesale services to be consumed directly. Instead, the national accounts register the consumption of retail and wholesale services as the trade margins included in the cost of the products bought. Take the example of computers. Producers are unlikely to sell these directly to households (with one or two major exceptions related to Internet sales). Instead, they sell through a supermarket or another type of retailer. Suppose that the producer sells a computer to the supermarket for 1 000 euros. The supermarket will add its mark-up, say 500 (to cover inventory charges, publicity, etc. and its profit margin). It also has to add VAT of 225 (assuming a VAT rate of 15%). The supply-use equilibrium of the "computer" product will therefore be: 1 000 (basic price of the producer) plus 500 (trade margin) + 225 (VAT) = 1 725 (price to the consumer).
3. An alternative presentation would have been to establish the equilibrium for computers excluding trade margins, as follows: 1 000 (basic price) + 150 (VAT) = 1 150 (price to the consumer excluding trade margins), and in parallel an equilibrium for the "distribution" product: 500 (basic price for the commercial service) + 75 (VAT) = 575 (price to the consumer for the commercial service). This presentation, which is highly artificial, has not been adopted by the national accountants, so that in the end the accounts show no specific consumption of commercial services. And yet there has indeed been output of a retail and wholesale services, equal to the sum of the trade margins. To resolve this contradiction, national accountants add a negative column in the input-output table, which reflects a conventional cancelling out of the output of distribution. We shall come back to this point later in this chapter.

The complete equation in constant prices

The above examples are at current prices. However, Equation 2 can be applied in exactly the same way using prices from a different period, for example the previous year. It can then be used to calculate changes in volume.

The following is a (simplified) balance for year A, at current prices, for a given product, in quantities, prices and monetary aggregates. It can be verified that the monetary aggregates are equal to the unit prices multiplied by the quantities.

	Output	Imports	Trade margins	VAT	Total Resources	Final consumption	GFCF	Exports	Total Uses
Quantity	*35 900*	*12 800*			*48 700*	*42 150*	*854*	*5 696*	*48 700*
Unit price	*15 000*	*15 000*				*18 940*	*16 000*	*16 000*	
Value in millions	538.5	192.0	48.7	123.9	903.1	798.3	13.7	91.1	903.1

The following is the balance, also at current prices, for the following year, A + 1.

	Output	Imports	Trade margins	VAT	Total Resources	Final consumption	GFCF	Exports	Total Uses
Quantity	*42 000*	*14 100*			*56 100*	*43 580*	*950*	*11 570*	*56 100*
Unit price	*15 500*	*15 500*				*19 538*	*16 500*	*16 500*	
Value in millions	651.0	218.6	56.1	132.4	1 058.1	851.5	15.7	190.9	1 058.1

The following is the resource-use balance for year A + 1, at year A's prices (*i.e.* in constant prices), obtained by replacing the prices of year A + 1 by the prices of year A.

	Output	Imports	Trade margins	VAT	Total Resources	Final consumption	GFCF	Exports	Total Uses
Quantity	*42 000*	*14 100*			*56 100*	*43 580*	*950*	*11 570*	*56 100*
Unit price	*15 000*	*15 000*				*18 940*	*16 000*	*16 000*	
Value in millions	630.0	211.5	56.1	128.1	1 025.7	825.4	15.2	185.1	1 025.7

The last row of this table therefore shows the "volumes", at the previous year's prices. All that is then needed to obtain the growth in volume is to divide these volumes for year A + 1 by the corresponding values at current prices for year A. For example, the growth in household consumption *in volume* between year A and year A + 1 is 825.4/798.3 = 1.034, *i.e* an increase of 3.4%.

Special mention should be made of the significance of in-volume figures for VAT and trade margins. These two items (VAT and trade margins) are elements of prices, so how is it possible to speak of volume in their case? This is another example of a national accounting convention one simply has to get used to. The volume of VAT is defined as the monetary amount obtained by applying the growth rate in volume of the use item on which VAT is received to the VAT in value of the previous year. In our example, therefore, the VAT in volume for year A + 1, *i.e.* 128.1, is obtained by applying the growth rate of 3.4% to 123.9, which is the value of VAT in year A. Why 3.4%? Because, this is the increase in volume of household consumption, the item on which the VAT is paid. Similarly, the trade margins in volume for year A + 1 are obtained by multiplying the growth rate in volume of each of the items of demand concerned by the trade margin to the corresponding value of the trade margin in year A.

Although already quite complicated, the above example has deliberately been kept simple in comparison with actual practice. Our main purpose is to illustrate the supply-use balance as an essential building block in national accounts calculations, at both current and constant prices.

2. The aggregate supply and final uses tables

There are as many supply and use tables as there are product categories in the national accounts. In the case of France, for example, 472 detailed SUTs are calculated each year at both current prices and previous year's prices. These detailed tables are then summed up to obtain more aggregated tables.

At aggregate level, the supply-and-use tables are broken down into three parts: the resources table; the intermediate uses table; and the final uses table (final uses being all uses other than intermediate). It has to be recognised, however, that not all countries use this presentation in their national accounts. The following elements are therefore not strictly capable of being generalised to all the OECD countries. They nevertheless make it possible to highlight certain practical presentation problems.

The resources table constitutes the left-hand part of the supply and use table. ▶ III. Table 1 is a version for France based on the highly aggregated so-called E level classification, consisting of 16 product groups. Tables at less aggregated levels would be too large for a single page. This table is to be read as if the resource parts of each SUT had been placed one above the other. For example, the first row shows resources for agricultural products (item EA in the classification), the second shows food products (item EB, Manufacture of food products, beverages and tobacco). For each item, one finds the resource headings set out in Equation 2 of the current chapter: output, imports, margins, taxes, subsidies. ▶ IV.

III. In the US, the resource table is called the "make" table.

IV. The section "Going a step further" explains the rows for the cif-fob adjustment and the territorial adjustment.

Table 2 shows final uses and is the counterpart of the previous table (Table 1). For each product category, it shows each type of final use.

3. Intermediate use table (IUT)

In addition to these two tables – the product supply table and the product final uses table – national accounts break out "intermediate consumption" for a given product into intermediate consumption figures **by industry**. An industry is defined as the aggregation of firms, or parts of firms, making a given product.

For a better understanding, let us take a fictitious and simplified supply-use balance for the electricity category. In this case, we have Output (250) + Imports (15) = Intermediate consumption (142) + Final consumption (97) + Exports (26). National accountants distribute the amount of 142 for intermediate consumption among detailed industries, recording, for example, 12 for the consumption of electricity by the automobile industry, 9 for the textile industry, 26 for the aluminium industry, and so on.

Table 1. **France: supply table**

Billions of euros, 2002, at current prices*

Product		Output of products	Imports	Cif-fob Adjustment	Trade margins	Transport margins	Total taxes on products	Of which, VAT	Subsidies on products	Total resources
EA	Agriculture	71	9	0	18	1	2	2	–8	93
EB	Food products	126	23	0	52	6	23	10	–2	229
EC	Consumer goods	118	57	0	65	5	20	18	0	264
ED	Motor vehicles	94	37	0	16	2	10	9	0	159
EE	Capital goods	156	72	0	29	3	5	5	0	265
EF	Intermediate goods	245	102	0	40	11	6	5	0	403
EG	Energy	92	31	0	11	2	39	11	–1	175
EH	Construction	171	0	0	0	0	16	16	0	187
EJ	Trade	277	4	0	–230	0	2	2	0	53
EK	Transport	127	17	–7	0	–31	3	2	–7	102
EL	Financial activities	137	3	0	0	0	9	2	0	148
EM	Real estate activities	220	0	0	0	0	3	3	0	223
EN	Services to businesses	439	22	0	0	0	24	15	0	484
EP	Personal and domestic serv.	141	2	0	0	0	13	9	0	156
EQ	Educ. health and social work	236	0	0	0	0	1	1	0	237
ER	Administration	142	0	0	0	0	0	0	0	142
PCHTR	Territorial Adjustment	0	21	0	0	0	0	0	0	21
PCIFFOB	Cif-fob Adjustment	0	–7	7	0	0	0	0	0	0
TOTAL		**2 792**	**393**	**0**	**0**	**0**	**175**	**109**	**–19**	**3 341**

* The sums of the columns and the rows may not correspond to the totals shown because of rounding.

Source: INSEE.

In this way, a matrix known as the intermediate uses table (IUT) is compiled, showing consumption *by products* in the rows, and intermediate consumption *by industry* in the columns. Table 3 below is an illustration in the case of France using the E-level classification (16 products/16 industries) for 2002.

Table 3 is to be read as follows: First, along the rows, we find intermediate consumption of a given product by different industries. For example, the row EG Energy (comprising electricity, gas and oil), shows that the French EA industry (Agriculture), shown in the first column, had intermediate consumption of energy products amounting

Table 2. **France: final uses table**

Billions of euros, 2002, at current prices*

Product	Final cons. Households	Final cons. General Government	Final cons. NPISH	Total final consumption expenditure	Total GFCF	Valuables	Changes in inventories	Total GCF	Exportations	Total final uses
EA	28	0	0	28	1	0	2	3	10	41
EB	134	0	0	134	0	0	0	0	30	164
EC	121	19	0	140	6	1	1	7	51	198
ED	51	0	0	51	20	0	1	22	48	121
EE	13	3	0	16	56	0	0	56	83	155
EF	34	0	0	34	5	0	0	5	99	139
EG	60	0	0	60	0	0	–1	–1	11	70
EH	9	0	0	9	136	0	–1	135	0	144
EJ	18	0	0	18	0	0	0	0	5	23
EK	23	1	0	25	0	0	0	0	17	42
EL	43	0	0	43	0	0	0	0	4	47
EM	147	11	0	158	16	0	0	16	0	174
EN	41	8	0	49	48	0	0	48	25	121
EP	99	13	4	116	2	0	0	2	2	121
EQ	37	170	14	221	0	0	0	0	0	222
ER	1	136	3	140	0	0	0	0	0	140
PCHTR	–14	0	0	–14	0	0	0	0	34	21
PCIFFOB	0	0	0	0	0	0	0	0	0	0
TOTAL	844	362	22	1 228	291	1	2	294	420	1 942

* The sums of the columns and the rows may not correspond to the totals shown because of rounding.

Source: INSEE.

to 4 billion euros; the EB industry (Food products) consumed 3 billion euros (the third column); and the EC Consumer goods industry consumed 1 billion, and so on. Total intermediate consumption of energy products amounted to 105 billion euros, the total of all the figures in this row.

Looking at the columns on Table 3, one can see the intermediate consumption of all product types for any given industry. In the case of "EG Energy", it can be seen that in 2002 its intermediate consumption of capital goods amounted to 1 billion, its consumption of intermediate goods to 4 billion, its consumption of energy products to 41 billion, etc. Its total intermediate consumption amounted to 64 billion euros.

Table 3. **France: intermediate uses table**

Billions of euros, 2002, at current prices*

Products	Industries	EA	EB	EC	ED	EE	EF	EG	EH	EJ	EK	EL	EM	EN	EP	EQ	ER	Total
EA	Agriculture	13	31	0	0	0	3	0	1	0	0	0	0	0	2	0	1	**51**
EB	Food products	7	28	2	0	0	2	0	0	1	0	0	0	2	17	6	0	**65**
EC	Consumer goods	1	1	23	3	2	2	0	1	4	1	2	0	10	4	8	4	**66**
ED	Motor vehicles	0	0	0	29	0	0	0	0	5	1	0	0	1	0	0	0	**38**
EE	Capital goods	2	1	2	8	47	11	1	11	2	4	0	0	8	1	4	8	**110**
EF	Intermediate goods	8	8	27	25	33	100	4	32	8	2	1	1	10	3	3	1	**264**
EG	Energy	4	3	1	1	1	12	41	3	9	11	1	1	5	4	4	3	**105**
EH	Construction	0	0	0	0	0	1	3	22	1	1	1	4	3	2	2	3	**43**
EJ	Trade	0	1	2	1	2	2	1	2	9	3	0	1	4	1	1	0	**30**
EK	Transport	0	1	2	0	1	4	1	1	13	24	1	1	5	2	2	2	**60**
EL	Financial activities	2	3	2	1	3	4	2	5	15	5	31	8	14	4	2	2	**102**
EM	Real estate activities	0	1	1	0	1	2	0	0	12	1	4	12	9	3	2	2	**50**
EN	Services to businesses	2	12	19	9	17	25	9	18	43	12	28	12	114	13	11	18	**363**
EP	Personal serv.	0	0	1	0	1	1	0	0	5	1	1	3	6	11	2	1	**35**
EQ	Educ. health and social	0	0	1	0	1	1	0	0	1	1	1	0	2	1	4	1	**15**
ER	Administration	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	**2**
PCHTR	Territorial Adjustment	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
PCIFFOB	Cif-fob Adjustment	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
TOTAL		**41**	**91**	**83**	**77**	**110**	**169**	**64**	**97**	**127**	**67**	**70**	**43**	**194**	**68**	**51**	**47**	**1 399**

* The sums of the columns and the rows may not correspond to the totals shown because of rounding.

Source: INSEE.

Be sure to note the difference between reading the rows, which show figures for a single product category, and the columns, which show a single industry. It is essential not to confuse the two, even if the items in the classification have the same name. In our example, the Energy product category and the Energy industry are both labelled EG, and yet one consists of energy products and the other of the firms producing these energy products. The similarities and differences between product and industry classifications are explained in the section "Going a step further".

4. The input-output table

We can now synthesize the three tables we have just looked at, plus two more. The resulting vast **input-output (IO) table** encompasses what might be called **goods and services accounts**. (This is in contrast to the "institutional sector accounts" that are part of the "integrated economic accounts" presented in Section 7 of this chapter). The organisation of the IO table is shown below. In the middle, we have the intermediate use table; on the left is the product supply table, and on the right is the product final uses table.

Table 4. **Input-output table**

Product supply table	Intermediate use table	Final uses table
	Production account by industry	
	Generation of income account by industry	

Underneath the intermediate use table there are two accounts that we have not yet looked at in this chapter: the production account by industry; and the allocation of income account by industry (see Table 5). These two accounts give for each industry its output, its intermediate consumption and, finally, its value-added, as well as the breakdown of the value-added between compensation of employees and gross operating surplus (or mixed income). All these concepts were examined in Chapters 6, 7 and 9, which focused on the accounts of households, firms and general government. In fact, these tables constitute a breakdown by industry of these accounts.

The input-output (IO) presentation, made up of these five tables, gives both a global and a detailed view of all the economic relationships involving products and industries. To get an idea of the wealth of data in the national accounts, note that the IO table of France is calculated at the G level, in other words 114 products and 116 industries. On its own, the French intermediate uses table therefore contains 13 224 cells (114 x 116) for each year. The whole IO table contains around 17 000 cells, and this for 20 years!

Table 5. **France: production and generation of income accounts by industry**

Billions of euros, 2002, at current prices*, at current prices

		EA	EB	EC	ED	EE	EF	EG	EH	EJ	EK	EL	EM	EN	EP	EQ	ER	TOTAL
P2	Intermediate consumption	41	91	83	77	110	169	64	97	127	67	70	43	194	68	51	47	1 399
B1	Value added	38	28	38	17	45	76	27	73	150	59	66	174	226	76	189	110	1 393
P1	Output by industry	79	118	121	94	155	245	91	170	277	126	137	217	419	144	240	157	2 792

Generation of income account by industry

		EA	EB	EC	ED	EE	EF	EG	EH	EJ	EK	EL	EM	EN	EP	EQ	ER	TOTAL
B1	VALUE ADDED	38	28	38	17	45	76	27	73	150	59	66	174	226	76	189	110	1 393
D1	Compensation of employees	8	15	23	9	33	52	11	42	92	40	40	9	154	50	146	89	814
B2 orB3	Gross operating surplus or mixed income	30	11	13	7	10	19	13	29	53	16	22	152	66	27	42	20	532
D29	Other taxes on production	1	2	2	1	2	5	3	2	6	4	5	13	8	2	5	2	63
D39	Operating subsidies	–2	0	0	0	0	–1	0	0	–1	–1	–1	0	–2	–3	–3	–1	–16

* The sums of the columns and the rows may not correspond to the total shown in the columns or the rows because of rounding.

