Understanding National Accounts 2006

L Chapter 1: The Essential Macroeconomic Aggregates

Exercises

- **Exercise 1** Observations and forecasts
- Exercise 2 A simple calculation of GDP
- Exercise 3 Relationship between current prices, volume and deflator
- Exercise 4 Calculation of contributions to growth
- Exercise 5 The public deficit and the Maastricht criterion

Exercise 6 Synonyms

- Exercise 7 Impact of modifications to GDP
- Exercise 8 Deflators and growth

http://publications.oecd.org/WebBooksV2/30-2006-06-1/12-03EX.htm[8/2/2011 6:04:39 PM]

Chapter 1: The Essential Macroeconomic Aggregates

Back

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).

Answer to exercise 2. Observations and forecasts

To download the answers in Excel, please click the StatLink: <u>http://dx.doi.org/10.1787/811018484246</u>.

			Firm	
	А	В	С	D
Input	Labour + machinery	Labour + machinery + iron ore	Labour + machinery + steel sheet and engine blocks	Labour + machinery + steel sheet
Output	Iron ore	Steel sheet	Cars	Machinery and robots
Production	50 000 tonnes x 200 euros = 10 M euros	15 000 tonnes x 3 000 euros = 45 M euros	5 000 x 15 000 = 75 M euros	1 machine at 10 M euros plus 2 robots at 5 M euros = 20 M euros
Intermediate consumption	0	10 M euros of iron ore	18 M euros of sheet plus 20 M euros (5 000 x 4 000) of imported engines	10 M euros of steel sheet
Value added	10 M euros	35 M euros	37 M euros	10 M euros

GDP = 10 + 35 + 37 + 10 = 92. Remember that purchases of machinery are not intermediate consumption, but GFCF.

Final demand = purchase of 5 000 cars (75 million euros) plus purchase of machinery and robots (20 million euros) *plus* constitution of inventories of steel sheet (45 M euros produced – 28 consumed = 17 M euros of increase in inventories, 15 by firm B and 2 by firm C) = 112 M euros.

GDP = 92 = Final demand (112) plus Exports (0) minus Imports (20)

┥ Back

http://publications.oecd.org/WebBooksV2/30-2006-06-1/12-04EX2.htm[8/2/2011 6:08:50 PM]

Understanding National Accounts 2006

Chapter 1: The Essential Macroeconomic Aggregates

Exercise 1: Observations and forecasts

Go to the OECD website (<u>www.oecd.org</u>), find the most recent issue of the "Economic Outlook" and update 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?

┥ Back

http://publications.oecd.org/WebBooksV2/30-2006-06-1/12-04EX1.htm[8/2/2011 6:09:06 PM]

Chapter 1: The Essential Macroeconomic Aggregates

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			

Answer to exercise 3. Relationship between current prices, volume and deflator

To download the answers in Excel, please click the StatLink: <u>http://dx.doi.org/10.1787/025261111032</u>.

We calculate the row (a) by applying (1) to (3): for example, $1\ 212\ 223 = 1\ 181\ 849\ x\ 1.0257$. Remember that a growth rate of 2.57% corresponds to multiplication by 1.0257.

We are then asked to calculate GDP in volume at 1995 prices. First let's calculate in row (b) the deflator in the form of an index number with 1995 = 100. To do this, we start with the value 100 in 1995 and apply (2): for example, $101.45 = 100 \times 1.0145$, and then cumulatively for the other years. Then in row (c), in application of one of the versions of the first fundamental equation, the volume GDP is equal to the GDP at current prices divided by its price index: for example, $1 \ 194 \ 897 = 1 \ 212 \ 223/101.45$ (as the base for the price index is 100 and not 1, the result has been multiplied by 100). The result is expressed in million 1995 euros. These are not current euros, because of the conversion to 1995 prices.

	1995	1996	1997	1998
(1) Gross domestic product at current prices	3.37	2.57	3.22	4.37
(2) GDP deflator	1.67	1.45	1.29	0.94
(a) GDP at current prices	1 181 849	1 212 223	1 251 257	1 305 937
(b) Price index, 1995 = 100 (cumulative value of (2) 1995 = 100)	100.0	101.45	102.76	103.73
(c) GDP in volume, at 1995 prices (=100*(a)/(b))	1 181 849	1 194 897	1 217 650	1 258 977
(d) GDP growth rate in volume		1.10	1.90	3.39
(e) Approximation: (1) minus (2)		1.12	1.93	3.43

In row (d), it is easy to calculate GDP growth rates in volume from (c).

It would have been possible to obtain the result for series (d) more rapidly (but with a slight approximation) by simply subtracting (2) from (1). Since the numbers involved are small, the subtraction gives a good approximation. However, the correct operation consists of dividing (1 + the growth rate at current prices/100) by (1 + the growth rate of the deflator/100). In this way, one obtains 3.39% as the growth rate in 1998 by dividing 1.0437 by 1.0094.

Comment: it is important to practise manipulating current prices/volume/price indices in all directions, always remembering the first fundamental equation.

Let (IOc, a) be the growth rate for investment spending on computers in current prices in country a (the United States) and (IOc, b) be the corresponding figure for country b (Europe). Let (IOp, a) and (IOp, b) be the price rises for computers. By hypothesis, IOp, a < IOp, b. As a consequence, if IOv is the growth rate in volume, IOv,a > IOv,b. This is because the first fundamental equation gives, for either country, IOc = IOp * IOv. Since the investment forms part of GDP, in terms of growth rates GDPv, a must necessarily be greater than GDPv,b, meaning that GDP growth is automatically higher in country a. This means that if Europe were to apply the American deflator, European GDP growth in volume would be higher. However, if country b is a large importer of computers and only a small producer, there will be a contrary effect on GDP because of the imports. This is because the imports of country b in volume would automatically be increased if lower prices were to be applied to them. However, imports (see the second fundamental equation) have a negative influence on GDP. Hence, the increase in GDP due to the increase in investment would be offset by the contraction due to imports. If all the country's computers are imported, the offsetting will be total. This is entirely logical: if country b is not a producer of computers, GDP (output approach) is unaffected.

http://publications.oecd.org/WebBooksV2/30-2006-06-1/12-04EX3.htm[8/2/2011 6:09:18 PM]

Chapter 1: The Essential Macroeconomic Aggregates

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

Answer to exercise 4. Calculation of contributions to growth

To download the answers in Excel, please click the StatLink: <u>http://dx.doi.org/10.1787/106365453876</u>.

Α	(contribution to GDP growth)
746	0.21
235	0.07
842	0.24
- 1 068	-0.31
1 206	0.35
	0.28
	A 746 235 842 - 1 068 1 206

Back

http://publications.oecd.org/WebBooksV2/30-2006-06-1/12-04EX4.htm[8/2/2011 6:09:31 PM]

L Chapter 1: The Essential Macroeconomic Aggregates

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

Answer to exercise 5. The public deficit and the Maastricht criterion

To download the answers in Excel, please click the StatLink: <u>http://dx.doi.org/10.1787/310786826447</u>.

	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
Net lending (+) or net borrowing (-) (billion euros)	-49.4	-38.0	-34.8	-22.0	-19.0
Net lending (+) or net borrowing (-) (% of GDP)	-4.1	-3.0	-2.7	-1.6	-1.3

┥ Back

http://publications.oecd.org/WebBooksV2/30-2006-06-1/12-04EX5.htm[8/2/2011 6:09:47 PM]

Understanding National Accounts 2006

Chapter 1: The Essential Macroeconomic Aggregates

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.

• Answer to exercise 6. Synonyms

A: 3, 6; C: 11;

B: 7, 10, 13, 15 (expressed as growth rate); D: 17.

1 no longer exists, 2 is not the same thing as GDP, 4 is not the same thing as GDP, 5 the term "in volume" is used rather than "in quantities", 8 differs from GDP in volume by the amount of taxes net of subsidies in volume, 9 is not the same thing as GDP, 12 is not the same thing as the GDP deflator, 14 is insufficiently precise, 16 is not the same thing as the public deficit.

┥ Back

http://publications.oecd.org/WebBooksV2/30-2006-06-1/12-04EX6.htm[8/2/2011 6:10:04 PM]

L. Chapter 1: The Essential Macroeconomic Aggregates

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.