Source: INSEE.

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However, INSEE does not publish all the detailed tables. Resources and final uses are made available at the G level, but the input-output table is made available only at the F level (40 products). Unfortunately, even at the most aggregated level, IO would not fit in a page of this book, so we cannot illustrate it here. However, Exercise 1 at the end of this chapter proposes the compilation of an IO table using copy-and-paste. The reader is advised to re-read the preceding paragraphs with a complete IO table of this kind in front of him or her. This will show the high internal consistency of the goods and services accounts much more clearly than any verbal description.

5. The use of the input-output table for economic analysis

What impact will the construction of a new high-speed rail link have on various branches of the national or regional economy? For the construction of the high-speed track, the public works firm will need steel for the rails, electric pylons and also pre-stressed concrete for the bridges and other major construction works. The result will be to increase demand for the products of the steel and concrete industries. But this is not all. The firm will also need to buy new excavators and cranes and the production of these will in turn also require more steel. The steel industry will therefore see demand for its products rise substantially and, since it consumes coal and electricity, demand for the products of these other industries will also increase, and so on.

This is one type of question for which the input-output table can be useful, once one accepts the fairly bold assumptions of a linear production function and, in particular, the fundamental assumption that the "technical coefficients" remain fixed. The "technical coefficients" for industry are the ratios obtained by dividing the value of each of the various products consumed by an industry by the output of that industry. These technical coefficients can be denoted by a_{ji}, where j is the intermediate-consumption product and i is the industry (a_{ji} is therefore "the technical coefficient" of industry i for product j).

It is assumed, in this simplified universe, that the classifications by product and by industry are identical, in other words that the i and the j belong to the same universe, with i and j running from 1 to n. The a_{ji} are equal to X_{ji}/x_i, where X_{ji} is the intermediate consumption of product j by industry i, and x_i is the output of industry i. They are called "technical coefficients" because they are meant to represent a given production technique: tor example, making one tonne of steel requires 5 tonnes of coal, 3 tonnes of iron, 10 megawatts of electricity, etc. The ratio between the value of the five tonnes of coal and the value of the resulting tonne of steel constitutes a coefficient that is representative of this production technique and is assumed to be fixed in volume. ▶ V. For the limitations of these assumptions, see the section "Relationship with economic theory".

V. "Accounting coefficient" would be a better term than "technical coefficient", since what we have are monetary amounts and not quantities. However, the term "technical coefficient" is generally used.

Using these notations, and adding a variable y_j to represent final demand for product j, a simplified supply-use balance can be written as follows:

$$x_j = X_{j1} + X_{j2} + ... + X_{jn} + y_j \quad (3)$$

The above indicates that the output of product j is equal to the sum of the intermediate consumption of product j by the various industries 1 to n, *plus* the final demand for this same product j.

As $a_{ji} = X_{ji}/x_i$, equation 3 can be written:

$$x_j = a_{j1}x_1 + a_{j2}x_2 + ……+ a_{jn}x_n + y_j \quad (4)$$

Using a matrix notation, and denoting by [A] the square matrix of the coefficients $[a_{ji}]$, by [x] the output column vector $[x_j]$ and by [y] the final demand vector $[y_j]$, we have:

$$[x] = [A] . [x] + [y] \quad (5)$$

Reorganising and denoting the diagonal unit matrix by I, and expressing [x] as a function of the remainder, we find:

$$[x] = [I - A]^{-1} . [y] \quad (6)$$

In other words, output is equal to the inverse of matrix [I – A] multiplied by the final demand vector. If one makes the bold assumption that the technical coefficients are fixed, this equation also holds for a variation Δy in demand. We then have:

$$[\Delta x] = [I - A]^{-1} . [\Delta y] \quad (7)$$

and Δx is therefore the value of change in output necessitated by the variation Δy in demand.

The answer to our initial question regarding the impact of a high-speed train link is therefore obtained by a calculation of this kind. One sets a value Δy_j on the variation in final demand necessitated by this project and applies equation 7. Exercise 4 at the end of this chapter is based on a similar simulation.

6. From the sum of the values added to GDP

Table 5, presented earlier, represents the production account by industry and gives the gross value added of each of these industries. We explained in Chapter 1 that GDP is the aggregate of output (free of double counting) obtained from the *sum of the gross values added*. We call this value *GDP output approach*. The total column in the "gross value added" row of the production account in Table 5 gives a value of 1 393. Is this the value of GDP for France?

The answer is no, because the national accountants have chosen to arrange matters so that GDP corresponds *also* to the sum of final uses; in other words, the *GDP output*

approach must equal the *GDP expenditure approach*. However, we have seen that both the value added and output approaches to calculating GDP use basic prices, while the final uses approach uses purchase prices, including taxes on products, net of subsidies on products.

This explains why the exact definition of GDP is not the sum of the values added, but the sum of the values added *plus* the taxes on products (D21), *minus* the subsidies on products (D31). ▶ VI. This price adjustment makes it possible to bring the GDP output approach and final uses approach into equality.

VI. The US is an exception regarding this rule. Value added in the NIPA accounts (see Chapter 12) is valued at market price, not at basic price. Thus, in the US national accounts, the sum of values added is, in principle, equal to the GDP expenditure approach.

Table 6 below shows the reconciliation between the output approach for calculating GDP and the expenditure approach, in this case using the case of Korea for 2003. The first part of the table clearly shows the addition to value added at basic prices of taxes on products *minus* subsidies on products (D21 – D31). It is this adjustment that makes it possible to obtain the value of GDP at market prices (as it is often called), and this also equals the figure obtained using the expenditure approach.

Table 6 also illustrates the equality of these two approaches with the "income approach", which is also based on the input-output table. The three GDPs are indeed equal. The generation of income account by industry shown earlier (Table 5) gives, for each industry, the breakdown of value added between the two factors of production – labour ("Compensation of employees", coded as D1) and capital ("Gross operating surplus and mixed income", coded as B2/B3) – *plus* "Other taxes on production" (D29) net of "Other subsidies on production" (D39).

This breakdown is also found in Table 6. Indeed, the gross value added at basic prices used to calculate the output-approach GDP (639 761.90) is equal to the sum of: "D1 Compensation of employees" or 319 891.70; *plus* "B2/B3 Gross operating surplus and mixed income", or 313 613.30; *plus* "D29-39 Other taxes on production", net of subsidies, or 6 256.90. These "other" taxes and subsidies (D29 or D39) should not be confused with taxes and subsidies on products (D21 or D31). D29 and D39 are specific taxes and subsidies, generally for small amounts, not applied to products but to the production process. An example is taxes on the wage bill. The income-approach GDP can also be obtained as the sum of the compensation of factors of production *plus* all taxes on production, and it can be expressed using the codes as: D1 + B2/B3 + D2-D3. We already saw this three-pronged approach to GDP in Chapter 1. Exercise 2 illustrates these calculations.

Table 6 also contains a typical "statistical discrepancy". Korea's GDP using the expenditure approach is equal to the GDPs obtained by the output and income approaches only if an additional 4 928.20, called the "statistical discrepancy", is added to the various elements of demand. The reason is that Korea's national accounts are derived from two distinct statistical sources. The figures for both the output and income accounts come from

Table 6. **Korea: gross domestic product: the three approaches**

Billions of Won, 2003

	2003
Gross Domestic Product (output approach)	724 675.00
B1 Gross Value Added at basic prices	639 761.90
+ D21-31 Taxes less Subsidies on products	84 913.10
Gross Domestic Product (expenditure approach)	724 675.00
P3 Final consumption expenditure	485 380.40
+ P5 Gross capital formation	217 099.00
+ P6 Exports of goods and services	274 995.10
– P7 Imports of goods and services	–257 727.70
+ Statistical discrepancy	4 928.20
Gross Domestic Product (income approach)	724 675.00
D1 Compensation of employees	319 891.70
+ B2/B3 Gross operating surplus and gross mixed income	313 613.30
+ D2-3 Taxes less subsidies on production and imports	91 170.00
of which: D29-39 Other taxes less subsidies on production	6 256.90
of which: D21-31 Taxes less subsidies on products	84 913.10
+ Statistical discrepancy	0

Source: OECD (2006), *National Accounts of OECD Countries: Volume II, Detailed Tables*, 1993-2004, 2006 Edition, OECD, Paris.
StatLink: *http://dx.doi.org/10.1787/845038246065*

the database consisting of the company accounts sent to the tax authorities, whereas the elements of demand (consumption, GFCF) come from surveys.

As a consequence, Korea's GDP obtained using the expenditure approach differs slightly from that obtained using the other approaches. Because the Korean national accountants found no satisfactory method of spreading this difference between the other items, they decided to show it separately in its own right. This practice of maintaining certain "statistical discrepancy" items between the different approaches to GDP has been adopted by several other OECD countries (the United States, in particular). Other countries, by contrast, eliminate these differences by various methods and do not show discrepancies that arise from the different ways of measuring GDP. This difference of methodology between countries does not imply that the statistical sources for the first group of countries are less reliable than for the second group. It is more a practical question and a presentational choice.

These statistical discrepancies are contrary to the "rigorous accounting framework" espoused by Edmond Malinvaud (see beginning of this chapter), but it is reasonable to leave a certain amount of latitude in the national accounts tables. As Alan Greenspan, former Chairman of the US Federal Reserve, used to say: showing statistical discrepancies has the advantage of reminding users that national accounts are far from being 100% reliable. Greenspan even added that the analysis of these discrepancies could itself be a source of information. In fact, some observers have shown a correlation between the value of the statistical discrepancies and the business cycle.

The three approaches to GDP reflect valuation of GDP at market prices as opposed to valuation "at factor cost". In the factor-cost approach, now abandoned, value added was calculated at the prices remunerating each of the factors of production, labour and capital. No taxes were taken into account. Some regret the abandonment of GDP at factor cost as an aggregate indicator of output. Indeed, from the point of view of the producer, taxes on products have no great influence on production decisions. But this has not prevented most economists and national accountant from using GDP at market prices as the main indicator of output, because it is highly practical to have GDP equal to the sum of final uses. However, some people consider that this practice has led to some double counting in GDP (see section "Limitations of the national accounts").

If instead of using the sum of the *gross* values added, one had used the values added *net* of the consumption of fixed capital, one would then have had NDP, standing for Net Domestic Product. This aggregate is unfortunately little used despite being conceptually more correct than GDP, for both the production and income approaches. However, NDP is less robust statistically because of the difficulty of calculating the consumption of fixed capital.

7. The integrated economic account (IEA)

We have just looked at the input-output table, the internally consistent table for the presentation of the goods and services accounts. The second major internally consistent table is known as the integrated economic account (IEA). This provides a synthesis of the entire institutional sector accounts (see Box 2 "Institutional units and institutional sectors"). The IEA table is much too large to be shown on a page of this book. In fact, it spreads over two pages, with the uses on the left and resources on the right, columns for the institutional sectors and rows for the transactions. It can be summarised by saying that it constitutes the juxtaposition of the accounts of households, corporations and general government presented in Chapters 6, 7 and 9. In addition to these sectors, the IEA table shows the account of the whole national economy and the account of the rest of the world (we shall be returning later to these two accounts). The advantage of the IEA account is that it provides an immediate and consistent vision of all the transactions concerning a given operation at current prices. One of the important rules of national accounts as depicted in the IEA is **accrual accounting** (see section "Going further").

Box 2. **Institutional units and institutional sectors**

The basic economic unit in the national accounts is known as the **institutional unit**. It is defined as "an elementary economic decision-making centre characterised by uniformity of behaviour and decision-making autonomy in the exercise of its principal function". A household is an institutional unit in the sense that it is within the household that decisions are made regarding the modalities of its principal function, *i.e.*, consumption. For a "legal person" (*i.e.* a corporate body and not a "physical person") to be an institutional unit it must, among other things, have a complete set of accounts. If the unit in question does not have complete accounts, it is considered as forming part of the larger unit that contains it. For example, the French statistical office (INSEE) is not an institutional unit, because it is a directorate of the Finance Ministry, which is itself part of general government. General government has complete accounts but INSEE does not.

The **institutional sectors** are groupings of institutional units. They are six in number: households (S14); non-financial corporations (S11); financial corporations (S12); general government (S13); non-profit institutions serving households (S15); and the rest of the world (S2). The rest of the world is not really an institutional sector since it comprises only that part of the accounts of non-resident units that relates to transactions with resident units. The notion of residence was explained in Chapter 4. The definition of most of the institutional sectors was set out in Chapters 5, 6, 7 and 9, except for financial corporations.

The **financial corporations** are the institutional units specialising in financial intermediation (banks) and in insurance. The financial corporation sector (S12) comprises the central bank, the commercial banks, specialised financial corporations, mutual funds (also called UCITS in Europe – undertakings for collective investment in transferable securities), financial auxiliaries, which comprise certain portfolio management companies, insurance companies and pension funds.

Let us take, among the 60 or so rows in the integrated economic account (IEA) for Denmark, the row for "interest" (D41). In the IEA, this is a single row, with the left side showing the amounts as uses, and the right side showing the amounts as resources. But for space reasons, in Table 7 we show the resources below the uses (even though in the actual table they are side by side).

Here is how to read the table: The first sub-table shows the "uses", *i.e.* the interest *paid* by the institutional sectors. The first group in the column is entitled "National economy" and labelled S1. This is the institutional sector, consisting of the four *resident* institutional sectors, as opposed to the "Rest of the world", consisting of *non-residents*. The four resident sectors are the non-financial corporations, the financial corporations, general government, households and non-profit institutions serving households. The figure of 334.3 billion kroner for interest is therefore the total amount of interest paid by each of the domestic sectors, *i.e.*: 45.2 + 157.9 + 48.0 + 83.1, these figures all appearing in the same row. ▶ **VII.** Following this,

VII. The equality between S1 and the sum of the resident sectors is a consequence of the national accounts not being "consolidated" (see section "Going further").

Table 7. **Extract from the integrated economic account for Denmark: row "D41 interest"**

Billions of Danish kroner, 2003

Uses								
		S1 National economy	S11 Non-financial corporations	S12 Financial corporations	S13 General government	S14-S15 Households and NPISHs	S2 Rest of the world	Total
D41.	Interest	334.3	45.2	157.9	48.0	83.1	31.4	365.6
Resources								
Total	S2 Rest of the world	S14 Households and NPISHs	S13 General government	S12 Financial corporations	S11 Non-financial corporations	S1 National economy		
365.6	47.6	22.5	18.9	237.1	39.6	318.1	D41	Interest

Source: OECD (2006), *National Accounts of OECD Countries: Volume II, Detailed Tables*, 1993-2004, 2006 Edition, OECD, Paris.
StatLink: *http://dx.doi.org/10.1787/252465163805*

the next column indicates the interest paid to Denmark by the rest of the world, amounting to 31.4 billion kroner. In all, 365.6 billion of interest is paid by the various sectors.

The second sub-table ("resources") shows the interest *received*, broken down by institutional sectors. Obviously the total interest received, 365.6 billion, is equal to the total interest paid, in conformity with the principle of consistency of the national accounts. Going along the row, one finds the sums received by each institutional sector.

This table is interesting because it makes it possible to visualise how the interest flows are broken down among agents. It nevertheless has two limitations. The first is that it is not consolidated (see section "Going a step further"), so it is important not to misinterpret the figures. The large sum of interest paid by the financial corporations does not signify that this interest is paid to other institutional sectors – far from it. Most of the interest paid by financial corporations is to other financial corporations, as a result of the complexity of modern financial systems.

The second limitation, linked to the first, is that these tables fail to show what national accountants call the "who-to-whom" element. For example, the table does not show "to whom" the financial corporations pay the 157.9 billion. Most probably, as has just been said, it is paid largely to other financial corporations, but also to households and non-financial corporations. However, these amounts are not known. Only a "who-to-whom" matrix could answer this question. The statistical offices have this type of information for certain transactions but do not generally publish them.

8. The transition from GDP to national income

It would be redundant to comment on all the rows in the integrated economic account (IEA) since the accounts for the main institutional sectors have already been described, one by one, in Chapters 6, 7 and 9. Here we shall only comment on the accounts of the S1 "National economy" sector, which is interesting in that it includes major aggregates such as Gross National Income, Gross Disposable Income, national saving and the nation's net lending/net borrowing.

Gross national income

Since GDP equals the sum of the values added *plus* taxes on products net of subsidies, it has an important place in the production account of sector S1, an extract of which is shown for Korea in Table 8. The second important aggregate in this account is gross national income (GNI), or net national income (NNI), if the consumption of fixed capital is subtracted. This aggregate (GNI) used to be called gross national product (GNP), but too many people confused it with gross domestic product, and it was therefore given a new – and more suitable – name.

Gross domestic product is the economic wealth produced by economic agents within the economic territory. Gross national income is the sum of the primary incomes of the economic agents resident in the territory. In the case of Korea, the difference between the two appears clearly in the first part of Table 8 below. In order to derive GNI from GDP, the following steps are necessary:

1. start with GDP (724 675.0 in 2003);
2. add the primary incomes received from the rest of the world (+9 116.7). These primary incomes consist of wages and salaries, property income (interest, dividends) and taxes and subsidies;
3. deduct the primary incomes paid to the rest of the world (–8 371.4);
4. to finally obtain the GNI (725 420.3).

The above makes it easier to interpret GNI. It is the totality of the primary incomes received by economic agents resident in the territory, regardless of whether these incomes are obtained in the territory or not. In addition to the income derived from production within the territory (already included in GDP), there are the incomes derived from production outside the territory (not included in GDP). This explains the addition of the compensation of employees received from the rest of the world, in all likelihood the wages and salaries of workers resident in Korea but working in neighbouring countries. Conversely, it is necessary to deduct the wages and salaries of workers who are non-resident in Korea but who have come to work there. The same operation is carried out for trans-border flows involving the two other forms of primary income, namely property income and taxes and subsidies on production. And the final result is GNI, which (unlike GDP) is an *income-based* concept and not a *production-based* concept, since it includes income derived from production abroad (and hence not recorded in its totality) and

Table 8. **Korea: the transition from GDP to GNI and other major aggregates**

Billions of Won, 2003, at current prices

B1_G.	**Gross domestic product**	**724 675.00**
D1_D4.	+ Primary incomes receivable from the rest of the world	9 116.70
D1_D4.	– Primary incomes payable to the rest of the world	–8 371.40
B5_G.	**Gross national income at market prices**	**725 420.30**
K1.	– Consumption of fixed capital	–98 850.60
B5_N.	**Net national income at market prices**	**626 569.70**
D5_D7.	+ Current transfers receivable from the rest of the world	9 375.90
D5_D7.	– Current transfers payable to the rest of the world	–12 819.40
B6_N.	**Net national disposable income**	**623 126.20**
P3.	–Final consumption expenditures	–485 380.40
B8_N.	**Saving, net**	**137 745.80**
D9.	+ Net capital transfers from the rest of the world	–1 601.10
P5.	– Gross capital formation	–217 099.00
K2.	– Acquisitions less disposals of non-produced assets	–66.40
K1.	+ Consumption of fixed capital	98 850.60
B9_S1.	**Net lending/net borrowing**	**17 829.90**

StatLink: *http://dx.doi.org/10.1787/671625385132*

excludes the value of output repaid to foreign factors of production. Hence, the use of the word "income" instead of "product" in its name. This being said, in the case of Korea the difference between the GDP and GNI is very small. We saw in Chapter 1 that it is greater for a country such as Luxembourg because of the importance of trans-border workers in relation to the country's economy. ▶ **VIII.** Given GNI, it is possible to calculate net national income (NNI) by subtracting the consumption of fixed capital.

VIII. GNI is an important aggregate for European Union (EU) countries because it is one of the main indicators used to allocate the operating costs of the EU institutions among member countries.

The rest of Table 8 outlines the transition from NNI to *national saving*. Similar additions and deductions for transactions with the rest of the world are made in order to obtain Net Disposable National Income, from which is deducted total final consumption expenditure in order to obtain National saving, which itself equals the sum of the savings of the different institutional sectors. Finally, one arrives at the *nation's net lending/net borrowing*, essentially by deducting capital formation. It can be seen from Table 8 that in 2003 Korea had net lending of 17 829.9 billion won. In other words, Korea had no need of foreign financing for its investment. On the contrary, Korea globally provided more financing to foreign countries than foreigners did to Korea.

Key points

- The balances depicted in the supply-and-use tables (SUTs) for products constitute the basic accounting identity for the goods and services accounts. They compare resources (output, imports) with uses (intermediate consumption and final uses). They are calculated at current prices and in volume.
- Output is valued at basic prices. Uses are valued at market prices.
- Trade and transport margins as well as taxes (net of subsidies) are all included in the calculation of resources for products in the supply-and-use table.
- The input-output (IO) table consists of the juxtaposition of the supply-and-use balances (resources table and final uses table) and the matrix of intermediate consumption. This matrix shows in its columns the various intermediate consumptions for a given industry.
- The input-output table also includes the production accounts and the generation of income accounts for industries.
- The input-output table is available at current prices and in volume.
- When value added is calculated at basic prices (which is generally the case), the Gross Domestic Product is the sum of the values added of the industries *plus* taxes on products net of subsidies.
- Gross National Income (GNI) is the new name for Gross National Product, which must not be confused with Gross Domestic Product. GNI equals the sum of the primary incomes of economic agents resident in the territory, regardless of whether these incomes were obtained within the territory or not. GNI does not include the primary incomes generated in the territory by non-resident agents.
- The integrated economic account is a reorganised grouping of the accounts of the institutional sectors. It shows the amounts of uses and resources of each institutional sector for all transactions. It is calculated only at current prices.

Going further

The treatment of VAT in the national accounts

In many countries, the VAT (Value-Added Tax) is one of the main taxes on products. It is collected in stages by firms for the benefit of government. The principle is as follows. All market producers (including distributors) are obligated to invoice a certain additional VAT percentage on the prices of the goods and services they sell. VAT is identified separately on the invoices of the seller firms so that the buyer firms know how much VAT they have paid. Firms pay to the government only the difference between the VAT they have collected on their sales and the VAT they have paid on their purchases. Hence the description "value-added": the tax relates to the difference between output (sales) and intermediate consumption and investment, a notion that therefore comes close to that of value added in the national accounts. VAT is not invoiced at all on exports. It is applied to imports, however.

Due to this construction, VAT is an economically more rational tax than the old taxes based on sales, which could show an increase, for example, simply if a new intermediary joined the chain from producer to consumer. This cannot happen with VAT. The success of this tax, which is now applied in more than 100 countries, lies also in the fact that it is less open to fraud than traditional taxes. This is because buyer firms have an interest in seeing that the seller firms record VAT correctly, since they are able to claim reimbursement.

The term "deductible VAT" is applied to the VAT payable on firms' intermediate consumption or gross fixed capital formation, since these amounts are deductible from the VAT owed by the firm to government as a result of its sales. Conversely, the term "non-deductible VAT" applies to the VAT that the buyer cannot deduct from his own VAT debt to the state. By definition, therefore, the VAT paid by households is totally non-deductible, since households are final consumers of the goods. On the other hand, also by definition, virtually all the VAT paid by firms on their purchases is deductible. There remain, however, special cases in which firms cannot entirely deduct the VAT on their purchases and are accordingly liable for a small portion of non-deductible VAT. VAT on purchases by non-market producers that are part of general government or NPISHs is often non-deductible.

In the national accounts system, only the non-deductible VAT is recorded. It would have been too complicated, and in the end would have been of little use for the purposes of analysis, to trace the flows of deductible VAT. This decision has three consequences. First, in the national accounts, the VAT paid on household consumption appears in the accounts in its entirety because it is totally non-deductible. By contrast, however, firms'

intermediate consumption and investment are subject, in the national accounts, only to a very small amount of VAT, since most of the VAT on these flows is deductible. Lastly, VAT is recorded not as having been received by government from individual firms but as a global receipt from "the total economy".

The brief example given below shows both the actual mechanism for the recovery of VAT and its recording in the national accounts (considering a VAT rate of 20%).

1. Actual VAT mechanism: firm A makes a sale of 120 to firm B, including 20 of VAT, which firm A pays back to the government. Firm B makes a sale of 270 to the final consumer, including 45 of VAT. It therefore pays the government (45 – 20) = 25. In total, the government receives 45 in the form of non-deductible VAT.
2. Corresponding treatment in the national accounts: firm A is recorded as making a sale of 100 to firm B (and not 120, as in reality). The 20 of VAT is not recorded because it is deductible. Firm B makes a sale to the final consumer of 270, including 45 of VAT. This amount of 45 is recorded in its totality, being non-deductible. Moreover, it is recorded as being received by the government not from firm B, but from the total economy.

As can be seen, the treatment in the national accounts does not correspond to the monetary flows. However, the result is the same from the point of view of the government's receipts of VAT. Better still, this presentation is more suited to macroeconomic analysis, because it means that virtually the total amount of VAT in the national accounts is shown as affecting household consumption. The system therefore marks a return to economic reality that might be otherwise masked. The payers of the VAT received by government are the final consumers, or households, and not the firms, which merely collect the tax.

Note that in Europe a small portion of the VAT is paid into the European budget. In practice, this portion is received by the government and then transferred to the European budget. In the national accounts, it is treated as being paid directly to the European institutions.

Industries, products and specific operations in the input-output table

This section explains certain additional notions that are indispensable for a full understanding of the tables making up the input-output table, using the example of France.

The classification of industries is almost the mirror image of the classification of products. In fact, an industry is defined as the totality of firms, or parts of firms, that produce a given product. For a full understanding of the relationship between the two, the best thing is to go to the INSEE website: *www.insee.fr/fr/indicateur/cnat_annu/base_2000/documentation/methodologie/nomenclatures.htm*.

INSEE presents its classifications as being simultaneously products and industries. From the above website, let us consider a classification at level G, titled "G31 pharmaceutical industry." This is itself contained within level F under "FC3 Pharmaceuticals, perfumes and toilet preparations" and in turn contains another subhead within level H titled "24.4C manufacture of medicines". The terminology used in this last case, including the word "manufacture", seems to suggest that it is an industry. But it is important not to go wrong on this point, since it can also be interpreted as the output of this industry, in this case medicines. It therefore represents simultaneously the activity (industry) and its result (the medicines produced). The principle that has to be kept in mind is that the output of industry X is (virtually) equal, by definition, to the output of product X. The word "virtually" is necessary because the national accounts are somewhat more complicated, and this equality does not hold for certain industries. It would take too long to go into the details here.

There is, however, one case where an industry exists but there is no corresponding product. This is "trade" (retail and wholesale trade). In the national accounts there is indeed output of trade services (measured by the trade margin) but there is no "trade" product, since, as explained in the main text, the trade margin is included in the purchase price of the product being sold. For this reason, the product supply table for France (Table 1) contains a row "EJ trade" with 277 in the output column, but this amount is cancelled out slightly further down by the purely conventional introduction of a negative margin of –230. The two amounts are not exactly equal, since the EJ item in fact contains other sub-headings than pure trade, but the idea is there: there is an output of trade, but no trade product. Although there is not the same dichotomy in the case of transport (for which there is both an industry and a product), a similar conventional cancelling out is applied relating to transport margins on final uses. This explains the figure of –31 appearing in the "transport margins" column for the "EK transport" product in Table 1.

Two other rows in the French input-output table deserve additional explanation. These are the last two rows of Tables 1 and 2: "territorial adjustment" and "cif-fob adjustment". The first concerns products consumed outside the territory, in practice tourism expenditure (see Chapter 5). Spending by French tourists abroad is conventionally recorded as an import of services (worth 21) in the product supply table (Table 1). Spending by foreign tourists in France is recorded as exports (worth 34) in the final uses table (Table 2). The difference between the two (–14) is recorded in the final uses table, in the same row and in the column "household final consumption expenditure". This sum will be added to the other consumption expenditure[1] in order to obtain, at the bottom of this column, the total household final consumption expenditure of households residing in France. This is because the other product rows in the same column of Table 2 include purchases by foreign tourists and these therefore have to be deducted to obtain consumption by residents. Conversely, the other product rows do not contain consumption by French tourists abroad and this has to be added in order to obtain their

total consumption. This dual operation is carried out in the input-output table with the help of this row.

The cif-fob adjustment also pertains to relations with the rest of the world. As we saw in the main text, imports of goods are calculated cif, *i.e.* including cost, insurance and freight to the frontier. However, this price includes transport services from the exporting country's frontier to the French frontier. To give a more precise image of the imports of services, it was decided to show the total of imports at fob (free on board) prices, which exclude these transport costs, and to show the imported transport charges in total in the "transport" row. This explains the subtraction of 7 billion euros in the cell at the intersection of the "imports of goods" column and the "cif-fob adjustment" row in Table 1. If the transport service is carried out by a resident transporter, the output of this service will be included in the output of the "EK transport" industry. If it is carried out by a non-resident transporter, it will be included in imports of transport services. In either case, these amounts have to be deducted from the transport product row, since there is no use corresponding to these resources. This explains the entry for the same amount of -7 billion in the cell at the intersection of the "cif-fob adjustment" column and the transport row in Table 1. As for the cell at the intersection of the "cif-fob adjustment" column and the "cif-fob adjustment" row in Table 1, this is purely conventional and serves only to ensure that the row totals and the column totals for this specific operation cancel out. This cif-fob adjustment is quite complicated but has no overall impact. Its sole purpose is to give a clearer picture of the total aggregate imports of goods and services.

Limitations of the national accounts: is there double counting in GDP?

GDP is equal to the sum of the components of final demand, each expressed at their purchase price, including taxes on products such as VAT. At the same time, GDP contains an estimate of the value of the output (and consumption) of non-market services, partly financed by these taxes. In so doing, are we not counting these taxes twice over?

The following simplified example will make it easier to understand the problem. Let us take an elementary economy in which there are only two products, manufactured goods and education. In this economy, the manufactured goods are subject to VAT at 20% and the proceeds are used by the authorities to purchase the services of teachers who provide free education services to households. It is assumed that there is no intermediate consumption in the economy.

The national accountants calculate GDP using the production approach: sum of values added + VAT, resulting in (120 + 20) = 140. This result matches that of the expenditure approach, since the addition of all the components of final demand, reduced in this case to consumption, does in fact give 140. But is there not something strange about including VAT of 20 in the value of final consumption of manufactured goods and also counting this 20 in the consumption of education, although the latter is in fact free?

A simplified economy financing education by VAT on manufactured goods

	Output = Value added	VAT	Final consumption
Manufactured goods	100	20	120
Education	20		20
GDP	140		140

Moreover, is it correct to speak of GDP at market prices when the consumption of education services is valued at a price that is not the one observed on the market, since education is free?

In order to understand the implications of the problem, let us suppose that the authorities decide to abolish VAT and to have the teachers paid directly by households. In addition, it will be assumed that nothing else happens either to volume or to prices. Following this change, we then obtain a GDP of 120 at current prices, representing a drop of 20.

Abolition of VAT, replaced by direct purchase of educational services

	Output = Value added	VAT	Final consumption
Manufactured goods	100		100
Education	20		20
GDP	120		120

This decline is somewhat strange. Seen from the producers' viewpoint, the value of their output has not changed; seen from the consumers' viewpoint, the value of their overall consumption has not changed. There has indeed been a decline in the prices of manufactured goods, thanks to the abolition of VAT, but this decline was offset by the rise in prices of educational services, which were previously free and now have to be paid for. The overall decline in GDP of 20 is therefore difficult to interpret.

Rather than talk of double counting, the conclusion may therefore be that there has been a failure to respect in the present definition of "GDP at market prices" the desired invariability in the face of such an institutional change. Should this be cause for concern? Not fundamentally, since the changes in volume will be unaffected. GDP in volume at the previous year's prices will still equal 140 following the institutional change. The consumption in volume of manufactured goods will also equal 140, since the prices applied are those of the previous period. In total, volume growth will be zero, which is intellectually satisfactory. As regards spatial comparison with another country, if (as is desirable) purchasing power parity (PPP) is applied, the problem will also be solved, since PPPs are calculated after tax and so will automatically correct for any "double counting".