Answer to exercise 7. Impact of modifications to GDP

To download the answers in Excel, please click the StatLink: <u>http://dx.doi.org/10.1787/533483016127.</u>

Take as a starting point the table in exercise 2 and modify it by introducing firm E (see table next page). This firm's output of temporary employment services amounts to 15 million euros and the value added to 15 million euros. The intermediate consumption of the car firm rise by 15 million euros and its value added accordingly declines by 15 million euros. Total GDP remains at 92 million euros. All that has happened is that the car firm generates less value added, while the services branch (which contains the temporary employment firms) generates more. This is logical, as no element of final demand has been affected by the modification, neither consumption nor GFCF.

	Year A						
	А	В	С	D	E		
Input	Labour + machinery	Labour + machinery + iron ore	Labour + machinery + steel sheet and engine- blocs + hiring of manpower	Labour + machinery + steel sheet	Labour		
Output	Iron ore	Steel sheet	Cars	Machinery and robots	Labour		
Production	50 000 tonnes x 200 euros = 10 M euros	15 000 tonnes x 3 000 euros = 45 M euros	5 000 X 15 000 = 75 M euros	1 machine at 10 M euros plus 2 robots x 5 000 M euros = 20 M euros	15 M euros		
Intermediate consumption	0	10 M euros of iron ore	 18 M euros of sheet plus 5 000 x 4 000 = 20 M euros of imported engines plus 15 M euros of temporary employment services 	10 M euros	0		
Value added	10 M euros	35 M euros	22 M euros	10 M euros	15 M euros		
					A Back		

📢 Back

http://publications.oecd.org/WebBooksV2/30-2006-06-1/12-04EX7.htm[8/2/2011 6:10:17 PM]

Chapter 1: The Essential Macroeconomic Aggregates

Back

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).

Answer to exercise 8. Deflators and growth

Let (IOc, a) be the growth rate for investment spending on computers in current prices in country a (the United States) and (IOc, b) be the corresponding figure for country b (Europe). Let (IOp, a) and (IOp, b) be the price rises for computers. By hypothesis, IOp, a < IOp, b. As a consequence, if IOv is the growth rate in volume, IOv, a > IOv, b. This is because the first fundamental equation gives, for either country, IOc = IOp * IOv. Since the investment forms part of GDP, in terms of growth rates GDPv, a must necessarily be greater than GDPv,b, meaning that GDP growth is automatically higher in country a. This means that if Europe were to apply the American deflator, European GDP growth in volume would be higher. However, if country b is a large importer of computers and only a small producer, there will be a contrary effect on GDP because of the imports. This is because the imports of country b in volume would automatically be increased if lower prices were to be applied to them. However, imports (see the second fundamental equation) have a negative influence on GDP. Hence, the increase in GDP due to the increase in investment would be offset by the contraction due to imports. If all the country's computers are imported, the offsetting will be total. This is entirely logical: if country b is not a producer of computers, GDP (output approach) is unaffected.

Back

http://publications.oecd.org/WebBooksV2/30-2006-06-1/12-04EX8.htm[8/2/2011 6:10:31 PM]

Understanding National Accounts 2006

L Chapter 2: Distinguishing Between Volume and Price Increases

Exercises

- Exercise 1 Using deflation to derive volume
- **Exercise 2** Calculation of volume at various price levels
- **Exercise 3** Calculation of a Laspeyres index and equivalence of calculation methods
- Exercise 4 Calculation of Laspeyres indices, Paasche indices and deflation
- Exercise 5 Calculation of " chained accounts " (chained Laspeyres indices)
- Exercise 6 Chained accounts and the loss of additivity
- Exercise 7 Volume changes in inventories: levels or contributions to GDP?
- **Exercise 8** Calculation of a Laspeyres index and equivalence of calculation methods

┥ 8/48 🕨

http://publications.oecd.org/WebBooksV2/30-2006-06-1/22-03EX.htm[8/2/2011 6:31:35 PM]

L Chapter 2: Distinguishing Between Volume and Price Increases

< Back

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 e 1 200 in October. He raises the prices of his lollipops by 12% on 1 November. His turnover in November is e 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 e 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?

Answer to exercise 1. Using deflation to derive volume

The increase in quantity of the number of lollipops sold is equal to the growth in turnover, *i.e.* 1 680/1 200 = 1.4, *divided* by the increase in the price of each lollipop, *i.e.* 1.12 (+ 12%), giving a neat result of plus 25% (1.4/1.12 = 1.25). Deflation consists of this division of the index of turnover by the index of the price rise. One could also *subtract* the increase in the price index from the increase in the turnover index, rather than *dividing* the two indices. However, the subtraction method is valid only when the variations are small, in practice on the order of less than 5%. For larger variations, it is necessary to use division rather than subtraction, which remains an approximation.

Let us check this result using quantities. In October, he sold 960 lollipops (1 200/1.25), whereas in November he sold 1200 (1680/1.4). 1 200/960 = 1.25, an increase of 25%.

Let us now suppose that he reduced his price by 12%, meaning that the price index is equal to 0.88 (1 - 0.12). The increase in volume will now be equal to 1.4/0.88 = 1.591, an increase in volume of 59.1%.

Back

http://publications.oecd.org/WebBooksV2/30-2006-06-1/22-04EX1.htm[8/2/2011 6:31:49 PM]

Chapter 2: Distinguishing Between Volume and Price Increases

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	2		Period 3	8
	Quantity		Price	Quantity		Price	Quantity		Price
А		20	5		40	3		60	2
В		150	0.2		145	0.25		160	0.25
С		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.

Answer to exercise 2. Calculation of volume at various price levels

To download the answers in Excel, please click the StatLink: <u>http://dx.doi.org/10.1787/4160143888881</u>.

Aggregate A + B + C	Period 1	Period 2	Period 3
Account at current prices	430.00	396.25	335.00
Growth rate		-7.80	-15.50
Volume at period 1 prices	430.00	379.00	457.00
Growth rate		–11.90	20.60
Volume at period 2 prices	577.50	396.25	420.00
Growth rate		-3.40	6.00

The current-price account of A + B + C, is equal to the sum of the multiplication of the respective quantities and prices for each product and for each period. This gives the sequence 430, 396.25, 335. The volume at the prices of the first period is equal to the sum of the elements consisting of the result of multiplying the quantity for each period by the price in period 1. For example, for the period 2, it is equal to 5 x 40 + $0.2 \times 145 + 25 \times 6 = 379$. This gives the sequence 430, 379, 457. The volume at the prices of the second period is equal to the sum of the elements consisting of the product of the quantity for each period multiplied by the price in period 2. This gives the sequence 577.5, 396.25, 420.

Comments

First, two technical points. By definition, the volume for period P at constant prices of P is equal to the value at current prices in P. For example, the volume for period 1 at period 1 prices (430) is equal to the account at current prices (430) for this period. Similarly the volume of period 2 at period 2 prices (396.25) is equal to the amount at current prices for period 2 (396.25). This result is entirely logical, since the price structure of constant-price accounts is that of the current period for the base year. This logic can even be used to check for errors.

Second technical point: it can be seen that the levels of the volume series can show wide variations, depending on the reference year chosen. This is not really important, however, since the volume series are of use only in terms of growth rates, so that absolute levels are of little importance.

In growth-rate terms, it can be seen that there are declines in total turnover at current prices in both periods. This is hardly surprising given the steep price drop for product A. Equally unsurprising is the fall in volume in period 2, at period 1 prices, and the subsequent rise in period 3. The quantities of A rise sharply in both periods, but this rise is offset in period 2 by the fall in quantities of C.

Somewhat more surprising is the comparison of the volume growth rates at period 1 vs. period 2 prices: +20.6% in the final period for the accounts at period 1 prices and +6.0% for the accounts at period 2 prices. This rather extreme result shows that the volume growth figure depends on the price structure chosen. Why should the volume growth rate at period 1 prices be much larger than at period 2 prices? The answer is: because the relative price of A, whose quantities rise sharply in period 3, is very high in period 1, while this is much less the case if the price structure of period 2 is chosen. The accounts for period 3 at period 2 prices correspond to accounts at the previous year's prices and use a price structure that is better-suited to the analysis of the current year. Hence national accountants' interest in using chained previous year's prices (see Exercise 5).

Back

http://publications.oecd.org/WebBooksV2/30-2006-06-1/22-04EX2.htm[8/2/2011 6:32:03 PM]

L Chapter 2: Distinguishing Between Volume and Price Increases

┥ Back

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	е
Small cars		1 000	10.0		600	10.5
Large cars		200	20.0		600	21.0

Answer to exercise 3. Calculation of a Laspeyres index and equivalence of calculation methods

To download the answers in Excel, please click the StatLink: <u>http://dx.doi.org/10.1787/885105731785</u>.