It remains true that direct comparisons of GDP at current prices should not be made in the absence of PPP adjustment, although this is something one sees very often. Also, it is not clear how to interpret the GDP price index in the case of abolition of VAT (the implicit deflator of GDP will decrease, while it should remain constant). Nevertheless, there is no other definition of GDP that makes it possible to verify that GDP = output = income = expenditure. One question could be: is this equation purely theoretical due to the wedge introduced by taxes?

Relationship with economic theory: Wassily Léontieff and the use of input-output tables

The first input-output tables were developed by an American economist of Russian descent, Wassily Léontieff. In the 1930s, he published an input-output table for the United States for the years 1919 and 1926 and used it to describe the structure of the American economy. However, it was in his native country, which had by then become the Soviet Union, that the most extensive use of the table was made. Gosplan, the Soviet Planning Ministry, drew up a five-year plan which set targets for the availability of consumer and capital goods and used input-output tables to evaluate the output needed to reach these targets. Each industry was accordingly given production targets that it was obligated to meet. Other countries like India, Egypt, China, Vietnam and Cuba adopted similar methods.

France and the Netherlands also had their five-year plans, but the purpose of these was not to impose targets on industries but rather to provide benchmarks and incentives. France and the Netherlands are market economies in which industries are not told what to produce. The five-year plans have now totally disappeared. At the same time, use of input-output tables to estimate the output needed to meet a given demand has become rarer but has not completely disappeared.

The assumption of fixed technical coefficients is a limitation of the method, except in the short term. Indeed, relative price movements between intermediate goods are not taken into account while they can generate technical changes that call this assumption into question. Moreover, long-period analysis of technical coefficients shows that they change substantially over time. Indeed, one of the major trends in recent decades has been industrial firms' increasing externalisation of entire portions of their production systems ("outsourcing"). For example, firms have drastically reduced their internal IT services to buy the IT services of specialised outside firms, regarded as giving better value for the money. This same phenomenon has occurred in the case of financial auditing, cleaning services and security, among others. Lastly, more and more industrial firms have been calling on the services of temporary agency staff (seen as being more flexible) even for their core productive activities. In all these cases, this outsourcing increases the intermediate consumption of industrial firms without correspondingly

increasing their output. The result is a slow but inexorable increase in technical coefficients.

Although the use of input-output tables for economic analysis has been tending to diminish, there are certain examples to the contrary. The OECD has recently published an interesting study using this technique in an economic/environmental framework.[2] The international Kyoto protocol on the environment sets targets for reductions in emissions of CO_2 (the principal "greenhouse gas") for the industrial countries. Most of the signatories have made progress towards these targets. However, this may not correspond to a genuine reduction in the emissions of CO_2 attributableto a country.

The problem is that the Kyoto protocol focuses on emissions within a country's borders, whereas globalisation means relocation of industries from the rich countries to the poor countries, reducing the emissions of the former but increasing the emissions of the latter, especially as they tend to use inefficient production techniques. In total, CO_2 emissions are higher than before. The OECD study dealt with emissions of CO_2 that are attributable not to the production of the rich countries, but to their consumption. For this purpose, it used input-output tables to determine which industries are involved in meeting certain types of consumption, including industries located in other countries. The study concluded that the emissions of CO_2 attributable to the consumption of the rich countries were 5% greater than the emissions due to their domestic production.

Accrual accounting

The so-called accrual principle is applied throughout the national accounts. It is based on the same method used in company accounts. The principle is as follows: a transaction must be recorded in accordance with the amount and the timing of the creation of the claim (for the creditor) or of the obligation (for the debtor). For example, sales from firm A to firm B will be recorded at the time of change of ownership, in other words, when the sales contract is signed, without waiting for the payment of the money corresponding to the sale. In the period between the time of sale and the time when the money is transferred, the accounts will show a credit by the seller in favour of the buyer. This is the general principle applied in theory to all the series in the national accounts.

There is a dual justification for adopting this principle. First, if one considers that one aim of the national accounts is to show the wealth of economic agents at the end of the period, it is nothing less than indispensable. An agent's wealth at the end of the period must include as positive items all the unconditional claims on other agents (for example, if the sales contracts have been signed and the product delivered, the seller has an unconditional claim on the buyer) and, as negative items, the obligations contracted *vis-à-vis* other agents (for instance, even if he has not yet paid the government the taxes for the period, he still owes them). Second, its application permits better analytical correspondence among the variations of the macroeconomic series. For example, if the government raises the VAT rate in December of a given year, the repercussions on VAT

receipts will be felt in the first quarter of the following year, given the time lag between the payment of VAT by agents and the receipt of these monies by government. However, it would be analytically incorrect to record the rise in VAT only in the following year, whereas some consumption at the new rate has already taken place in the current year. In accountants' jargon, it is said that the VAT receipts have to be "time-adjusted" in order to attach them to the period when the flow was generated (at the time when, for example, a household purchases a product).

In practice, things are not so simple. On the one hand, the national accountants use company accounts, for which accrual accounting is primordial. One might therefore think that the principle is respected. However, this is not totally the case, since in many countries one of the largest macroeconomic agents, *i.e.* government, does not systematically apply this rule. Quite rightly, the national accountants consider that for certain transactions (*e.g.* taxes) government statistics are better than those derived from aggregating the company accounts. The national accounts, which are bound to be internally consistent, therefore replace the accrual-basis tax data supplied by firms with the government statistics, which are better in terms of coverage but worse with respect to the accrual basis. An adjustment is therefore necessary and is made by shifting the timing of the VAT receipts of the government in order to bring them more into line with the timing of the generation of the tax.

Another practical difficulty needs to be pointed out, namely the difficulty experienced by the national accountants in applying this principle without taking into account "provisions". A firm always has to deal with bad payers. While it will therefore record all its claims on its purchasers, it will also, by precaution, set aside a "provision" to cover non-payment and this will be recorded in its income statement. But the national accounts do not allow for the recording of these provisions, which, by definition constitute a view taken by one agent of other agents, entailing a lack of symmetry. The national accounts, for the purpose of internal consistency, record only what is symmetrical. This is a contradiction that needs to be resolved.

What does "consolidation" mean?

There are two ways of aggregating institutional units' accounts. The first is simply to add them together, as do most national accounts systems. The second is to add them together but to eliminate the transactions between individual institutional units involved in the aggregation. This method is known as "consolidation". When consolidation has been carried out, there remain only the transactions between the aggregate grouping created and the units located outside this grouping. For example, in the extract from the integrated economic account concerning interest discussed in the main text (see Table 7), if the total for the national economy (S1) had been calculated by consolidation, the figure would have been much smaller than DKK 334.3 billion, because most of the interest is paid by resident units to other resident units, and so takes place within S1.

It is fairly easy to find a consolidated figure for S1. This is because if one eliminates transactions between resident sectors all that is left, in principle, are the transactions with non-resident sectors, and there is only one such sector, *i.e.* the rest of the world (S2). The "consolidated S1" figures therefore correspond to the counterpart of the figure for S2, and so the consolidated interest paid by "S1 National Economy" is necessarily equal to the interest received by "S2 Rest of the World", *i.e.* DKK 47.6 billion. Note that two sectors are already consolidated. These are the rest of the world and households. The rest of the world by definition because the national accounts for a country take no interest in transactions that are internal to other countries or to transactions between other countries; households by statistical necessity because their accounts are obtained by difference since virtually no direct information is available regarding households. Because they are obtained by difference, household accounts are consolidated out of necessity. However, as it is very difficult to consolidate aggregate business accounts, they are most often not consolidated in the national accounts.

Note also that the items obtained as balancing items in the accounts (value added, operating surplus, saving, net lending/net borrowing) are generally invariant, whether there is consolidation or not. This is because they result from the difference between resources and uses. If the resources consist of transactions internal to the sector, the uses must necessarily include them also.

Notes

1. This value is in fact negative in the case of France and so it would be more correct to say that it is subtracted. It is negative because spending by foreign tourists in France is greater than spending by French tourists abroad. This situation is also described by saying that the tourism balance is positive.
2. Ahmad, Nadim and Wyckoff, Andrew (2003): Carbon Dioxide Emissions Embodied in International Trade of Goods, *OECD Science, Technology and Industry Working Papers,* No. 2003/15, OECD, Paris.

Exercises

Answers at www.SourceOECD.org/understandingnationalaccounts

Exercise 1. Reconstitution of an input-output table using "copy and paste"

The aim of this exercise is to compile a life-size input-output table at level E of the French classification (16 products/industries). Go to the INSEE website (insee.fr), find the annual national accounts, and then look for "Synthesis tables" and then "input-output table" ("tableau des entrées et sorties"). This will give you the product supply table ("tableau des ressources en produits"), the final use table ("tableau des emplois finals par produits"), the intermediate use table ("tableau des entrées intermédiaires") and, underneath, the production accounts ("comptes de production") and the generation of income accounts ("comptes d'exploitation") by industry ("branche"). Print out these tables separately. Using copy and paste, reassemble them so as to obtain the picture of the input-output table given in Section 4 of this chapter. Be careful to ensure that both the rows and the columns correspond. Read again Sections 1 to 4 of this chapter with this new set of tables in front of you. For those courageous enough, the INSEE site makes it possible to perform the same manipulation at level F (40 products). The result is a very large table. Imagine how big it would be at level G (114 products)!

Exercise 2. Reconstitution of the accounts of institutional sectors

Take the case of an economy with three institutional sectors: households (including NPISHs), corporations (financial *and* non-financial) and general government.

Various sources have been used and processed according to the definitions in the national accounts, with the following result:

	Corporations	General government	Households
Expenditure			
Interest	162	35	20
Employers' social contributions	129	53	11
Dividends	60		
Other taxes *minus* subsidies on production	54	2	2
Operating surplus	?	?	65
Gross wages and salaries	431	87	51
Withdrawals from income of quasi-corporations	24		
Current taxes on income, wealth, etc.	34		178
Other property income	25		
Income from land and sub-soil assets	31	7	27

	Corporations	General government	Households
Final consumption expenditure		368	1 031
Social security reimbursements		57	
Benefits		162	
Other current transfers	57	159	73
Social benefits other than social transfers in kind	43	289	
Adjustment for the change in net equity of households in pension fund reserves	11		
Resources			
Value added (at basic prices)	780	158	561
Social contributions	54	268	
Dividends	28	5	13
Taxes *minus* subsidies on products		133	
Other current transfers	59	109	72
Income from land and sub-soil assets	44		21
Other property income	16		23
Interest	139	14	56
Withdrawals from income of quasi-corporations		13	44

In addition, the balance of payments supplies the following data:

Debit (resources of the rest of the world)	
Gross wages and salaries	2
Interest	21
Dividends	14
Other current transfers	59
Withdrawals from income of quasi-corporations (located within the economy)	3
Credit (uses of the rest of the world)	
Gross wages and salaries	6
Other property income	14
Interest	13
Withdrawals from income of quasi-corporations (located in other countries)	36
Other current transfers	10

Here are certain indications that will be useful for the exercise:

1. the data shown in the first table above are not complete, and additional figures will have to be reconstituted;
2. the wages and salaries shown in the balance of payments table are by their nature paid to, or received, by the rest of the world, and the remainder are paid to households;
3. social benefits are by definition received by households;
4. social contributions received by corporations and general government are paid by households;

5. the adjustment for the change in the net equity of households in pension fund reserves applies to households, by definition;
6. households' adjusted disposable income is equal to disposable income *plus* social transfers in kind (Social Security reimbursements, other benefits in kind).

This exercise consists of completing the accounts for the three institutional sectors shown on the website.

Households

Generation of income account

Uses	Resources
Compensation of employees	Value added
Gross wages and salaries	
Employers' social contributions	
Other taxes on production, less subsidies	
Operating surplus	
Mixed income	

Allocation of primary income account

Uses	Resources
	Gross operating surplus and mixed income
	Compensation of employees
	Gross wages and salaries
	Employers' social contributions
Property income	Property income
Interest	Interest
Income from land and subsoil assets	Dividends
	Withdrawals from income of quasi-corporations
Balance of primary incomes	Income from land and subsoil assets
	Other property income

Secondary distribution of income account

Uses	Resources
Current taxes on income, wealth, etc.	Balance of primary incomes
Social contributions	Social benefits other than social transfers in kind
Other current transfers	Other current transfers
Disposable income	

Use of income account

Uses	Resources
	Disposable income
Final consumption expenditure	Adjustment for the change in the net equity of households in pension fund reserves
Saving	

Use of adjusted disposable income account

Uses	Resources
	Adjusted disposable income
Actual consumption	Adjustment for the change in the net equity of households in pension fund reserves
Saving	

Corporations

Generation of income account

Uses	Resources
Compensation of employees	Value added
Gross wages and salaries	
Employers' social contributions	
Other taxes on production, less subsidies	
Operating surplus	

Allocation of primary income account

Uses	Resources
	Operating surplus
Property income	Property income
Interest	Interest
Income from land and sub-soil assets	Dividends
Other property income	Withdrawals from income of quasi-corporations
	Other property income
Balance of primary incomes	

Secondary distribution of income account

Uses	Resources
Current taxes on income, wealth, etc.	Balance of primary incomes
Social benefits other than social transfers in kind	Social contributions
Other current transfers	Other current transfers
Disposable income	

Use of income account

Uses	Resources
Adjustment for the change in the net equity of households in pension fund reserves	Disposable income
Saving	

General government

Generation of income account

Uses	Resources
Compensation of employees	Value added
Gross wages and salaries	
Employers' social contributions	
Other taxes on production, less subsidies	
Operating surplus	

Allocation of primary income account

Uses	Resources
Property income	Operating surplus
Interest	
Income from land and sub-soil assets	Taxes *minus* subsidies on production and imports
Other property income	Taxes *minus* subsidies on products
	Other taxes *minus* subsidies on production
	Property income
	Interest
	Dividends
	Withdrawals from income of quasi-corporations
Balance of primary incomes	Other property income

Secondary distribution of income account

Uses	Resources
	Balance of primary incomes
	Current taxes on income, wealth, etc.
Social benefits other than social transfers in kind	Social contributions
Other current transfers	Other current transfe s
Disposable income	

Use of income account

Uses	Resources
Final consumption expenditure	Disposable income
Saving	

Use of adjusted income account

Uses	Resources
Actual consumption	Adjusted disposable income
Saving	

Exercise 3. Creating an integrated economic account

Use the accounts of the three institutional sectors in the previous exercise to complete the integrated economic account in the following pages:

Integrated economic account (extract) (1/3)

Total	Rest of the world	Total economy	Corporations	General government	Households	**Production account**	Corporations	General government	Households	Total economy	Rest of the world	Total
						Imports					499	499
540	540					Exports						
						Output	1 708	410	1 264	3 382		3 382
1 883		1 883	928	252	703	Intermediate consumption						
						Taxes minus subsidies on products				133		133
1 632		1 632	780	158	561	Value-added/GDP						
–41	–41					Trade balance (goods and services)						
						Generation of income account						
						Value added						
						Compensation of employees						
						Gross wages and salaries						
						Employers' social contributions						
						Taxes *minus* subsidies						
						On products						
						Other taxes						
						Operating surplus						
						Mixed income						

Integrated economic account (extract) (2/3)

Total	Rest of the world	Total economy	Corporations	General government	House-holds	**Allocation of primary income account**	Corporations	General government	Households	Total economy	Rest of the world	Total
						Operating surplus/mixed income						
						Compensation of employees						
						Gross wages and salaries						
						Employers' social contributions						
						Taxes *minus* subsidies						
						On products						
						Other taxes on production						
						Property income						
						Interest						

Integrated economic account (extract) (2/3) *(cont.)*

Total	Rest of the world	Total economy	Corporations	General government	House-holds	**Allocation of primary income account**	Corporations	General government	Households	Total economy	Rest of the world	Total
						Dividends						
						Income from quasi-corporations						
						Income from land and sub-soil assets						
						Other property income						
						Balance of primary incomes/National Income						

Integrated economic account (extract) (3/3)

Total	Rest of the world	Total economy	Corporations	General government	Households	**Secondary distribution of income account**	Corporations	General government	Households	Total economy	Rest of the world	Total
						Balance of primary incomes						
						Current taxes on income, wealth, etc.						
						Social contributions						
						Other social benefits						
						Other current transfers						
						Disposable income						
						Use of income account						
						Disposable income						
						Final expenditure						
						Change in pension fund equity						
						Saving						
						Current-account balance						

Exercise 4. Use of the input-output table in a so-called Léontieff model

Take the following input-output table, consisting of: [M] the intermediate consumption matrix; [Y] the vector of final demand for intermediate products, capital goods and consumer products; and, lastly [X], the vector of output from the industries producing these same products (in order, intermediate products, capital goods and consumer products).

		[M]		[Y]
Intermediate products	5	20	20	5
Capital goods	5	10	12	33
Consumer products	10	6	15	89
[X]	50	60	120	
	Intermediate products	Capital goods	Consumer products	

Given the above figures, and with the help of the equations in Section 5 of this chapter, do the following:

1. calculate the matrix [A] of technical coefficients;
2. use Equation 7 to calculate the impact on [X] of an increase of 20 in final demand for consumer products (say, as a result of a tax cut by the government).

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Chapter 11

THE NATIONAL ACCOUNTS MACHINERY: COMPILATION AND REPORTING

1. The quarterly national accounts
2. The annual national accounts
3. The revisions to the national accounts and their precision
4. Comprehensive revisions
5. Other datasets related to the national accounts

Previous chapters concentrated on the definitions of the variables in the national accounts. This chapter is quite different; its aim is to explain how national accounts are compiled *in practice* and to describe the main consequences of this process for the user. We will start by discussing the quarterly accounts; then we will examine the relationship between quarterly national accounts and annual national accounts. Finally, we will look at ordinary revisions and comprehensive revisions in the national accounts. The example used will be France, but the lessons to be learned apply also to other countries.

1. The quarterly national accounts

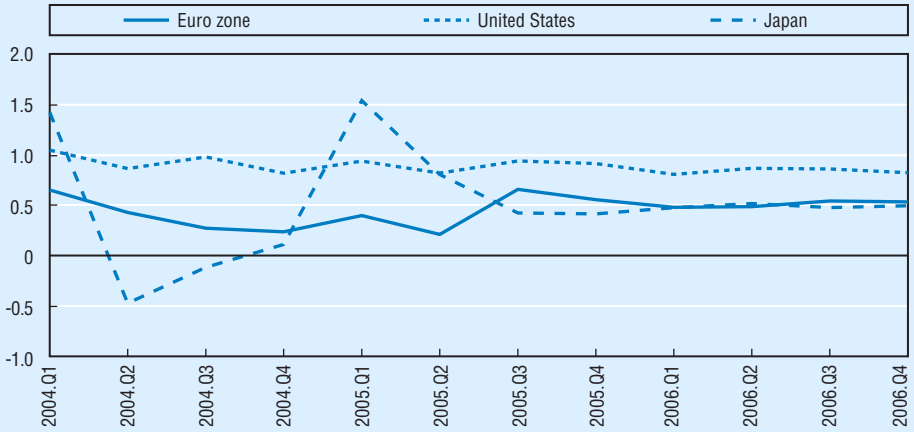
In the United States or the United Kingdom, the national accounts have been from the start almost entirely quarterly. In France and in many other countries, they have been essentially annual for a long time but are becoming increasingly quarterly, thanks to the progress made in the collection and processing of statistics. It is therefore essential for the macroeconomist to be well-informed regarding the timing, format and publication of quarterly national accounts.

Why have quarterly accounts?

One of the crucial objectives of macroeconomic statistics is to help the authorities make the right decisions at the right moment. It would not be appropriate to launch a policy boosting the economy when the upswing has already started, or conversely to "cool down" the economy when it is already entering recession. It is therefore desirable to have the most refined possible information regarding the economic cycle and its turning points. In this context, the annual national accounts, which in the French case are published in April of the following year, arrive far too late. Moreover, exclusive reliance on annual averages can in fact be misleading about the true state of the economy (see Exercise 1 at the end of this chapter). Hence, the importance of compiling accounts that are more timely than annual ones. The present situation regarding the resources available and the reliability of statistics limits this effort to quarterly accounts, but some countries such as Canada calculate GDP monthly.

The quarterly national accounts constitute the central instrument for short-term economic analysis at the OECD. The first pages of *Economic Outlook No. 78* dated December 2005 open with the following graph and the attached comment: "*World growth has been broadening over the past few months. Already strong in North America and most of Asia, economic momentum now looks well established in Japan, and continental Europe is progressively recovering from its latest bout of weakness. The fledgling European expansion*

Figure1. **Quarterly real GDP growth rate: USA, Japan, Euro area**



Source: OECD (2006), *Economic Outlook*, December No. 78 – Volume 2005 Issue 2, OECD, Paris.

has been facilitated by low long-term interest rates, euro depreciation and buoyant export markets, although final domestic demand is still growing below trend."

Quarterly accounts are much used by forecasters, whether in the Finance Ministry helping in the preparation of the government budget or in public or private research institutions such as those connected to the large banks. Thanks to the quarterly accounts, these economists are in a position to update their forecasts for the coming year as quarterly information becomes available for the current year. ▶ I. In France, the quarterly accounts are also used in connection with the six-month forecasts made by INSEE's Short-Term Economic Forecasts Department. These are presented in the regular publications entitled *Conjoncture in France*, which contain numerous quarterly figures accompanied by comments regarding average year-on-year changes or statistical carryover (see Box 1 "Annualisation and various growth indicators"). The French INSEE is in fact one of the few statistical institutes that has been given the authority to make forecasts.

I. A good forecast is, above all, one that is based on the most recent past figures.

Specific features of the quarterly accounts

In certain countries such as the United States or the United Kingdom, the user of the national accounts sees no real difference between the annual accounts and the quarterly accounts. These are countries where the national accounts were developed *simultaneously* on a quarterly and on an annual basis from the start. In France and certain other countries, the quarterly accounts were developed much later than the annual accounts (in the mid-1970s for

France, as compared with 1950 for the US and the UK). It is in fact only recently that the teams of INSEE accountants involved have been attached to the same department. This means that the user could think there were two separate sets of publications.

However, there is *strictly* no difference between the quarterly accounts and the annual accounts as regards the basic principles and the definitions of the variables. The difference is merely that the size of the flows shown in the quarterly accounts are roughly one quarter of those shown in the annual accounts (as is logical, given that one calendar quarter accounts for only three months out of 12). ▶ **II.** Conversely, the annual flows are equal (in theory, as we will see later) to the sum of the flows for the four quarters.

II. This does not apply to the accounts published in the United States, which are annualised, and thus multiplied by 4 (see Box 1 "Annualisation and various growth indicators").

Box 1. **Annualisation and various growth indicators**

The most important use made of the national accounts is to forecast the following year in order to provide the macroeconomic framework for the government budget. The prime aim is to evaluate the volume growth in GDP for the following year, on an "annual average" basis. This expression signifies that one is trying to evaluate the variation between GDP in calendar year Y and GDP in year Y + 1, *i.e.* (Y + 1)/Y. The information given in the quarterly accounts generally shows quarterly changes, *i.e.,*(Q + 1)/Q. The further one moves into the year, the more information there is on recent quarters thanks to the quarterly accounts, and the closer one comes to the prime aim of forecasting annual average growth.

Certain national accountants (Canada, Japan, Mexico, United States) usually express quarterly figures "at annual level", meaning that quarterly levels are multiplied by four. They also express quarterly changes "at annualised rate", which amounts to raising them to the power of 4. The advantage of this method is to place the quarterly growth rate on a slope that uses the same measurement framework as for the annual data. This practice has not however been generalised to the other countries. This practice is indeed not without problems as it is based on the assumption that the observed changes for the quarter are going to continue, which is by no means certain. Thus some short-term analysts prefer to use "year-on-year changes" and/or "the statistical carryover" in order to give indications regarding the annual growth rate. Year-on-year changes consist of calculating the change for the current period (quarter, in this case) since the corresponding period of the previous year (Q/Q-4). The "statistical carryover" consists of calculating an annual average for the current calendar year on the assumption that the remaining quarters are at the same level as the last known quarter. The further one moves into the year, the closer the statistical carryover comes to the future annual average, the two becoming equal when the fourth quarter is known. Exercise 1 at the end of this chapter provides an opportunity to work with these notions. One of the indispensable conclusions to be drawn is that one should be careful to avoid the trap of comparing an American growth figure (raised to the power of 4) with a French or European figure that is not. To make valid comparisons, either one takes the fourth root of the American growth or one raises the European figure to the power of 4.

The aim of the quarterly accounts is to provide at the earliest possible moment reliable figures for the changes in the major macroeconomic aggregates. Thus, the quarterly accounts are simplified compared with the annual accounts and are presented slightly differently. In France, for example, quarterly accounts are calculated using a classification consisting of 41 items, and the accounts made available to the users are based on a 16-item classification. The detailed analyses of structural changes in the economy are left to the annual accounts, which are calculated for a 472-item classification and published for a 116-item classification. On the same lines, the detail of the transactions in the accounts for institutional sectors is not as great in the quarterly accounts as in the annual accounts. This enables INSEE to reduce the workload entailed by the more frequent calculation of quarterly accounts which are calculated three times for each quarter, as shown in the following table. This frequency of calculation is made possible by highly effective estimation procedures using rapidly available indicators (see "Sources and methods for the French quarterly accounts" and "Resources of national accounts departments").

Table 1. **France calendar for the publication of the accounts for quarter Q 2006***

Q + 42 days	Q + 50 days	Q + 90 days
Preliminary estimate: GDP in volume only	First results: Revised GDP + goods and services accounts + certain elements of the income approach of GDP.	Detailed results: Revised GDP + revised goods and services accounts + fairly complete accounts for institutional sectors

* This calendar reflects the situation as of May 2006. It is not carved in stone: France has recently announced that it may suppress the Q + 42 and the Q + 50 publications to replace them by a new Q + 45 publication containing the same data as the current Q + 50 publication.

The "preliminary estimate" of the change in French GDP in volume in quarter Q is published 42 days[1] after the end of the quarter concerned. For the time being, no other figures are provided at this time, since INSEE considers that subsequent revisions would be too substantial. This GDP figure is then revised at Q + 50 days, at the time of the publication of the "first results", and is then accompanied by a complete set of goods and services accounts and certain elements regarding profits and the total wage bill. The next revision takes place at Q + 90 days in the form of "detailed results", this time including fairly complete accounts for institutional sectors. As a result, figures are published quarterly for the household saving ratio or the corporate profit ratio at Q + 90 days. A similar calendar applies for other countries (see Table 2). For completeness, mention should also be made of the existence in some countries of a monthly series of national accounts. In France, it is limited to "household expenditure on consumption of manufactured goods". This monthly national accounts series makes it possible to know, roughly 23 days after the end of the month, the change in consumption expenditure – limited to manufactured goods, admittedly. However, since

changes in total consumption are closely linked to consumption of manufactured goods, this indicator is useful for the short-term analysts.

Despite the fact that the definitions of the variables are the same in the two sets of accounts, it turns out in practice that the sums of the four quarters from the quarterly accounts are not equal to the corresponding annual figures, because the French quarterly accounts are "working-day adjusted" (wda). To be more precise, the French quarterly national accounts are now calculated "wda-sa" meaning that they are adjusted both for the number of working days and for seasonal variations.[2] In statisticians' terminology and in this context, "wda" and "sa" are in opposition to the unadjusted figures. The **working-day adjustment** consists of calculating the quarterly accounts as if each quarter contained the same number of working days. This means that changes in GDP are not affected by differences in the numbers of working days in each quarter. The adjustment gives a better indication of the actual ongoing tendency in the economy and leads to smoother quarterly variations than shown in the unadjusted figures. Many countries make this adjustment (see Table 2).

The difficulty created in some countries (France, Italy and Germany) by the working-day adjustment is that the sum of the four quarters no longer equals *by definition* the unadjusted figures for the year because there are often differences in the number of working days between one year and the next, partly because of leap years, but it is not the most important factor. More important, for example, is the fact that public holidays fall on week-ends in some years, but on working days in other. The difference can be quite significant, as in the case of the year 2004 compared with 2003 (see Box 2). Does this not suggest that all national accounts, including annual accounts, should be calculated after adjustment for the number of working days? Economists are divided on this point because, while adjusted data is more useful to analyse the trend, some major economic aggregates are unadjusted. For example, the government budget that is voted by Parliament is unadjusted (*i.e.* is not working-day-adjusted). The best solution would be to have a choice between the two, as is given in the case of France where there are two sets of accounts: one (wda) consisting of the quarterly accounts and one (unadjusted) for the annual accounts. In order to obtain the annual accounts on a wda basis, one merely has to add up the four quarters from the quarterly accounts; to have the unadjusted annual figures, all that is needed is to take the figures in the annual accounts. In some other countries, such as the US, wda is conducted for quarters but the data are then benchmarked to the unadjusted annual figures, or the annual data are obtained by the sum of the quarters so that, at the end, there is no difference between the sum of the four quarters and the annual figure.

The other calendar adjustment of the quarterly accounts is the **seasonal adjustment**. This consists in eliminating, by means of complex statistical processes based on moving averages, the changes from one quarter to the next that are due simply to seasonal effects. For example, the output of transport services rises systematically and steeply before Christmas and the summer holidays. It is therefore better to eliminate the impact of this seasonal effect in order to know whether holidaymakers actually consumed more or less in

Box 2. **Calendar effects: the years 2003 and 2004**

In France, the years 2003 and 2004 were very special from the point of view of the calendar. The number of working days in 2003, at 252, was in fact slightly below the average of 253. The year 2004 was exceptional with 255 working days, a figure not seen since 1976. The impact of this greater number of working days on the annual change in GDP, everything else remaining equal, is estimated to have been 0.2/0.3 of a percentage point, which is by no means negligible. It is nevertheless smaller than the simple ratio of the numbers of working days: 255/252 = +1.2%. This is because INSEE's estimate of the impact of the number of working days attaches different weights to individual days of the week, especially for the months of July and August, and the "catching-up" that takes place between different months. The estimation method used is econometric. The unadjusted monthly figures are projected on variables representing the different types of days of the week (number of non-worked Mondays, non-worked Tuesdays, etc.) and the number of Sundays.

Table 2. **Some features of quarterly national accounts for selected OECD countries**

	First estimate (Q + 60 means published 60 days after end of quarter)	Second estimate	Third estimate	Working Day Adjustment (in italics countries for which the sum of four quarters do not equal the annual value)	Mean absolute revision of quarterly GDP growth* (in %)
Australia	Q + 60			Yes	0.36
Canada	Q + 60			Yes	0.24
France	Q + 42	Q + 50	Q + 90	*Yes*	0.29
Germany	Q + 44	Q + 54		*Yes*	0.36
Italy	Q + 44	Q + 70		*Yes*	0.20
Japan	Q + 48	Q + 73		Yes	0.69
Korea	Q + 26	Q + 80		Yes	0.97
United Kingdom	Q + 25	Q + 56	Q + 86	Yes	0.18
United States	Q + 30	Q + 60	Q + 90	Yes	0.33

* In terms of quarterly rates (*i.e.* Q/Q-1), absolute rates, first estimate *versus* three years after (see the "Revision Database" on the OECD website). This is different from what appears in the US tables of revision published for the accounts of the United States, in which all quarterly growth rates are systematically "annualised" (see Box 1 "Annualisation and various growth indicators").

the quarter in question than in the previous quarter. Unlike the working-day adjustment, things are so arranged that the sum of the quarterly seasonal adjustments for the year as a whole is zero. In other words, the sum of the quarterly seasonally adjusted figures is equal to the unadjusted figure for the year.

2. The annual national accounts

If all one needs are the major economic aggregates, one needs look no further than the series and publications of the quarterly accounts. However, if one wants detailed results, it is necessary to consult the series and publications of the annual national accounts. In particular, the very important general government account is still, for many OECD countries, available only on an annual basis, as are the financial accounts and the balance sheet accounts. However, there is a sustained effort by OECD countries to expand the number of tables compiled quarterly. It is therefore possible that in the coming years, general government accounts will be available quarterly for most OECD countries.