Method using Formula (2)	Period 1		Period 2
Accounts at period-1 prices	14 000		18 000
Growth rate for all cars (%)			+28.6
Method using Formula (1)	Value	Weighting	Quantity ratio
Small cars	10 000	71.4	0.6
Large cars	4 000	28.6	3.0
Calculation of the weighted index	14 000	100.0	128.6
Growth rate for all cars (%)			+28.6

Calculation using Formula (2).

First, derive p_0q_0 , which corresponds to the value of the accounts at current prices for period 1. The answer is 14 000. Then derive the account for period 2 at period-1 prices, *i.e.* p_0q_1 , with the answer being 18 000. Calculate the change between the two periods by dividing (18 000/14 000 = 1.286), the result being the growth rate: +28.6%.

$$L_{q} = \sum_{i} \frac{v_{i0} \cdot \frac{q_{ii}}{q_{i0}}}{\sum_{i} v_{i0}}$$

Calculation using Formula (1),

First, derive the quantity ratios (q_{it}/q_{i0}) for the two products. The results are respectively 0.6 (*i.e.* -40%) and 3.0 (+200%). Then calculate the weights v_{i0} . These are the amounts at current prices for each of the products in the first period, 10 000 and 4 000 respectively. Calculate their sum (14 000) and then the weights expressed as percentages (10 000/14 000 = 71.4% and 4 000/14 000 = 28.6%). Next, calculate the weighted sum of the quantity ratios, *i.e.* 71.4 x 0.6 + 28.6 x 3 = 128.6, giving +28.6%. It will be seen that the results of the two calculation methods are indeed equal.

📢 Back

http://publications.oecd.org/WebBooksV2/30-2006-06-1/22-04EX3.htm[8/2/2011 6:32:18 PM]

L. Chapter 2: Distinguishing Between Volume and Price Increases

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.

Answer to exercise 4. Calculation of Laspeyres indices, Paasche indices and deflation

To download the answers in Excel, please click the StatLink: <u>http://dx.doi.org/10.1787/578674367841</u>.

Calculations for the "all cars" aggregate	Period 1	Period 2
Accounts at current prices	14 000	18 900
Index of the evolution in accounts at current prices		1.350
Elements in the calculation of the Paasche price index	18 000	18 900
Paasche price index		1.050
Volume index obtained by deflation		1.286

First, calculate the accounts at current prices for the "all car" aggregate, resulting in 14 000 for period 1 (1 000 x 10 + 200 x 20) and 18 900 for period 2 (600 x 10.5 + 600 x 21). Dividing these figures (18 900/14 000), we obtain an index for the evolution in accounts at current prices equal to 1.35.

To calculate the Paasche price index use Formula (3) in the main text of this chapter. First, calculate the numerator (p_tq_t), corresponding to the account at current prices for period 2, *i.e.* 18 900. Then calculate the denominator (p_0q_t), *i.e.* 18 000. Then calculate the index of the evolution: 18 900/18 000 = 1.050.

Use Formula (4) to obtain the volume index by deflation: divide the evolution in the account at current prices by the Paasche price index, *i.e.* divide 1.35 by 1.05. The result is 1.286 (+28.6%), exactly the same result as for the Laspeyres volume index calculated in the preceding exercise.

Note that Formula (4) could have been used in other ways. For example, if one knows the volume index (in this case 1.286) and the index of the change in the accounts at current prices (in this case 1.35), one can obtain the price index by dividing the second figure by the first (1.35/1.286 = 1.05). Similarly, the value index can be obtained by multiplying the volume index by the price index $(1.35 = 1.286 \times 1.05)$. (Also note that national accountants often talk of "value accounts" instead of "accounts at current prices".)

┥ Back

📢 Back

http://publications.oecd.org/WebBooksV2/30-2006-06-1/22-04EX4.htm[8/2/2011 6:32:45 PM]

L Chapter 2: Distinguishing Between Volume and Price Increases

Back

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?

	199	9	200	0	2001		200	2
	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
В	150.00	0.20	145.00	0.25	160.00	0.25	175.00	0.30
С	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								

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

Answer to exercise 5. Calculation of " chained accounts " (chained Laspeyres indices)

To download the answers in Excel, please click the StatLink: <u>http://dx.doi.org/10.1787/811018484246</u>.

	199	9	200	0	2001		200	2
	Quantity	Price	Quantity	Price	Quantity	Price	Quantity	Price
А	20.00	5.00	40.00	4.00	60.00	2.00	90.00	1.00
В	150.00	0.20	145.00	0.25	160.00	0.25	175.00	0.30
С	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	430.00		436.25		360.00		394.50	
Accounts at previous year's prices			379.00		480.00		503.75	
Growth rates			-11.86		10.03		39.93	
Accounts at previous year's prices, chained, base 2000	494.95		436.25		480.00		671.67	
Accounts at 2000 prices	597.50		436.25		480.00		683.75	
Growth rates			-27.0		10.0		42.4	

First, calculate the accounts at current prices: for each period, multiply the quantity of each product by the price and then total. For example, for 1999: $20 \times 5 + 150 \times 0.2 + 12 \times 25 = 430$.

Then calculate the accounts in volume at the previous year's prices for 2000, 2001 and 2002. (Note that this calculation cannot be made for 1999, since we do not have the price structure for the year 1998.)

Let us start with 2000, for example: Sum up the quantities in 2000 multiplied by the prices in 1999 (the previous year), *i.e.* 40 x 5 + 145 x 0.2 + 6 x 25 = 379. The corresponding figures for 2001 and 2002 are 480 and 503.75. Next, calculate the growth rates, but beware of the trap. The growth rate between 2000 and 2001 does not equal 480 divided by 379. These two figures are not comparable in volume since one uses the prices in 2000, and the other the prices in 1999. The growth rate for the accounts at previous year's prices is calculated by dividing the volume at previous year's prices by the account for the previous year at current prices: for example, in the case of 2001, 480 divided by 436.25, which results in 1.10 (+10%). The growth rates between 1999 and 2000 and between 2001 and 2002, calculated in identical fashion, come out as -1.86% and +39.93%, respectively. \blacktriangleright 1 >

Results shown are calculated to two decimal places to facilitate verification of the calculations. National accountants normally round growth rates to a single decimal place.

Next, chain the accounts starting from a base year, which in this case is 2000. For the base year, we use the value of the accounts at current prices, *i.e.* 436.25. Next, we use the growth rates derived above to obtain volumes for the other years, through a successive chaining process. Thus, the volume for 2001 is obtained by multiplying the figure of 436.25 by the growth rate of 10% (436.25 x 1.10 = 480.00). Volume for 2002 is obtained by multiplying 480 by 39.93% (the growth rate between 2001 and 2002), resulting in 671.67. For 1999, the volume figure is obtained by dividing the value in 2000, *i.e.* 436.25, by the growth rate between 1999 and 2000, *i.e.* -11.86%, resulting in 436.25/(1 - 0.1186) = 494.95. It will be seen that in order to chain years prior to the base year it is necessary to use the inverse of the growth rates, tending to complicate the calculation still further. In the end, one obtains the sequence 494.95, 436.25, 480.00, 671.67. The growth rates of this series correspond by definition to the growth rates for the accounts at previous year's prices, and so there is no difference between the two. The absolute levels of this series are set by the value of the accounts at current prices for the base year, in this case 2000.

Next, let us calculate the accounts at constant 2000 prices. This method, which is much simpler, was illustrated in Exercise 2. The sequence obtained is 597.5, 436.25, 480.00, 683.75.

http://publications.oecd.org/WebBooksV2/30-2006-06-1/22-04EX5.htm[8/2/2011 6:32:59 PM]

Finally, let us compare the two methods (chained *vs.* constant prices). In terms of absolute level, it can be seen that the values for the years 2000 and 2001 are identical. This is not surprising, since both methods use the same base year (2000), and they obtain the figures for 2001 in the same way. But the figures for all the other years show differences. Take the year 2002. The growth rate for this year using the chained accounts is +39.93%, whereas the growth rate for the accounts at 1995 prices is +42.4%. The first figure is preferred to the second, because it uses a price structure that is closer to the one that in large part motivated the changes in volumes between 2001 and 2002. The disadvantage of this method, however, apart from its complexity, is the loss of additivity.

http://publications.oecd.org/WebBooksV2/30-2006-06-1/22-04EX5.htm[8/2/2011 6:32:59 PM]

L Chapter 2: Distinguishing Between Volume and Price Increases

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?