In France, like in all OECD countries, there are major dates for publications. The main publication for the annual accounts is the report entitled *The French Economy*, published in June and providing indispensable analysis of the recent economic evolution. This publication goes hand-in-hand with the publication on the INSEE website of a set of tables giving details for institutional sectors accounts, external flows of goods and services, gross fixed capital formation by products and institutional sectors, final consumption expenditure and population and employment.

The annual accounts are the backbone of the whole system of national accounts. They are based mainly on four sources: 1) the aggregation of company accounts (in France, INSEE receives and processes each year the accounts of more than 2 million corporations and unincorporated enterprises); 2) the complete accounts of all general government, consisting of central government and the attached agencies, local authorities and all the Social Security bodies (around 120 000 organisations in all in France); 3) the detailed accounts of the financial institutions that are supervised by the central bank (Banque de France) whose statistical directorate is, as in all countries, the main collaborator of the National Statistical Office for production of the national accounts; 4) the balance of payments (generally published by the central bank), which makes it possible to trace relations with the rest of the world.

Much of these data, however, are available only after a certain timelag, generating a specific calendar of compilation and publication. In what follows, Y will refer to the year for which new accounts are calculated. In France, each year, at the end of April in year Y + 1, new annual accounts are published containing new data for year Y (the so-called "provisional" accounts), for year Y – 1 (the so-called "semi-final" accounts) and for year Y – 2 (the so-called "final" accounts). The mechanism used for the annual accounts therefore implies two systematic revisions for each set of published accounts, revisions that obviously, by definition, have an impact on the quarterly accounts. For example, the annual GDP for year Y will be published in April Y + 1 as "provisional", in April Y + 2 as "semi-final" and in April Y + 3 as "final" (as we shall see later, the term "final" is in fact inappropriate). This sequencing is explained mainly by the delays in obtaining data from the principal source mentioned earlier, namely company accounts. Other countries may have some difference in the timing and terminology, but basically the system is similar to that of France.

In France, the "provisional" accounts are mainly the combination of the quarterly accounts for the goods and services accounts *plus* the complete accounts for the general government *plus* the financial accounts. At the time these provisional accounts are published, INSEE has not yet received any company accounts and has to wait until Q4 of year Y + 1 before receiving and processing a first substantial set of corporate accounts (for roughly 400 000 large firms), but still excluding the smallest firms. This information can thus only be processed to be published in April of the next year, on the occasion of the publication of the next year's provisional accounts. Finally, the totality of corporate accounts (for roughly 2 500 000 firms) is received and processed by INSEE only in Q4 of year Y + 2. Table 3 below recapitulates this sequence. In the end, it is necessary to wait two years and five months for national accounts that have "digested" the totality of the available statistical sources used for the national accounts for calendar year Y.

Table 3. **France: Sequencing of the calculation of the annual accounts for year Y**

April Y + 1	April Y + 2	April Y + 3
Provisional accounts Accounts at the F level (41 headings). Complete accounts for institutional sectors. *Source:* quarterly accounts, general government accounts.	**Semi-final accounts** Revised accounts at the G level (116 headings). Complete revised accounts for institutional sectors. *Source:* first version using directly corporate accounts, excluding the smallest firms. Complete revised version of the general government accounts.	**Final accounts** Re-revised accounts at the G level. Complete revised accounts for institutional sectors. *Source:* version fully using the corporate accounts, including the smallest firms.

3. The revisions to the national accounts and their precision

As we have just seen for France (and the situation is similar in other countries), the complete sources for the national accounts are available only in Q4 of year Y + 2. If they had to wait as long as this for this information, short-term macroeconomic analysts would have no use for the national accounts. This explains the complex sequencing of successive quarterly and annual accounts, the aim being to provide the most reliable information possible as rapidly as possible. However, the price paid for this rapidity is the need to revise the initial figures. Some macroeconomists complain about revisions to the national accounts. However, it is not possible to "have one's cake" in the form of reliability and at the same time "eat it" in the form of rapidity. Nor should one be fooled: the countries that performed little or no revision were the Soviet bloc countries, where statisticians, for political reasons, were forbidden to make revisions. This did not mean

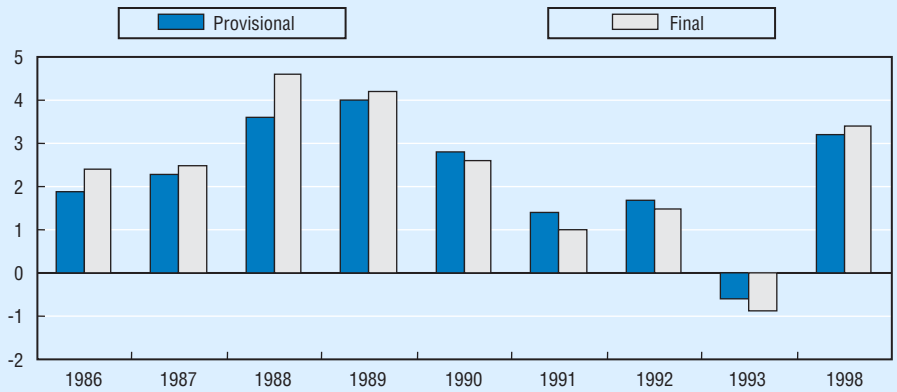
that the national accounts were reliable – quite the contrary. On the other hand, major revisions are obviously not a good thing. The professionalism of national accountants is judged by their capacity to combine a high degree of reliability with satisfactory rapidity.

When does a figure for quarterly GDP growth become "final"? The somewhat surprising answer is "never". As an illustration, this is the sequence of events that in France covers the repeated revision of the quarterly GDP change: 1) first publication at Q *plus* 42 days; 2) first revision at the time of the "first results" at Q + 50 (the source of the revision being the availability of figures for the final month of the quarter); 3) second revision at the time of the "detailed results" at Q + 90 (source: availability of new indicators); 4) minor revisions due to changes in the seasonal adjustment coefficients[3] occur at the time of publication for the following quarters; 5) major revision in April in the following year due to benchmarking on the semi-final annual accounts; 6) significant revision in April in the following year due to the benchmarking on final annual accounts; 7) later still, possible minor revisions due to changes in the seasonal adjustment coefficients, etc.

Clearly, the most significant revisions are the first two, followed in April of the following year at the time of the benchmarking of the unadjusted quarterly accounts on the annual accounts. The other revisions are very small. Even so, the user of the national accounts, if he or she wants to be really up-to-date, must study each publication to find the whole new series and not be content with adding the latest figure to an already existing series. Today, thanks to computer processing and the Internet, downloading an entire series costs no more than downloading the last figure, so no one need complain about this state of affairs. French policy regarding revision is an extreme case. Some other countries make revisions less systematically.

Numerous studies have addressed the question of the scale and sign of the revisions. In France, it is thought that the average revision of the GDP growth rate in volume for a given quarter (*i.e.,* Q/(Q-1)) is 0.3% in absolute value. In other words, there is a 90% chance that the revision in the quarterly growth rate (after a few years have passed) is between + 0.6% and – 0.6% compared with the initial published figure. This range is comparable to that for the American quarterly accounts (see Table 2). Some other OECD countries make slightly larger revisions, on average. As regards the annual accounts, the following chart illustrates a sequence of revisions between the provisional accounts and the final accounts for France. On average, over this period the average revision amounted to 0.4% (in absolute value). As can be seen, there are no earth-shaking revisions, but on occasion the annual revision has amounted to as much as 1.0% (for example, in 1988, a year of strong recovery), which is quite significant. Some observers have seen signs that the initial figures in the national accounts are understated in years of recovery and overstated in years of recession, because the sources used in the first estimates exclude small businesses that are more affected by the business cycle than large businesses.

Figure 2. **France: Comparisons of estimates of annual growth for the "provisional" and "final" accounts**



Source: INSEE.

The various revisions to the GDP *growth rate* listed above show that the national accounts cannot claim to be absolutely precise. It would in fact be by no means wrong to conclude from the previous paragraphs that the initial estimates of the quarterly GDP growth rate for France should probably be presented in the form of a range of ±0.5% of the estimated figure (and even greater amplitude for the other detailed items in the accounts, especially GFCF). American quarterly accounts are indeed presented with an accompanying note presenting this type of range for the main aggregates. ▶ III.

It would be good to know the precision attached to the *level* of GDP. Unfortunately, there is no way of knowing this. While it is fully possible to calculate scientifically the precision of an extrapolation of a random sample survey to the total population, it is impossible to do so for the national accounts, whose sources are a blend of surveys and comprehensive databases that are then the subject of "arbitration". ▶ IV. vis-à-vis many other sources. Another consideration is that, as we saw in Chapter 4, the national accounts attempt to take into account the "underground economy", but the calculations to do this are inevitably tainted with substantial error. In the end, the "real" level of GDP could well differ from the published figure by several percentage points, although probably less than 5% in France. Just as there is no need to react to all the exagerated accusations levelled at statisticians, it is equally necessary to recognise the limitations of the national accounts, and in

III. As explained in a previous footnote, US quarterly growth rates are systematically annualized in US publications (see Box 1 "Annualisation and various growth indicators"), so the range of deviation published in the US quarterly accounts may (wrongly) appear much larger than for France or other countries.

IV. "Arbitration" is a key word in the machinery of annual national accounts. In France, there are two ways of estimating GDP: the approach based on output and final uses and the income-based approach. It is therefore necessary to "arbitrate" (... see next page)

IV. (...) between the two resulting values. This is an operation that INSEE is trying to make increasingly scientific. Some countries, like the United States, do not perform arbitration, and there are therefore officially two GDPs and a statistical adjustment reconciling the two.

particular, recognise that changes are better known than absolute levels. Thus, as was explained in Chapter 3, international comparisons based on the levels (of GDP or other variables) are to be treated more cautiously than comparisons between variations in national aggregates. Moreover, in all countries, preference is given to changes over levels when there is a choice in the matter. This means that, if an error is discovered in a figure in the national accounts, but for technical reasons it is not possible to correct all the past series, national accountants will not correct this last point, since it would introduce bias into the changes. Instead, they will maintain the error in absolute level until the following comprehensive revision in order to preserve the changes. National accountants in France give this approach the somewhat bizarre title of "constant error computation".

4. Comprehensive revisions

In addition to the revisions described above, which might be qualified as ordinary, national accountants from time to time make "comprehensive revisions", also called "base changes" or "benchmark years", and these involve much more substantial overhauls of the system. In France, INSEE has recently decided to carry out base changes every five years. The last took place in 2005, and the next will be in 2010 (see Box 3 "France: Latest and future base changes".). A base change involves four distinct operations: 1) the absolute levels for the year known as the "base year" are re-estimated using statistical sources that are not available every year (population or economic census, housing surveys, etc.) and corrected for past errors; 2) changes of a definitional nature are introduced in conformity with the evolution of the international standards for national accounts; 3) the reference year for chained prices is modified; 4) all past data are re-estimated using past changes, corrected as needed for benchmarking on the new level of the base year. The latter operation, known as "retropolation" or "back-calculation", is quite costly in terms of resources.

A base change therefore leads to fairly generalised modification of all the series, often accompanied by changes in classifications. The macroeconomists using these series need a certain amount of time to update their databases and re-estimate their models. The principal difficulty from their point of view is that statistical offices do not always immediately provide the long time-series, because of the difficulty of "retropolation".

5. Other datasets related to the national accounts

For reasons of space, we can only describe in this manual the central national accounts framework. However, numerous other datasets gravitate around this framework and use broadly the same definitions as the national accounts, while at the same time adjusting them

Box 3. **France: Latest and future base changes**

In France, the latest base change (the so-called "base 2000") was introduced in May 2005. The main conceptual change was the allocation of imputed banking services (FISIM), which raised the level of GDP by roughly 1%. In addition to this "conceptual" rise, there were also modifications in absolute levels related to numerous upward or downward revisions affecting the base year, one of which was an upward revision in GFCF in the form of software. All the volume series are presented on the 2000 base year (instead of on the 1995 base in the preceding base). The next base change (base 2005) will take place in 2010 and will take into account the new international statistical classification (ISIC 4). It will probably not be before the base change in 2015 (base 2010) that the French accounts will apply the recommendations of the new SNA manual published in 2008. Significant changes should then be introduced, such as the recording of R&D and military hardware spending as GFCF.

for their own special purposes. They are known as "satellite accounts". Below is a listing of satellite accounts existing in France, including the agencies that compile them:

- Regional accounts, or GDP by region. Most OECD countries calculate regional accounts. In Europe, these accounts are used by the European Commission as the basis for the allocation of structural funds; in Canada, they are used to allocate VAT.
- Housing accounts – data published by the statistical service of the Ministry of Equipment and Housing.
- Health accounts – statistical service of the Health Ministry.
- Social welfare accounts – statistical service of the Health Ministry.
- National defence accounts – statistical service of the Defence Ministry.
- Education accounts – statistical service of the Education Ministry.
- Research accounts – statistical service of the Research Ministry.
- Environment accounts – IFEN (French Institute for the Environment).

These accounts are not necessarily available every year. In countries other than France, the range of satellite accounts differs from country to country. Most countries compile health, tourism and environment satellite accounts. Some researchers (such as in the US) publish a household satellite account, which includes an estimate for unpaid domestic services produced by household members.

Notes

1. This figure is an order of magnitude. The exact number of days depends on weekends and holidays. The same is true for the other publication dates.
2. In the methodology used for the French quarterly accounts (see "The sources and methods used for the French quarterly accounts"), it is the indicators that are adjusted, first for the number of working days and then for seasonal variations. The calibration (see a definition of this term later in the same box) is then applied to each type of indicator: unadjusted, sa, wda-sa. There are thus three sets of quarterly accounts: the unadjusted accounts; the seasonally adjusted accounts; and the wda-sa accounts. The quarterly calibration residuals are the same in the three cases. The wda-sa accounts are the ones appearing in the principal publication and subjected to comment. The unadjusted figures are available on request.
3. The "seasonal adjustment coefficients" are the coefficients applied to the unadjusted quarterly series to eliminate seasonal variations. In the methodology used for the French quarterly accounts, these coefficients are re-estimated every quarter, leading to slight revisions, even affecting quarters going back as far as the 1970s, although to an almost imperceptible degree.

Key points

- The quarterly national accounts constitute the most important source of data for macroeconomists.
- Most OECD countries publish quarterly growth as the simple growth ratio based on Q/Q – 1. Some countries, however, "annualise" this figure. The OECD often uses annualised figures. Another indicator of growth is the year-on-year change which is the variation between the current quarter and the corresponding quarter of the previous year (Q/Q – 4).
- Most quarterly accounts are seasonally adjusted ("sa"); in addition, some are "working-day adjusted", or wda. In this case, the sum of the four quarters may not equal the corresponding annual account.
- The national accounts are the subject of regular revision. It is therefore necessary to use the whole of the newly published series and not be content with the latest published figure.
- In France, revisions to the growth rates in the national accounts average around 0.3% in absolute value for the quarterly accounts (Q/Q – 1) and 0.5% for the annual accounts (Y/Y – 1). The scale of revisions in other countries is slightly different.

Going further

Sources and methods used for the French quarterly accounts

In all countries, the full wealth of annual statistical data is not available on a quarterly basis. For example, there is no substantial quarterly database for company accounts, which are on an annual basis and often are one of the principal sources for the annual accounts. Instead, the quarterly accounts use monthly or quarterly "indicators" whose annual changes are similar to the change of the corresponding figures in the national accounts. For example, France's INSEE publishes monthly production indices, derived from small-scale surveys of a sample of firms. The quarterly accountants use the changes in this indicator to deduce movements in the figures for the quarterly accounts, basing themselves on the pre-existing structure of the annual accounts (*i.e.* the quarterly accounts are not themselves capable of providing levels, so they rely for this purpose on the annual accounts).

Many countries use indicators in a simple way: they simply use the change of the indicator to extrapolate the quarterly account. In France, and in some other OECD countries, a more sophisticated statistical method has been developed for using indicators to derive quarterly accounts. This is known as "benchmarking" or also "calibration/fitting" ("étalonnage/calage" in French). Calibration consists of estimating an econometric model that relates the annual value of the indicator to the annual series in the national accounts. Once the coefficients of this model have been estimated, the assumption is made that the same coefficients (divided by four) can be applied on a quarterly basis and this provides the basis for the calculation of the so-called "non-fitted" quarterly accounts. The annual sum of these quarterly accounts is not equal to the annual account, since there is no reason why the annual residuals estimated by the econometric method should be zero. Thus, there is an additional step to the calculation, known as "fitting", which consists of interpolating the sum of the annual residuals in a relatively "smooth" manner (one talks of "quarterly smoothing") in order to obtain a series of quarterly residuals which, combined with the non-fitted series, produce a quarterly so-called "fitted" series. These are equal by definition to the annual accounts series (ignoring at this stage the adjustment for the number of working days). Exercise 3 gives a simplified example of calibration/fitting. Because of the sophistication of the method used for the French quarterly accounts, some people consider that the quarterly accounts are more in the nature of an economic model. Fortunately, this is not true. If this were indeed the case, there would be confusion between statistical calculations and modelling. There are in fact no "behavioural" relationships in the calculation of the French quarterly accounts. The calibration/fitting relationship is purely statistical, linking two time series that are intended to measure roughly the same thing.

In France, the principal indicators for the quarterly accounts are as follows: for output, the industrial production indices and the sales indices derived from processing VAT declarations; for consumption, a variety of sources derived from panels of distributors (business surveys by the Banque de France) or from administrative data (for example, new

vehicle registrations in the case of car consumption); for exports and imports, the sources are the same as for the annual accounts, and since customs figures are available monthly the calibration is of excellent quality; investment (GFCF) is estimated either from sales sources or from indicators of availability on the domestic market (output + imports – exports). In France, contrary to some other countries that have better surveys, there is no direct source for variations in inventories and they are estimated as a balancing item in the supply-use balance. The price indicators are the major price indices compiled by INSEE (consumer price indices or producer price indices), which are available either monthly or quarterly. In this case, too, the sources are the same as for the annual accounts and calibration is therefore almost perfect.

Values added for institutional sectors are obtained by difference between output and intermediate consumption. Wages and salaries in the market sector are estimated using statistics of hours worked combined with hourly wage rates. Recently, the French quarterly accountants have introduced a direct quarterly indicator of the wage bill paid by general government. Taxes, social contributions and social benefits are for the most part available on a quarterly basis. The gross operating surplus is obtained as the difference between resources and uses, and not from a direct survey of profits, as in some other countries. Relations with the rest of the world are obtained through the balance of payments, which is available monthly. For certain items, no quarterly indicator is available. In this case, quarterly interpolation within the annual series is carried out by an automatic method known as quarterly smoothing; therefore, the quarterly accounts do not provide any real information regarding the within-year pattern of the series.

The French system of quarterly national accounts covers all the input/output tables and institutional sector accounts (see Chapter 10), even if they are simplified compared to the annual accounts. The three approaches of GDP (expenditure, production, income) are thus present (even if they are not estimated independently from each other). Some other countries, such as the US, do not cover all approaches. For example, the production approach is not yet available quarterly in the US national accounts.

Box 4. **Resources of national accounts departments**

Good statistics are the result of a complex process which needs appropriate human resources. For example, INSEE, the French statistical office, employs 6 300 staff. National accounts departments constitute only a very small part of this: only 126 are directly employed to process the national accounts in France. In Japan, the staff for national accounts is even less: 47. This is explained by the fact that national accountants do not directly organize surveys and/or other basic statistics, which are resource-costly. They use statistical or administrative data that are already processed by other statistical units and transform these data into the definitions of the national accounts. Thus, in fact, the total cost for processing national accounts is much more than the cost of the staff directly devoted to its compilation.Still, when compared to the resources devoted to company accounts, those devoted to national accounts appear low. Some may consider that it is already sufficiently costly for statistics. Others consider that, in the context of the increasing importance of national accounts, in particular for the monitoring of public finance, the resources directly devoted to national accounts remain insufficient.

Exercises

Answers at www.SourceOECD.org/understandingnationalaccounts

Exercise 1: Quarterly *versus* annual results

Calculate the annual averages for years A and B of the series for quarterly GDP in volume as shown in the following table. Make a graph for the quarters, including points for the annual averages. Illustrate the difference between the change in the annual averages and the within-year economic situations.

AQ1	600.00
AQ2	420.00
AQ3	300.00
AQ4	150.00
BQ1	180.00
BQ2	250.00
BQ3	380.00
BQ4	450.00

Exercise 2: Annualisation, year-on-year changes, statistical carryover

The table below shows the quarterly series for French GDP in volume for the years 2001, 2002 and 2003. *Question 1:* calculate the annual GDP for the years 2001 and 2002. *Question 2:* show the quarterly absolute levels in 2001 "at annual level". *Question 3:* calculate the 2001 annual average on the basis of these figures and find the GDP for 2001. *Question 4:* calculate the annual average change between 2001 and 2002. *Question 5:* calculate the quarterly change between Q3 2003 and Q2 2003. *Question 6:* Express this change at "annualised rate". *Question 7:* calculate the year-on-year change for Q3 2003. *Question 8:* calculate the statistical carryover in Q3 2003. Comment on all these results.

Table 4. **GDP at constant 1995 prices**

	2001	2002	2003
Q1	345.75	348.61	350.91
Q2	345.78	350.94	349.68
Q3	347.22	351.70	350.98
Q4	346.22	350.73	

Exercise 3: Calibration/fitting: the French method for calculating the quarterly accounts

This exercise consists of breaking down the stages of the "calibration/fitting" method used for the French quarterly accounts and described in the section "The sources and methods used for the French quarterly accounts". Note that the statistical methods used in this exercise are ultra simplified compared with the methods used by INSEE or other countries that also use this type of methods, but the exercise at least makes it possible to understand the underlying principles.

The tables below show a series for the quarterly indicator (QI) and the corresponding annual item in the national accounts (AA). *Stage 1:* calculate annual averages AI for the indicator series. *Stage 2:* draw a graph showing the point cloud for the abscissa AI and the ordinate AA. Verify that the straight line regression equation AA = a*AI + b is an acceptable approximation. *Stage 3:* estimate, by the least squares method, the parameters a and b for the model AA = a*Ai + b. *Stage 4:* calculate the non fitted quarterly series (QA) by applying the same model to the quarterly absolute figure QA = (a/4).*QI + b/4 and calculate the annual residuals. *Stage 5:* deduce from this the quarterly residuals (by simply dividing by 4). *Stage 6:* calculate the calibrated/fitted QA series. This constitutes the final quarterly accounts series.

Table 5. **Quarterly indicator QI (over five years)**

	Y1	Y2	Y3	Y4	Y5
Q1	105.2	103.9	111.5	117.6	116.3
Q2	106.7	105.9	117.2	118.1	115.8
Q3	104.3	107.8	117.3	119.1	114.2
Q4	104.2	109.6	117.5	117.4	112.0

Table 6. **Annual accounts series AA (over same five years)**

Y1	Y2	Y3	Y4	Y5
6 658.1	6 813.2	7 435.4	7 455.9	7 302.4

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Accounting identity Ch. 10

An equality between national accounts variable which stands by definition.
For exemple, supply = use is an accounting identity.

Accrual accounting Ch. 10

Accrual accounting records flows at the time economic value is created, transformed, exchanged, transferred or extinguished; this means that flows which imply a change of ownership are entered when ownership passes, services are recorded when provided, output is entered at the time products are created and intermediate consumption is recorded when materials and supplies are being used.

Actual consumption Ch. 5

Actual individual consumption is measured by the total value of household final consumption expenditure, non-profit institutions serving households (NPISHs) final consumption expenditure and government expenditure on individual consumption goods and services.

Actual final consumption of households is the value of the consumption goods and services acquired by households, whether by purchase in general, or by transfer from government units or NPISHs, and used by them for the satisfaction of their needs and wants; it is derived from their final consumption expenditure by adding the value of social transfers in kind receivable.

Actual final consumption of general government is measured by the value of the collective (as opposed to individual) consumption services provided to the community, or large sections of the community, by general government; it is derived from their final consumption expenditure by subtracting the value of social transfers in kind payable.

There is no actual final consumption of non-profit institutions serving households (NPISHs) because, in practice, most of their services are individual in nature and so, for simplicity, all services provided by NPISHs are treated by convention as individual (as social transfers in kind).

Aggregate Ch. 1

Data obtained by aggregation, as distinct from unit record data.

Apparent productivity Ch. 4

Apparent labour productivity is defined as output or value added per person employed or per hour worked.

Balance sheet Ch. 15

A balance sheet is a statement, drawn up at a particular point in time, of the values of assets owned and of liabilities outstanding. The balancing item is called net worth. In national accounts a balance sheet is drawn up for sectors, the total economy and the rest of the world. For a sector the balance sheet shows the value of all assets – produced, non-produced and financial – and liabilities and the sector's net worth. For the total economy the balance sheet provides as balancing item what is often referred to as national wealth: the sum of non-financial assets and net financial assets with respect to the rest of the world.

Basic price Ch. 10

The basic price is the amount receivable by the producer from the purchaser for a unit of a good or service produced as output minus any tax payable, and plus any subsidy receivable, on that unit as a consequence of its production or sale; it excludes any transport charges invoiced separately by the producer.

Basic wage Ch. 2

Wage rates measure the basic remuneration per time unit or unit of output.

Although the Resolutions of the 12th International Conference of Labour Statisticians (ICLS, 1973) does not contain a specific definition of "wages" as such, it recommends the compilation of wage rate statistics which should include basic wages, cost-of living allowances and other guaranteed and regularly paid allowances, but exclude overtime payments, bonuses and gratuities, family allowances and other social security payments made by employers. Ex gratia payments in kind, supplementary to normal wage rates, are also excluded.

Wage rate data should relate to an appropriate time period- hour, day, week or month.

Wage rates may be viewed from the perspective of a "price" of labour services.

Capital stock Ch. 8

Gross capital stock is the value of all fixed assets still in use, at the actual or estimated current purchasers' prices for new assets of the same type, irrespective of the age of the assets.

Net capital stock is the sum of the written-down values of all the fixed assets still in use is described as the net capital stock; it can also be described as the difference between gross capital stock and consumption of fixed capital.

Changes in inventories Ch. 1

Changes in inventories (including work-in-progress) consist of changes in: (a) stocks of outputs that are still held by the units that produced them prior to their being further processed, sold, delivered to other

units or used in other ways; and (b) stocks of products acquired from other units that are intended to be used for intermediate consumption or for resale without further processing; they are measured by the value of the entries into inventories less the value of withdrawals and the value of any recurrent losses of goods held in inventories.

Collective consumption expenditure Ch. 9

Goods and services that are consumed simultaneously by a group of consumers or by the community as a whole: for example, defence services provided by the state.

Compensation of employees Ch. 1

Compensation of employees is the total remuneration, in cash or in kind, payable by an enterprise to an employee in return for work done by the latter during the accounting period.

Compensation of employees has two main components:

a) Wages and salaries payable in cash or in kind;

b) The value of the social contributions payable by employers: these may be actual social contributions payable by employers to Social Security schemes or to private funded social insurance schemes to secure social benefits for their employees; or imputed social contributions by employers providing unfunded social benefits.

Constant prices Ch. 15

Constant prices are obtained by directly factoring changes over time in the values of flows or stocks of goods and services into two components reflecting changes in the prices of the goods and services concerned and changes in their volumes (i.e. changes in "constant price terms"); the term "at constant prices" commonly refers to series which use a fixed-base Laspeyres formula.

Consumption of fixed capital Ch. 1

Consumption of fixed capital represents the reduction in the value of the fixed assets used in production during the accounting period resulting from physical deterioration, normal obsolescence or normal accidental damage.

Demand Ch. 5

Final demand is the short term used by economists to qualify the sum of final consumption expenditures, investment expenditures and net exports.

Disposable income Ch. 1

Disposable income is derived from the balance of primary incomes of an institutional unit or sector by adding all current transfers, except social transfers in kind, receivable by that unit or sector and subtracting all current transfers, except social transfers in kind, payable by that unit or sector; it is the balancing item in the Secondary Distribution of Income Account.

Domestic demand Ch. 5

Final domestic demand is the short term used by economists to qualify the part of final demand that is domestic: final consumption expenditures + investment expenditures.

Economic territory Ch. 5

The economic territory of a country consists of the geographic territory administered by a government within which persons, goods, and capital circulate freely.

It includes: (a) the airspace, territorial waters, and continental shelf lying in international waters over which the country enjoys exclusive rights or over which it has, or claims to have, jurisdiction in respect of the right to fish or to exploit fuels or minerals below the sea bed; (b) territorial enclaves in the rest of the world; and (c) any free zones, or bonded warehouses or factories operated by offshore enterprises under customs control (these form part of the economic territory of the country in which they are physically located).

Economically significant Ch. 9

Prices are said to be economically significant when they have a significant influence on the amounts the producers are willing to supply and on the amounts purchasers wish to buy.

External demand Ch. 5

External demand is the short term used by economists to qualify net exports.

Final consumption expenditure Ch. 9

Government final consumption expenditure consists of expenditure, including imputed expenditure, incurred by general government on both individual consumption goods and services and collective consumption services.

Household final consumption expenditure consists of the expenditure, including imputed expenditure, incurred by resident households on individual consumption goods and services, including those sold at prices that are not economically significant.

Final consumption expenditure of non-profit institutions serving households (NPISHs) consists of the expenditure, including imputed expenditure, incurred by resident NPISHs on individual consumption goods and services.

Final uses Ch. 5

Short terminology used to qualify the sum of final consumption expenditures, gross capital formation and net exports.

Financial corporations Ch. 10

Financial corporations consist of all resident corporations or quasi-corporations principally engaged in financial intermediation or in auxiliary financial activities which are closely related to financial intermediation.

Financial intermediation Ch. 4

Financial intermediation is a productive activity in which an institutional unit incurs liabilities on its own account for the purpose of acquiring financial assets by engaging in financial transactions on the market; the role of financial intermediaries is to channel funds from lenders to borrowers by intermediating between them.

Financial intermediation services indirectly measured (FISIM) Ch. 4

Financial intermediation services indirectly measured (FISIM) is an indirect measure of the value of financial intermediation services provided but for which financial institutions do not charge explicitly.

Financial transaction Ch. 8

Financial transactions between institutional units and between institutional units and the rest of the world cover all transactions involving change of ownership of financial assets, including the creation and liquidation of financial claims.

Flow of funds table Ch. 15

Synonym for “financial accounts”.

GDP deflator Ch. 1

GDP at current prices divided by GDP in volume.

GDP in volume Ch. 1

Gross Domestic Product (GDP) in volume often refers to GDP at constant prices which is obtained by expressing values in terms of a base period.

In theory, the price and quantity components of a value are identified and the price in the base period is substituted for that in the current period. Two main methods are adopted in practice.

The first, referred to as “quantity revaluation”, is based on a methodology consistent with the above theory (i.e., by multiplying the current period quantity by the base period price).

The second, commonly referred to as “price deflation”, involves dividing price indexes into the observed values to obtain the volume estimate. The price indexes used are built up from the prices of the major items contributing to each value.

General government Ch. 1, 9

The general government sector consists of the totality of institutional units which, in addition to fulfilling their political responsibilities and their role of economic regulation, produce principally non-market services (possibly goods) for individual or collective consumption and redistribute income and wealth.

Goods Ch. 4

Also called "merchandises". All products that are not services.

Goods and services accounts Ch. 10

The goods and services account shows for the economy as a whole and for groups of products, the total resources in terms of output and imports, and the uses of goods and services in terms of intermediate consumption, final consumption, gross capital formation and exports.

Gross capital formation Ch. 1

Gross capital formation is measured by the total value of the gross fixed capital formation, changes in inventories and acquisitions less disposals of valuables for a unit or sector.

Gross domestic product (GDP) Ch. 1

Gross domestic product is an aggregate measure of production equal to the sum of the gross values added of all resident institutional units engaged in production (plus any taxes, and minus any subsidies, on products not included in the value of their outputs). The sum of the final uses of goods and services (all uses except intermediate consumption) measured in purchasers’ prices, less the value of imports of goods and services, or the sum of primary incomes distributed by resident producer units.