Germany

	2002	2003	2004	2005	2006
Household saving ratio	10.5	10.7	11.1	11.1	10.8
General government financial balance	-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.

Answer to exercise 6. Chained accounts and the loss of additivity

To download the answers in Excel, please click the StatLink: <u>http://dx.doi.org/10.1787/048231164287</u>.

Million 1995 euros	1999	2000	2001	2002
Gross domestic product	1 299 510	1 348 801	1 377 067	13 93 687
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	1 620 958	1 715 964	1 748 974	1 767 876
Evolution (%)		5.861	1.924	1.081
Total by summation	1 620 830	1 717 021	1 750 051	1 768 915
Difference	0.128	1.057	1.077	1.039
Evolution (%)		5.935	1.924	1.078
Accounts at 2001 prices (additive)				
Gross domestic product			1 475 584	1 493 393
Imports			388.709	391.049
Total resources			1 864 293	1 884 442
Evolution (%)				1.081

Source: INSEE, National accounts

As required, the total is calculated by summation (row in bold type). Surprise, surprise! The result is not the same as INSEE's, with a difference of 128 million in 1999, 1.057 billion in 2000, and so on. This discrepancy is not due to a mistake in INSEE's calculations (these can happen but are extremely rare). The reason for the difference (called the "residual") stems from the accounts being presented at previous year's prices, chained, base 1995. Once accounts are chained, they lose their additivity.

In order to reconstitute the growth rate for the total as calculated by INSEE, it is necessary to use accounts at previous year's prices. Let us do this for the year 2002. We know that at current prices 2001 is 1 475 584 and imports are 388 709. Since accounts at current prices are always additive, we can calculate the total by simple addition, the result being 1 864 293. Next, calculate the accounts for 2002 at previous year's prices, *i.e.* those of 2001. To do this, we simply apply the growth rates given in the table for GDP and imports. This results in 1 475 584 x 1.01207 = 1 493 393 for 2002 GDP at 2001 prices, and 388 709 x 1.00602 = 391 049 for imports at 2001 prices. Since the accounts at 2001 prices are additive, we can add the two amounts, resulting in total resources of 1 884 442. We then derive a growth rate of 1.081% for this aggregate, the same figure as in INSEE's original table.

Back

Conclusions

Unfortunately, when accounts are presented as chain-linked levels, they are no longer additive. This means that aggregates can no longer be easily calculated by adding or subtracting them from others. For aggregates to become additive, it is always necessary to recalculate the accounts at previous year's prices.

Back

Chapter 2: Distinguishing Between Volume and Price Increases

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:

(millin 1995 euros)	1999	2000	2001	2002
Cross domostic product	1299	1348	1377	1393
	510	801	067	687
Evolution (%)		3.793	2.096	1.207
Imports	321	368	372	375
Imports	320	220	984	228
Evolution (%)		14.596	1.294	0.602
Total ressources	1620	1715	1748	1768
Total ressources	958	964	974	876
Evolution (%)		5.861	1.924	1.081

At prices of year 1	Year 1	Year 2
FDLI	1 430	1 468
1	-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
1	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.

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

To download the answers in Excel, please click the StatLink: <u>http://dx.doi.org/10.1787/344188427266</u>. The first table is titled "At prices of year 1", thus data for year 1 are at current prices. For the same reason, the data for year 2 is in volume terms, at prices of year 1. So these data are presented in volume expressed at previous year's prices. The data are additive for year 1 because they are at current prices, and for year 2 because they are at prices of the preceding year, which is equivalent to volume Laspeyres, making them additive.

Here is the presentation of the first table with growth rates and contributions to GDP growth. We were not able to calculate a relevant growth rate for I, because I moves from negative to positive. The application of the growth rate formula to I would have delivered: –260%, an absurd figure.

At prices of year 1	Year 1	Year 2	Growth	Contributions to GDP growth	
FDLI	1 430	1 468	2.657		2.740
1	-43	69			8.075
GDP	1 387	1 537	10.815		10.815

The contribution to growth for I is: $100 \times [69 - (-43)]/1$ 387. For FDLI it is $100 \times [1 468 - 1 430]/1$ 387. Note that contributions to growth are entirely additive (10.815 = 2.740 + 8.075).

We can do the same for the second table, which shows volume for year 3 expressed in previous year's prices (year 2).

At prices of year 2	Year 2	Year 3	Growth	Contributions to GDP growth	
FDLI	1 490	1 363	-8.523		-7.874
1	123	148			1.550
GDP	1 613	1 511	-6.324		-6.324

The Economics department of the OECD would have presented this table in the following way, which is a combination of current price data (for year 1), volume growth rates (for other years and for GDP and FDLI) and volume contribution to GDP change (for I).

	Year 1	Year 2	Year 3
	At current prices	Volume, in % change	Volume, in % change
FDLI	1 430	2.657	-8.523
I (in contribution to GDP growth)	-43	8.075	1.55
GDP	1 387	10.815	-6.324

The next table is an initial version of the above table in which the different variables appear as chain-linked volume levels. For example, 1 468 for FDLI (year 2) has been derived from: 1 430 x (1 + 2.657/100), and

http://publications.oecd.org/WebBooksV2/30-2006-06-1/22-04EX7.htm[8/2/2011 6:33:30 PM]

1 342.875 (for year 3) as 1468 x (1 – 8.523/100). However, "I" cannot be calculated in the same way because there are no sensible growth rates for I. \blacktriangleright II

In fact, "I" can be calculated for year 2 as the difference between GDP and FDLI, resulting in 69, which is correct. However, while this approach applies to year 2, which remains additive when compiled at the prices of the preceding year, it cannot be used for years 3 and beyond.

Chained linked volume, at prices of year 1	Year 1	Year 2	Year 3
FDLI	1 430	1 468	1 342.875
l	-43		
GDP	1 387	1 537	1 439.806

As explained in the main text, there is in fact only one correct presentation for I that does not lead to misinterpretation: it is to show I in terms of contributions to growth. However, one could present the previous table with "virtual" levels for I, allowing for a rapid correct calculation of contributions to GDP growth. This would lead to the following table:

Chained linked volume, at prices of year 1	Year 1	Year 2	Year 3
FDLI	1 430	1 468	1 342.875
1	-43	69	92.822
GDP	1 387	1 537	1 439.806

FDLI and GDP are unchanged. For I in year 2, 69 is obtained in this way: $-43 + (1 \ 387 \ x \ 8.075/100)$, and in year 3: 69 + (1 537 x 1.55/100) = 92.822. These levels for I, when applied to the chain-linked GDP levels, deliver by definition the correct contribution. Indeed, one can easily verify this by now calculating the contribution of I to the change in GDP, which is 8.075 for year 2 and 1.55 for year 3. Such a presentation allows economists to have the data they should have: they can easily derive growth rates for FDLI and GDP, as well as contributions to GDP growth for I. Note for experts: one can prove that this method gives the same results as deflating the changes in inventories expressed in prices of previous year by the price deflator of GDP.

http://publications.oecd.org/WebBooksV2/30-2006-06-1/22-04EX7.htm[8/2/2011 6:33:30 PM]

L Chapter 2: Distinguishing Between Volume and Price Increases

Back

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 $(1 + 0.02)^{\hat{A}V_4}) = +0.496\%$. 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
	200)201		200202	
	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		?	?
Gross domestic product before residual		9 343			?
Residual		20			?
Gross domestic product	10 313	9 363		?	?
Forecasted growth				??	??

Answer to exercise 8. The US approach: forecasting using chained accounts

To download the answers in Excel, please click the StatLink: <u>http://dx.doi.org/10.1787/602755581453</u>.

		2002Q1		Correct solution 2002Q2	Wrong solution
	Current dollar level	Chained dollar levels	Forecasted growth	"2002 Q1dollars"	Chained dollars
Personal consumption expenditures					
Durable goods	859	976	2	863	981
Nondurable goods	2 085	1 921	-0.1	2 084	1 921

http://publications.oecd.org/WebBooksV2/30-2006-06-1/22-04EX8.htm[8/2/2011 6:33:46 PM]

Services	4 230	3 642	2.7	4 258	3 666
Gross private domestic investment	1 559	1 551	7.9	1 589	1 581
Fixed investment					
Non residential					
Structures	288	243	-17.6	274	232
Equipment and software	838	954	3.3	845	962
Residential	463	384	2.7	466	387
Change in private inventories		-29		4	1
Net export of goods and services					
Exports					
Goods	680	738	15.9	706	766
Services	298	292	10.7	306	300
Imports					
Goods	1 102	1 250	27.9	1 172	1 329
Services	235	226	-2.1	234	225
Government consumption and investment					
Federal	672	598	7.5	684	609
State and local	1 267	1 099	-1.7	1 262	1 094
Gross domestic product before residual		9 343			9 363
Residual		20			20
Gross domestic product	10 313	9 363		10 346	9 383
Forecasted growth				1.3	0.85

Correct solution:

First, calculate the different elements of column 4, applying the forecasted quarter-to-quarter change to the amount in the first column, which reflects levels at current prices. For example, the forecasted annual growth rate for 2002Q2 durable goods is equal to 2.0%. Take the quarter-to-quarter growth, which equals $(1 + 0.02)^{\hat{A}_{4}}$ or 1.00496, and multiply that by 859 to obtain 863 (rounded). Do this for all the components of GDP, except for changes in inventories, which is calculated as the difference between gross private fixed investment and the sum of its components. The value for GDP thus obtained is equal to the sum of all the components, or 10 346. Then, calculate the growth rate between 10 346 and 10 313, which is 1.0032 (+0.3%). Expressed at annual rates (raised by an exponent of 4), the result is 1.013, thus +1.3%. This figure (+1.3%) will be very close to what the BEA would publish using its very detailed and sophisticated Fisher index method.

Incorrect solution:

First, calculate the different elements of column 5. In contrast to the correct method above, apply the forecasted quarter-to-quarter change to the amount in the *second* column, which represents "chained" dollars. For example, the forecasted annual rate for 2002Q2 durable goods is equal to 2.0%. Take the quarter-to-quarter growth, which equals $(1+0.02)^{\hat{A}\frac{1}{4}}$ or 1.00496, and multiply that by 976 to obtain 981 (rounded). Do this for all the components of GDP, except for changes in inventories, which is calculated as the difference between gross private fixed investment and the sum of its components. The value for GDP (before residual) thus obtained is the sum of all the components, or 9383. Then, calculate the growth rate between 9383 and 9363, which is the corresponding value for 2002Q1, to obtain 1.0021 (+0.21%). Expressed at annual rates (raised by an exponent of 4), the result is 1.0085, thus +0.85%. This figure is significantly below the one that the BEA would publish using its very detailed and sophisticated Fisher index method.

What about forecasts for 2002Q3? The quasi-perfect solution would be to apply the correct method above to the current price values of 2002Q2. However, these may not be part of the forecasting exercise. In this case, one can use the current price values of 2002Q1, as in the first method above. The difference between the two quarters is sufficiently small to allow for this additional approximation.

Back

http://publications.oecd.org/WebBooksV2/30-2006-06-1/22-04EX8.htm[8/2/2011 6:33:46 PM]

Understanding National Accounts 2006

Exercises

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

∢ 11/48 **▶**

┥ 11/48 🕨

http://publications.oecd.org/WebBooksV2/30-2006-06-1/32-02EX.htm[8/2/2011 6:13:05 PM]

Chapter 3: International Comparisons

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

Question 1: below shows PPP for the United States, Sweden and Japan; shows GDP in volume (at 2000 prices) for the same countries; and 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 3.2 in this chapter.

Question 2: 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.

	1995	1996	1997	1998 1	1999	20	00 2	2001	2002	2003
Japan	175.49	170.87	168.68	166.54	162.04	154.	82 14	9.22	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
	1995	1996	1997	1998	1999	2000	200	01	2002	2003
Japan	480 223	496 718	505 517	500 224	499 546	511 462	512 50	D1 5	510 949	517 619
Sweden	1 870.72	1 894.87	1 941.06	2 011.82	2 103.93	2 194.97	2 217.9	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	9 838.9	90 10	023.50	10 330.00
		11	995 199	96 1997	1998	1999	2000	2001	2002	2003
Japan		125	570 125 80	54 126 166	12 486	126 686	126 926	127 291	127 435	127 619
Sweden		8	827 8 84	41 8 846	8 851	8 858	8 872	8 896	8 925	8 958
USA		266	588 269 7 ⁻	14 272 958	276 154	279 328	282 429	285 366	288 217	291 073
	1995	1996	1997	1998	1999	2000	20	01	2002	2003
Japan	496 922	509 983	520 939	514 595	507 224	511 462	505 8	47 4	197 896	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
1154	7 3/2 30	7 762 30	8 250 00	8 601 60	0 216 20	0 764 80	10 075	00 10	131 80	10 051 30

Source: http://dx.doi.org/10.1787/154437888722

Answer to exercise 1. Calculations of GDP per head in constant PPP and comparison with current PPP

To download the answers in Excel, please click the StatLink: <u>http://dx.doi.org/10.1787/154437888722</u>.

First, note that purchasing power parities are here calculated using the United States as the reference country. For this reason, the PPP for the United States is equal to 1.

Question 1: calculation of GDP at constant prices and PPPs.

The first step (below) consists of calculating GDP per head from GDP. This means dividing the GDP in volume for each country in each year (in) by the population in . For example, for Japan in 1995, the result is 3.824344499 (480 223.20 is divided by 125.570). Because GDP is expressed in billions and the population in thousands, the number obtained is in million units of national currency (at 2000 prices).

	1995	1996	1997	1998	1999	2000	2001	2002	2003
Japan	3.82434499	3.94646603	4.00676093	3.95477760	3.94318236	4.02960780	4.02621552	4.00948719	4.05597129
Sweden	0.21193157	0.21432756	0.21942799	0.22729861	0.23751750	0.24740419	0.24931992	0.25341961	0.25618888
USA	0.02990682	0.03066730	0.03168106	0.03263578	0.03371341	0.03457435	0.03447818	0.03477762	0.03548938

The second step () consists of deflating the GDPs in volume by the purchasing power parities *for the year 2000*. For Japan in 1995, for example, we obtain 0.0247019 (3.82434499/154.82), and this figure is in millions of US dollars. For easier presentation, this figure is then multiplied by 1 000 000, to obtain US\$24 702 (rounded). Be careful: notice that we divide by the parities of the year 2000 and not by the parities of 1995. That is because for Question 1, we have been asked to apply constant PPPs and not, as in Question 2, current PPPs. In below, all the amounts are expressed in US dollars and are in volume relative to the United States, the reference country for PPP.

It would have been perfectly acceptable to use a year other than 2000 for the constant PPPs. In other words, it is not because the time-series volumes are at 2000 prices that we are obliged to use the year 2000 for the constant PPPs.

	1995	1996	1997	1998	1999	2000	2001	2002 2	003
Japan	24 702	25 491	25 880	25 544	25 469	26 028	26 006	25 898	26 198
Sweden	23 061	23 322	23 877	24 733	25 845	26 921	27 129	27 576	27 877
USA	29 907	30 667	31 681	32 636	33 713	34 574	34 478	34 778	35 489

The following table is a simple transformation of the previous one, obtained by dividing the value for each country by that of the United States (and multiplying by 100). In this way, we obtain indices relative to the USA (USA = 100), giving the level of GDP per head in volume at 2000 prices and PPPs. This table is then used to draw the requested graph. (see note 1)

	1995	1996	1997	1998	1999	2000	2001	2002	2003
Japan	82.6	83.1	81.7	78.3	75.5	75.3	75.4	74.5	73.8
Sweden	77.1	76.0	75.4	75.8	76.7	77.9	78.7	79.3	78.6
USA	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Figure 3. : . GDP per head, constant 2000 prices and PPPs, USA = 100



Question 2: Calculation of relative GDPs at current prices deflated by current PPPs.