Gross fixed capital formation Ch. 1

Gross fixed capital formation is measured by the total value of a producer’s acquisitions, less disposals, of fixed assets during the accounting period plus certain additions to the value of non- produced assets (such as subsoil assets or major improvements in the quantity, quality or productivity of land) realised by the productive activity of institutional units.

Gross national income (GNI) Ch. 1

Gross national income (GNI) is GDP less net taxes on production and imports, less compensation of employees and property income payable to the rest of the world plus the corresponding items receivable from the rest of the world (in other words, GDP less primary

incomes payable to non- resident units plus primary incomes receivable from non-resident units).

An alternative approach to measuring GNI at market prices is as the aggregate value of the balances of gross primary incomes for all sectors; (note that gross national income is identical to gross national product (GNP) as previously used in national accounts generally).

Gross national product (GNP) Ch. 1

See Gross national income (GNI).

Household Ch. 1, 6

The concept of household is based on the arrangements made by persons, individually or in groups, for providing themselves with food or other essentials for living. A household may be either (a) a one-person household, that is to say, a person who makes provision for his or her own food or other essentials for living without combining with any other person to form part of a multi-person household or (b) a multi-person household, that is to say, a group of two or more persons living together who make common provision for food or other essentials for living. The persons in the group may pool their incomes and may, to a greater or lesser extent, have a common budget; they may be related or unrelated persons or constitute a combination of persons both related and unrelated.

A household may be located in a housing unit or in a set of collective living quarters such as a boarding house, a hotel or a camp, or may comprise the administrative personnel in an institution. The household may also be homeless.

Household final consumption expenditure Ch. 1

Household final consumption expenditure consists of the expenditure, including imputed expenditure, incurred by resident households on individual consumption goods and services, including those sold at prices that are not economically significant.

Household saving ratio Ch. 1

The household saving ratio is most often defined as net saving divided by the sum of net disposable income and the adjustment D8. A gross version exists: gross saving divided by the sum of gross disposable income and the adjustment D8.

Households' actual final consumption Ch. 9

Actual final consumption of households is the value of the consumption goods and services acquired by households, whether by purchase in general, or by transfer from government units or NPISHs, and used by them for the satisfaction of their needs and wants; it is derived from their final consumption expenditure by adding the value of social transfers in kind receivable.

Imputed expenditures Ch. 5

Some transactions which it is desirable to include in the accounts do not take place in money terms and so cannot be measured directly; in such cases a conventional value is imputed to the corresponding expenditure (the conventions used vary from case to case and are described in the SNA as necessary).

Individual consumption expenditure Ch. 9

Part of general government expenditure thant can be attributed to households plus all expenditure of NPISHs.

Input-output table Ch. 10, 13

An input-output table is a means of presenting a detailed analysis of the process of production and the use of goods and services (products) and the income generated in that production.; they can be either in the form of (a) supply and use tables or (b) symmetric input-output tables.

Institutional sector Ch. 9, 10

The SNA 93 states that Institutional units are grouped together to form institutional sectors, on the basis of their principal functions, behaviour, and objectives.

Institutional unit Ch. 9, 10

An institutional unit may be defined as an economic entity that is capable, in its own right, of owning assets, incurring liabilities and engaging in economic activities and in transactions with other entities.

Intermediate consumption Ch. 1

Intermediate consumption consists of the value of the goods and services consumed as inputs by a process of production, excluding fixed assets whose consumption is recorded as consumption of fixed capital; the goods or services may be either transformed or used up by the production process.

Market producers Ch. 15

Market producers are producers that sell most or all of their output at prices that are economically significant.

Market price Ch. 10

Market prices are the actual price agreed upon by the transactors. In the absence of market transactions, valuation is made according to costs incurred (non-market services produced by government) or by reference to market prices for analogous goods or services (services of owner-occupied dwellings).

Market sector Ch. 4

Also called "business sector". The sector comprising all enterprises selling their output at economically significant prices.

Mixed income Ch. 1

Mixed income is the surplus or deficit accruing from production by unincorporated enterprises owned by households; it implicitly contains an element of remuneration for work done by the owner, or other members of the household, that cannot be separately identified from the return to the owner as entrepreneur but it excludes the operating surplus coming from owner-occupied dwellings.

Net disposable income Ch. 8

Gross disposable income minus consumption of fixed capital.

Net domestic product (NDP) Ch. 1

Net domestic product (NDP) is obtained by deducting the consumption of fixed capital from gross domestic product.

Net exports Ch. 5

Difference between exports and imports of goods and services. Also referred to as net foreign balance, or balance of imports and exports.

Net lending/net borrowing Ch. 8

Net lending is the net amount a unit or a sector has available to finance, directly or indirectly, other units or other sectors.

It is the balancing item in the capital account and is defined as: (Net saving plus capital transfers receivable minus capital transfers payable) minus (the value of acquisitions less disposals of non-financial assets, less consumption of fixed capital).

Negative net lending may also be described as "net borrowing".

Net lending/net borrowing of general government Ch. 1, 9

See "Net lending/net borrowing".

Net value added Ch. 1

Net value added is the value of output less the values of both intermediate consumption and consumption of fixed capital.

Non-financial accounts Ch. 9

The complete sequence of national accounts excluding financial accounts and balance sheet.

Non-financial corporations Ch. 7

Non-financial corporations are corporations whose principal activity is the production of market goods or non-financial services.

Non-financial transaction Ch. 8

A transaction not included in the financial accounts of the system of national accounts.

Non-market producers Ch. 4, 15

Non-market producers are producers that provide most of their output to others free or at prices which are not economically significant.

Non-market sector Ch. 4

The sector comprising all non-market producers which are producers that provide most of their output to others free or at prices which are not economically significant.

Non-observed Ch. 3

The groups of activities most likely to be non-observed are those that are underground, illegal, informal sector, or undertaken by households for their own final use. Activities may also be missed because of deficiencies in the basic statistical data collection programme.

Non-profit institutions serving households (NPISHs) Ch. 5

Non-profit institutions serving households (NPISHs) consist of NPIs which are not predominantly financed and controlled by government or by corporations and which provide goods or services to households free or at prices that are not economically significant.

Operating surplus Ch. 1

The operating surplus measures the surplus or deficit accruing from production before taking account of any interest, rent or similar charges payable on financial or tangible non-produced assets borrowed or rented by the enterprise, or any interest, rent or similar receipts receivable on financial or tangible non-produced assets owned by the enterprise.

Note: for unincorporated enterprises owned by households, this component is called "mixed income".

Net operating surplus Ch. 6

Gross operating surplus minus consumption of fixed capital.

Output Ch. 4

Output consists of those goods or services that are produced within an establishment that become

available for use outside that establishment, plus any goods and services produced for own final use.

Output gap Ch. 4

An output gap refers to the difference between actual and potential gross domestic product (GDP) as a per cent of potential GDP.

Output of non-market services Ch. 9

Other non-market output consists of goods and individual or collective services produced by non- profit institutions serving households (NPISHs) or government that are supplied free, or at prices that are not economically significant, to other institutional units or the community as a whole.

Such output is one of three broad categories of output in the System of National Accounts (SNA), with the others being market output and output produced for own final use.

Potential GDP Ch. 4

Potential gross domestic product (GDP) is defined in the OECD's Economic Outlook publication as the level of output that an economy can produce at a constant inflation rate. Although an economy can temporarily produce more than its potential level of output, that comes at the cost of rising inflation. Potential output depends on the capital stock, the potential labour force (which depends on demographic factors and on participation rates), the non-accelerating inflation rate of unemployment (NAIRU), and the level of labour efficiency.

Production function Ch. 4

Production function is the maximum set of output(s) that can be produced with a given set of inputs. Use of a production function implies technical efficiency. Synonym for production frontier, the technically efficiency part of a feasible production set, the set of all input- output combinations that are feasible (but not necessarily efficient).

Purchase price Ch. 10

The purchaser's price is the amount paid by the purchaser, excluding any deductible VAT or similar deductible tax, in order to take delivery of a unit of a good or service at the time and place required by the purchaser; the purchaser's price of a good includes any transport charges paid separately by the purchaser to take delivery at the required time and place.

Purchasing power of household gross disposable income Ch. 2

Household gross disposable income deflated by an appropriate price index, in general the implicit deflator of household final expenditure.

Purchasing power parities Ch. 3

Purchasing power parities (PPPs) are the rates of currency conversion that equalise the purchasing power of different currencies by eliminating the differences in price levels between countries. In their simplest form, PPPs are simply price relatives which show the ratio of the prices in national currencies of the same good or service in different countries.

Residence Ch. 5

A unit is said to be resident in a country when its "center of economic" interest is situated in that country's economic territory.

Rest of the world Ch. 1

The rest of the world refers to all non-resident institutional units that enter into transactions with resident units, or have other economic links with resident units. Included are certain institutional units that may be physically located within the geographic boundary of a country, for example, foreign enclaves such as embassies, consulates or military bases, and also international organisations.

Saving Ch. 1, 6

Saving is disposable income less final consumption expenditure (or adjusted disposable income less actual final consumption), in both cases after taking account of an adjustment for pension funds; saving is an important aggregate which can be calculated for each institutional sector or for the whole economy.

Seasonal adjustment Ch. 11

Seasonal adjustment is a statistical technique to remove the effects of seasonal calendar influences operating on a series. Seasonal effects usually reflect the influence of the seasons themselves either directly or through production series related to them, or social conventions.

Other types of calendar variation occur as a result of influences such as number of days in the calendar period, the accounting or recording practices adopted or the incidence of moving holidays (such as Easter).

Services Ch. 4

Services are outputs produced to order and which cannot be traded separately from their production. Services are not separate entities over which ownership rights can be established. They cannot be traded

separately from their production. Services are heterogeneous outputs produced to order and typically consist of changes in the conditions of the consuming units realized by the activities of producers at the demand of the consumers. By the time their production is completed they must have been provided to the consumers.

Social benefits in kind Ch. 9

Social benefits in kind consist of (a) social security benefits, reimbursements, (b) other social security benefits in kind, (c) social assistance benefits in kind; in other words they are equal to social transfers in kind excluding transfers of individual non-market goods and services.

Social benefits other than social transfers in kind Ch. 9

Social benefits other than social transfers in kind consist of all social benefits except social transfers in kind.

In other words, they consist of:

a) all social benefits in cash – both social insurance and social assistance benefits – provided by government units, including social security funds, and NPISHs; and

b) all social insurance benefits provided under private funded and unfunded social insurance schemes, whether in cash or in kind.

Supply and use balance Ch. 2

Supply and use tables are in the form of matrices that record how supplies of different kinds of goods and services originate from domestic industries and imports and how those supplies are allocated between various intermediate or final uses, including exports.

Taxes net of subsidies Ch. 1

Taxes minus subsidies.

Taxes on income and wealth Ch. 9

Most current taxes on income, wealth, etc consist of taxes on the incomes of households or profits of corporations and taxes on wealth that are payable regularly every tax period (as distinct from capital taxes levied infrequently).

Taxes on production and imports Ch. 9

Taxes on production and imports consist of taxes payable on goods and services when they are produced, delivered, sold, transferred or otherwise disposed of by their producers plus taxes and duties on imports that become payable when goods enter the economic territory by crossing the frontier or when services are delivered to resident units by non-resident units; they also include other taxes on production, which consist mainly of taxes on the ownership or use of land, buildings or other assets used in production or on the labour employed, or compensation of employees paid.

Terms of trade indices Ch. 5

Terms of trade is the ratio of export and import prices.

Underground Ch. 3

Underground production consists of activities that are productive in an economic sense and quite legal (provided certain standards or regulations are complied with), but which are deliberately concealed from public authorities for the following reasons:

a) to avoid the payment of income, value added or other taxes;

b) to avoid payment of social security contributions;

c) to avoid meeting certain legal standards such as minimum wages, maximum hours, safety or health standards, etc;

d) to avoid complying with certain administrative procedures, such as completing statistical questionnaires or other administrative forms.

Value added Ch. 1

Gross value added is the value of output less the value of intermediate consumption; it is a measure of the contribution to GDP made by an individual producer, industry or sector; gross value added is the source from which the primary incomes of the SNA are generated and is therefore carried forward into the primary distribution of income account.

Volume index Ch. 2

A volume index is most commonly presented as a weighted average of the proportionate changes in the quantities of a specified set of goods or services between two periods of time; volume indices may also compare the relative levels of activity in different countries (e.g. those calculated using PPPs).

Working-day adjustment Ch. 11

Working day or trading adjustments refer to the correction for differences in the number of working or trading days in a given month or quarter which differ from year to year which will impact upon the level of activity in that month or quarter for flow series or the sort / type of day for stock series.

In most countries working day adjustment and trading day adjustment are used as synonyms.

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Understanding NATIONAL ACCOUNTS

This manual explains what GDP and GNI and their components are, and what they mean. It shows how they are used and what they are used for. And it uses practical examples and exercises to clearly explain these notions.

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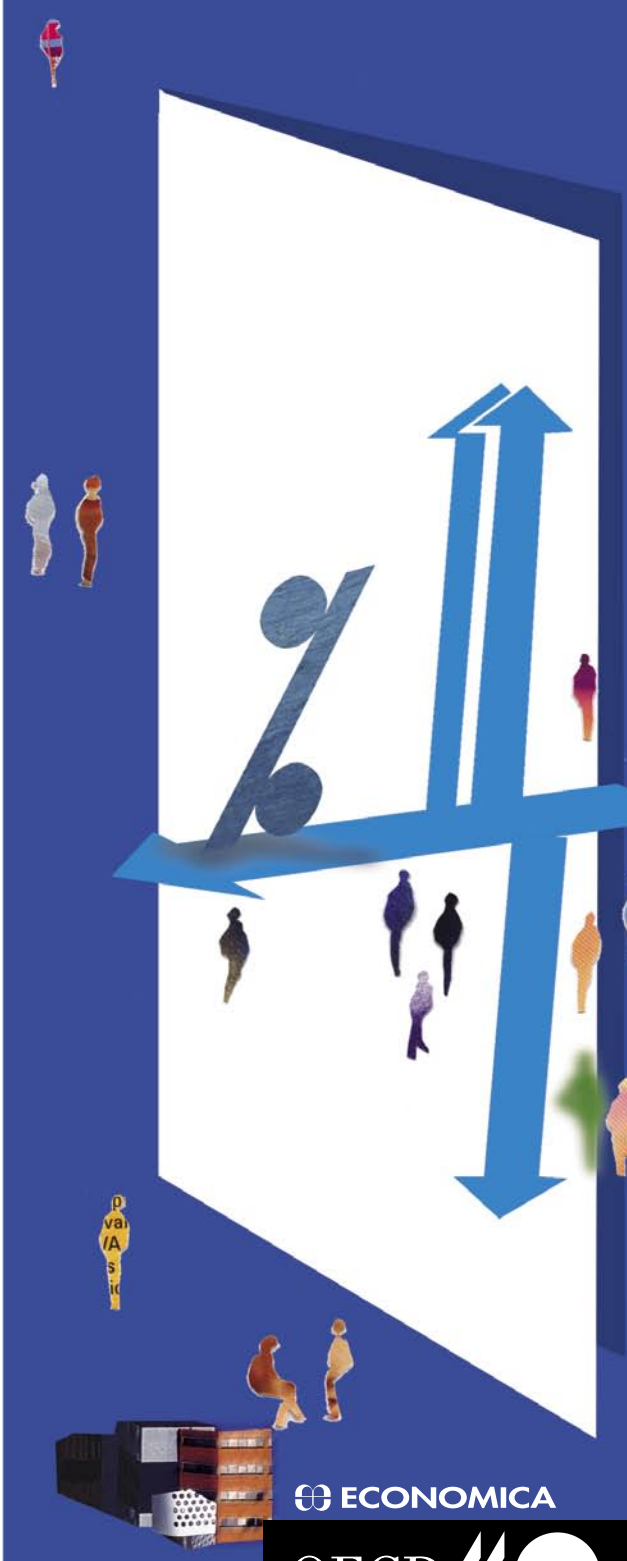

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