The first step, as in Question 1, consists of calculating GDP per head from GDP. The results are as follows (see Table 8).

http://publications.oecd.org/WebBooksV2/30-2006-06-1/32-03ex1.HTM[8/2/2011 6:13:20 PM]

	1995	1996	1997	1998	1999	2000	2001	2002	2003
Japan	3.95733057	4.05185756	4.12899672	4.06839492	4.00378890	4.02960780	3.97394160	3.90705850	3.89820481
Sweden	0.20054945	0.20530935	0.21345580	0.22278500	0.23442425	0.24740419	0.25507531	0.26363473	0.27220920
USA	0.02754175	0.02877974	0.03022773	0.03148461	0.03299419	0.03457435	0.03530869	0.03620467	0.03762390

The next stage consists of dividing each cell in by the PPP in the corresponding cell in (and multiplying by 1 000 000). For example, Japan in 1995 equals 22 550 (1 000 000 x 3.95733057/175.49). In this way we obtain GDP per head at current prices and PPPs, relative to the United States, expressed in US dollars (see Table 9). First, note that the figure for the United States is simply the current United States GDP per head at current prices, since the PPP for the United States is, by definition, equal to 1. Note, also, that these amounts do indeed give for each year the volume of GDP per head for Japan and Sweden relative to the United States, but they do not give a series of changes in volume over time for the country concerned. In other words, 23 713 does indeed represent the volume of Japanese GDP per head for 1996 (22 076 in the case of Sweden), but 23 713/22 550 s not the change in volume in Japan's GDP per head between 1996 and 1997. This is because these amounts are GDP per head at United States prices and therefore incorporate US inflation between the two years.

	1995	1996	1997	1998	1999	2000	2001	2002	2003
Japan	22 550	23 713	24 478	24 429	24 709	26 028	26 631	27 195	28 016
Sweden	21 312	22 076	22 756	23 501	25 099	26 921	27 310	28 166	28 989
USA	27 542	28 780	30 228	31 485	32 994	34 574	35 309	36 205	37 624

is a simple transformation of , derived by dividing the figure for each year by the value of GDP per head in current United States dollars (and multiplying by 100). This results in relative indices of GDP per head at current prices and PPPs, USA = 100, as shown in (also in the corresponding Figure3.2).

	1995	1996	1997	1998	1999	2000	2001	2002	2003
Japan	81.9	82.4	81.0	77.6	74.9	75.3	75.4	75.1	74.5
Sweden	77.4	76.7	75.3	74.6	76.1	77.9	77.3	77.8	77.1
USA	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0



Figure 3. : . GDP per head, at current prices and current PPPs, USA = 100



It will be seen that and are very similar (as are the associated). They both show series of GDP per head in volume, relative to the United States.

The OECD nevertheless prefers to use, showing GDP per head at constant prices and PPPs, since the evolution of each country's GDP per head is derived in this table to the evolution in the volume of GDP per head expressed in its national currency. This is not quite true of . This is because the year-to-year evolution in the indices shown in is affected by two things: 1) the inevitable errors of measurement in the calculation of PPPs from one year to another; and 2) changes between years in the price structure. The evolution presented in is therefore to some extent affected by variations in prices (see "Mathematical Notation" below).

Comments on mathematical notation: versus

Although simplistic, the following example explains mathematically the similarities and differences between and . We begin with the simple case of two countries: A (the reference country) and B, and a single product (the hamburger) and without deriving "per head" levels for the aggregates.

Because there is only a single product, the GDP of country A can be written as P a, t x H a, t , where P a, t is the price of a hamburger in country A in period t and H_{a,t} is the number of hamburgers in country A in period t (similarly for country B). Our aim is to compare the volumes, i.e. the quantities H a,t and H b,t. To do this, we calculate the price ratio P b,t /P a,t ?, which we shall call "purchasing power parity of B with respect to A" for period t: PPP $_t = P_{b,t} / P_{a,t}$. This result is similar to that in with B = Japan or Sweden, A = United States. Deflating the GDP of B by PPP t, in other words dividing GDP b,t by PPP t, gives the magnitude P a,t x H b,t, which is the volume for country B at the prices of country A for period t. This is similar to what is presented in . For each year t, this magnitude is directly comparable in volume with the GDP of country A, since it uses the same prices. This means that the comparison of Pa,t x Hb,t with Pa,t x Ha,t does indeed measure the GDP of B in volume relative to the GDP of A for year t. By contrast, the comparison over time of Pa,t + 1 x H_{b,t+1} with P_{a,t} x H_{b,t} does not give the evolution in volume of the GDP of B between period t and period t +1, because this evolution incorporates a price change: $P_{a,t+1}$ occurs in the first term and $P_{a,t}$ in the second (corresponding to the price rise in the reference country).

Things are not the same for the data in , where each cell is divided by the GDP of the reference country. For a given country other than the reference country (for which the ratio equals 100, by definition), each line corresponds to the sequence of ratios $(P_{a,t x} H_{b,t})/(P_{a,t x} H_{b,t})$ $H_{a,t}$; $(P_{a,t+1} \times H_{b,t+1})/(P_{a,t+1} \times H_{a,t+1})$; $(P_{a,t+2} \times H_{b,t+2})/(P_{a,t+2} \times H_{a,t+2})$. Because prices in country A occur in the numerator and denominator of each of these ratios, the evolution over time in these ratios is very similar to the evolution in volume shown in , which for its part corresponds to the formula: $P_{a \ 2000} \times H_{b,t}/P_{a \ 2000} \times H_{a,t}$; $P_{a \ 2000} \times H_{b,t+1}/P_{a, \ 2000} \times H_{a,t+1}$; $P_{a \ 2000} \times H_{b,t+2}/P_{a \ 2000} \times H_{b,t+2}/P_{a \ 2000} \times H_{b,t+1}$ $H_{a,t+2}$; where $P_{a 2000}$ denotes the prices of country A for the reference year 2000.

But there are nevertheless certain differences. First, in , the price structure changes in each period, whereas in the second (that of) it remains fixed (being for the year 2000). This is why the OECD prefers the second formula (that of), in which the evolution reflects changes in quantity only. As explained in the main text, this method measures volume doubly at constant prices - both spatially and over time. It nevertheless has the disadvantage of all volume indices with fixed weighting, since it uses the relative weighting structure of a past year and applies it to all the periods. When, as in the notable case of computers, there is a steady decline in relative prices, this method can lead to an overstatement of the volume of GDP per head in countries that are large producers of computers. That is because the large volume of computer production is weighted by a relative price that is higher than in the most recent period, whereas it is the price for this recent period that should be used.

Notes

1. Note that the changes in the indices for each country in Table 7 do not correspond to the change in volume for this country, but to the change in volume *relative* to the change in volume of the USA.

Back

Understanding National Accounts 2006

Chapter 4: Production: What it Includes and Excludes

Exercises

- **Exercise 1** Change in the structure of production
- **Exercise 2** Branches and products
- **Exercise 3** Calculation of output
- **Exercise 4** Calculation of output: the non-market case
- **Exercise 5** Calculation of output: the case of banks
- **Exercise 6** Calculation of output: the case of distributors
- **Exercise 7** Calculation of output: the case of insurance companies

◀ 15/48 ▶

http://publications.oecd.org/WebBooksV2/30-2006-06-1/42-03EX.htm[8/2/2011 6:14:14 PM]

Chapter 4: Production: What it Includes and Excludes

Exercise 1: Change in the structure of production

This exercise is based on the 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?

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

Answer to exercise 1. Change in the structure of production

To download the answers in Excel, please click the StatLink: <u>http://dx.doi.org/10.1787/183200405337</u>. The table below gives the answer to the first question. Total value added was calculated by summing the values added of the "trade," "business services" and "other services" branches. The resulting total was then calculated as a percentage of total value added. The results were 58.1% for 1980 and 67.6% for 2002, confirming that there has been a distinct increase (of around 10 points) in the share of services in the Austrian economy over a period of more than 20 years. This evolution is typical of the OECD countries, with agricultural and manufactured products being increasingly imported due to globalisation.

In %	1980	1995	2002
Services	58.1	66.9	67.6
Other	41.9	33.1	32.4
Total value added	100.0	100.0	100.0

These values are shown graphically in Figure 1.



Figure 4. : . Austria: share of services in total value added

Non-market activities are to be found in the "other services" branch and especially in the "public administration", "education" and "health". The imputed rents are included in the "real estate, renting" sub-branch.

The sum of the values added is not equal to GDP. To obtain the latter, it is necessary to add taxes on products and deduct subsidies on products. For more detail concerning this adjustment, see Chapter 11.

The Table 2 shows the annual average growth rate in value added for major branches over this period of more than 20 years. The average annual growth rate is obtained as the 22nd root of the ratio between value added in 2002 and value added in 1980 (to be more precise, it is equal to 100x[(va2002/va1980)**(1/22)-1], where "**" denotes "raised to the power of"). It can be seen that it is business services that have grown the most, with an annual average growth rate of 7.9% over the 20 years, 2.9 points more than the average annual growth rate for value added as a whole. The service branches have grown more than the average, and agriculture and industry have grown the least. However, the outsourcing of some activities by industrial firms to external service providers implies that the results may to some extent overstate the magnitude of the switch from industry to services.

http://publications.oecd.org/WebBooksV2/30-2006-06-1/42-04EX1.htm[8/2/2011 6:14:26 PM]

In %	2002/1980
Agriculture and fishing	0.2
Industry	4.0
Construction	4.5
Trade	4.8
Business services	7.9
Other services	5.0
Total value added	5.0

This comparison of growth rates over 20 years is not totally convincing because the data in the table are at current prices and not in volume. Part of the growth shown is therefore due to changes in prices. A comparison in volume would have been more convincing.

┥ Back

http://publications.oecd.org/WebBooksV2/30-2006-06-1/42-04EX1.htm[8/2/2011 6:14:26 PM]

Chapter 4: Production: What it Includes and Excludes

Exercise 2: Branches and products

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?

Answer to exercise 2. Branches and products

To download the answers in Excel, please click the StatLink: <u>http://dx.doi.org/10.1787/587326685082</u>.

The fundamental relationship is as follows: value added = output minus intermediate consumption. This relationship can be found in the Table 2. If we start with, for example, the "food products, beverages and tobacco", the results are as follows: value added = 5868; output = 26 541; intermediate consumption = 20 672; therefore 26 541 - 20 672 = 5 868. Similarly, for the "transport equipment" branch: 2 340 - 18 430 = 910.

shows a breakdown by branch, which should not be confused with a breakdown by product. For one thing, a table showing breakdown by product would not include value added, since value added is only relevant for branches. Second, output in terms of product is slightly different from output in terms of branch. Above all, however, intermediate consumption would take on a different meaning and its value would be very different as a result. in fact includes intermediate consumption of any product in a given branch. For example, the 20 672 representing intermediate consumption in the "food products, beverages and tobacco" branch contains the value of all products consumed by firms in this branch in order to produce foodstuffs – agricultural products, petroleum products, temporary employment services, chemicals, etc. In a table based on product, by contrast, the intermediate consumption item would contain intermediate consumption of the given product in all branches of the economy. For example, in a table based on product, agricultural inputs would be equal to the value of agricultural products consumed by all branches (including agriculture itself). When talking of intermediate consumption, therefore, it is necessary to know whether it is intermediate consumption of a branch or intermediate consumption of a product. The only common element between the two is intermediate consumption of product X in branch X: for example, intermediate consumption of agricultural products in the agriculture branch (seeds, for example) is included in the intermediate consumption of the agriculture branch but also forms part of the intermediate consumption of agricultural products.

makes it possible to calculate a ratio for intermediate consumption as a percentage of output. This ratio is known as the IC ratio (IC standing for intermediate consumption). Let us calculate this ratio for certain branches (see). It is interesting to see the differences in the ratio from one branch to another. For example, the IC ratio in car making is very high (82.5%). This reflects the fact that car making is an assembly industry which consumes a substantial amount of material inputs (*i.e.* intermediate consumption) purchased from other branches. It is therefore highly "externalised". Car making is also, in certain countries, a large consumer of temporary employment services, which are classified as intermediate consumption. Conversely, service activities such as advisory services, hotels and restaurants, education and healthcare are "externalised" to a much smaller extent, since these are labour-intensive industries, with costs consisting mainly of employee compensation, which is not intermediate consumption but is included in their value added.

Belgium, 2002	Intermediate consumption ratio, in %
Manufacturing	74.3
Manufacture of food products, beverages and tobacco	77.9
Manufacture of textiles and textile products	73.2
Manufacture of leather and leather products	69.3
Manufacture of wood and wood products	73.5
Manufacture of pulp, paper and paper products; publishing and printing	66.7
Manufacture of coke, refined petroleum products and nuclear fuel	90.9
Manufacture of chemicals, chemical products and man-made fibres	69.9
Manufacture of rubber and plastic products	65.0
Manufacture of other non-metallic mineral products	65.2
Manufacture of basic metals and fabricated metal products	74.1
Manufacture of machinery and equipment n.e.c.	64.7
Manufacture of electrical and optical equipment	65.7
Manufacture of transport equipment	82.5
Manufacturing n.e.c.	73.3

📢 Back



http://publications.oecd.org/WebBooksV2/30-2006-06-1/42-04EX2.htm[8/2/2011 6:14:41 PM]

L Chapter 4: Production: What it Includes and Excludes

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?

Answer to exercise 3. Calculation of output

Output is equal to sales plus the change in inventories of finished products. The latter is equal to the inventory at the end of the period minus the inventory at the beginning of the period: $346\ 700\ -\ 245\ 000\ =\ 101\ 700$. Output is therefore equal to 1 353 500 + 101 700 = 455 200. Intermediate consumption is equal to purchases of materials and temporary employment services minus the change in materials inventories (43 000 - 73 200 = -30 200). This shows that this change can be negative. Intermediate consumption is therefore equal to 540 000 + 350 500 + 30 200 = 920 700. As can be seen, this solution does not include the amount of machine-tool purchases because these are not intermediate consumption but gross fixed capital formation. The value added is equal to the difference between production and intermediate consumption: 1 455 200 - 920 700 = 534 500.

The absence of a change in prices is an important assumption because it makes it possible to calculate the change in inventories by simply subtracting the value of the stocks at the end of the period from the stock values at the beginning of the period. If the prices of either the finished products or of the goods held for intermediate consumption are not constant (which is the usual situation), this simple calculation will include holding gains and losses, and these have to be deducted in the calculation of gross output and intermediate consumption.

http://publications.oecd.org/WebBooksV2/30-2006-06-1/42-04EX3.htm[8/2/2011 6:14:58 PM]

Chapter 4: Production: What it Includes and Excludes

Back

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.

Answer to exercise 4. Calculation of output: the non-market case

Non-market output is calculated on the basis of the sum of the costs. The latter include civil servants' gross wages and salaries ($562\ 980$) + the employers' social contributions ($65\ 450$) + the intermediate consumption (assumed here to be equal to the purchase of materials (*i.e.* $85\ 340$) + depreciation (consumption of fixed capital corresponding to the utilisation costs of plant and buildings, machinery, software, etc.), which equals ($124\ 320$). In total, this makes $838\ 090$. Tax revenue has nothing to do with the measurement of output. Value added is therefore equal to $752\ 750\ (838\ 090\ -\ 85\ 340)$. This value added breaks down into the cost of labour, the cost of capital and profits. The cost of labour is $628\ 430\ (gross\ wages\ and\ salaries\ +\ employers'\ social\ contributions)$. The cost of capital is equal to the depreciation: $124\ 320$. When these two items are deducted from value added, one is left with zero, meaning that profits are nil. The assumption that general government entities are non-profits is therefore verified.

http://publications.oecd.org/WebBooksV2/30-2006-06-1/42-04EX4.htm[8/2/2011 6:15:37 PM]

L Chapter 4: Production: What it Includes and Excludes

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.

Answer to exercise 5. Calculation of output: the case of banks

The output in the case of banks is equal to the sum of their sales of invoiced services (foreign exchange commissions and stock-market trading commissions) plus FISIM, assumed here to equal interest received minus interest paid (in reality, things are more complicated than this – see box "Going a step further: FISIM"). The output of this bank is therefore $32\ 980\ +\ 23\ 430\ +\ 357\ 850\ -\ 204\ 650\ =\ 209\ 610$. The intermediate consumption is equal to purchases of materials minus the change in inventories of materials plus the purchases of IT consultancy services: $34\ 520\ -\ (3\ 860\ -\ 7\ 420)\ +\ 32\ 890\ =\ 70\ 970$ (remember that purchases of software are not intermediate consumption but gross fixed capital formation, o GFCF). The value added is therefore 209\ 610\ -\ 70\ 970\ =\ 138\ 640.

┥ Back

http://publications.oecd.org/WebBooksV2/30-2006-06-1/42-04EX5.htm[8/2/2011 6:15:51 PM]

Chapter 4: Production: What it Includes and Excludes

┥ Back

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.

Answer to exercise 6. Calculation of output: the case of distributors

Output in the case of distribution is equal to the distribution margin on the products for resale. This can be calculated as sales (4 567 800) minus purchases of products resold (this assumes that the prices of purchased products in stock have not changed between purchase and sale, which corresponds to the assumption of negligible inflation). This latter figure equals purchases for resale (3 987 350) minus the change in the inventories of products for resale (548 400 – 476 000). The result is therefore 4 567 800 – [3 987 350 – 72 400] = 652 850. Intermediate consumption is equal to purchases that were not for resale (4 120 500 – 3 987 350) minus the change in the inventories of materials (3 250 – 120) = 130 020. The value added is 652 850 - 130 020 = 522 830.

Back

http://publications.oecd.org/WebBooksV2/30-2006-06-1/42-04EX6.htm[8/2/2011 6:16:06 PM]

Chapter 4: Production: What it Includes and Excludes

Back

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?

T Answer to exercise 7. Calculation of output: the case of insurance companies

The output of insurance companies is measured by the formula: premiums + investment income – indemnities. Therefore, the output in our example is: $210\ 400\ +\ 34\ 270\ -\ 187\ 500\ =\ 57\ 170$. Intermediate consumption is equal to purchases of consumables minus the variation in inventories of materials: $24\ 320\ -\ [20\ -\ 5\ 630]\ =\ 29\ 930$. Value added is equal to 27\ 240.

If, all other things remaining equal, an exceptional claim raises total indemnities to 245 000, output now becomes $210\ 400\ +\ 34\ 270\ -\ 245\ 000$, *i.e.* - 330, a negative figure! This result is difficult to interpret. The company has fulfilled its role of insurer by dealing with exceptional claims and yet its output is negative. This is why national accounts are planning to use a more complex measure of output which "smoothes out" exceptional claims.

http://publications.oecd.org/WebBooksV2/30-2006-06-1/42-04EX7.htm[8/2/2011 6:16:18 PM]

Understanding National Accounts 2006

Exercises

Exercise 1 Final uses in volume

Exercise 2 True, false or choose from the list

Exercise 3 Evaluation of changes in inventories excluding stock appreciation

Exercise 4 The terms of trade

┥ 19/48 🕨

http://publications.oecd.org/WebBooksV2/30-2006-06-1/52-03EX.htm[8/2/2011 6:16:51 PM]

Chapter 5: Defining Final Uses of GDP

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 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.

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

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

Answer to exercise 1. Final uses in volume

To download the answers in Excel, please click the StatLink: <u>http://dx.doi.org/10.1787/507447371655</u>.

The change in current-price data is a mixture of changes in prices and changes in the underlying volumes. The analysis of growth concerns only growth in the underlying volumes. This is why it is necessary to analyse final uses in volume terms and not at current prices.

The series for final uses in volume is obtained by deflating the current-price series by the corresponding price indices. We then have:

Final uses in volume	1995	1996	1997
Household final consumption expenditure	649.03	657.28	658.24
Final consumption expenditure by general government	282.16	288.55	294.70
Final consumption expenditure by non-profit institutions serving households (NPISHs)	7.03	7.16	7.39
Gross fixed capital formation	222.10	222.07	221.95
Acquisitions of objects of value, net of disposals	0.92	0.89	0.99
Changes in inventories	4.41	-2.57	-2.04
Exports	265.97	275.22	307.70
Minus Imports	-249.76	-253.74	-271.19
Gross domestic product	1 181.85	1 194.85	1 217.67
Total final uses	1 181.85	1 194.86	1 217.74
Chain-weighting residual	0.00	0.01	-0.07

┥ Back

The next to last row corresponds to the algebraic sum of the final uses. In principle, this sum is equal to GDP. This is seen to be true for 1995 and for 1996, but there is a difference for 1997, which is known as the "chain-weighting residual". This difference stems from the fact that the volumes in the annual accounts are calculated using chain-linked indices (see Chapter 2) and therefore lose their additivity when one moves away from the base year (1995 in this case). Since this residual is very small, it will be ignored here, and the data will be manipulated as if they were additive.

Domestic demand is equal to the sum of consumption expenditure by households, general government and NPISHs, gross fixed capital formation, net acquisition of valuables and changes in inventories. External demand is equal to net exports. The calculation of the contributions of domestic and external demand to GDP growth is

http://publications.oecd.org/WebBooksV2/30-2006-06-1/52-04EX1.htm[8/2/2011 6:17:06 PM]

made using the formulae set out in Chapters 1 and 2. It turns out that the 1.1% GDP growth in 1996 is explained by a contribution of 0.65 of a point from domestic demand and 0.45 of a point from external demand. These results are obtained in the following manner: after converting final uses into percentages of GDP, domestic demand accounts for 98.63% of final uses and net exports for 1.37%.

The contribution of domestic demand to GDP growth will therefore be equal to $98.63 \times [(1 \ 173.37/1 \ 165.64) - 1]$, which equals 0.65 of a point.

Similarly, for the contribution of external demand to GDP growth we obtain $1.37 \times [(21.48/16.21) - 1]$, which equals 0.45 of a point. Simple addition of these two results gives us the GDP growth rate of 1.1%. In 1997, it was external demand that permitted GDP growth to accelerate. The contribution of domestic demand remained the same as in 1996, while the contribution of external demand climbed to 1.26.

Final uses in volume	1995	1996	1997
Domestic demand	1 165.64	1 173.37	1 181.23
External demand (net exports)	16.21	21.48	36.51
GDP	1 181.85	1 194.88	1 217.67

Final uses as % of GDP	1995	1	996
Domestic demand		98.63	98.2
External demand (net exports)		1.37	1.8
GDP		100.00	100.00

Contributions to GDP growth	1996	1997
Domestic demand	0.65	0.65
External demand (net exports)	0.45	1.26
GDP	1.10	1.91

http://publications.oecd.org/WebBooksV2/30-2006-06-1/52-04EX1.htm[8/2/2011 6:17:06 PM]
Chapter 5: Defining Final Uses of GDP

┥ Back

Exercise 2: True, false or choose from the list

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?
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?

Total consumption expenditure by households includes expenditure by foreign tourists in France. True or false?
Actual household consumption is equal to household consumption expenditure plus that of general government. True or false?

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

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

Answer to exercise 2. True, false or choose from the list

• Included in France but not in the UK; not included (part of GFCF); not included (transfers); not included (transfers); included.

- 300.
- False.

• False (only the individual expenditures of general government and NPISHs are included in actual household consumption expenditure).

• True.

• Individual; collective; individual; collective; individual; individual; collective.

• False.

Back

http://publications.oecd.org/WebBooksV2/30-2006-06-1/52-04EX2.htm[8/2/2011 6:17:20 PM]

Chapter 5: Defining Final Uses of GDP

Back

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

- Value of inventory at the beginning of the period in current prices:
- Value of inventory at the end of the period in current prices:
- Difference (b) (a), including stock appreciation:

Correct method

- Total value of additions:
- Total value of withdrawals:
- Correct measurement of the changes in inventories (excluding stock appreciation):
- Approximate method
- Quantity at the beginning of the period:
- Quantity at the end of the period:
- Approximate measure of the change in inventories (excluding stock appreciation):

Answer to exercise 3. Evaluation of changes in inventories excluding stock appreciation

To download the answers in Excel, please click the StatLink: <u>http://dx.doi.org/10.1787/881767268287</u>.

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	13	11	4	5	7
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	13	11	4	5	7	10
Value of additions (prices x quantities)	12			7	36	27
Value of withdrawals (prices x quantities)		10	35		24	

Average price over the totality of the subperiods:

6 = (4 + 5 + 5 + 7 + 6 + 9)/6

Wrong method

- Value of inventory at the beginning of the period in current prices: 40(10 x 4)
- Value of inventory at the end of the period in current prices: 90(10 x 9)
- Difference (b) (a), including stock appreciation: 50

Correct method

- Total value of additions: 82 = (12 + 7 + 36 + 27)
- Total value of withdrawals: 69 = (10 + 35 + 24)
- Correct measurement of the change in inventories (excluding stock appreciation): 13 = (82 69)Approximate method
- Quantity at the beginning of the period: 10
- Quantity at the end of the period: 10
- Approximate measure of the change in inventories (excluding stock appreciation) $0 = (10 10) \times 6 = 0$ The difference between the correct method and the approximate method is that, in the correct method the

additions to, and withdrawals from, inventories are valued at the prices for each individual period, whereas in the approximate method an average price is applied. The approximate method results in zero changes in inventories if the quantities are the same at the beginning and the end, as in our example. The correct method takes into account the changes in prices and quantities. The "stock appreciation" is obtained simply as the difference between the result of the wrong method and the right method, *i.e.* 50 - 13 = 37. The stock appreciation is obtained in approximate manner as the result of the wrong method *minus* the approximate method, *i.e.* 50 - 0 = 50.

Back

http://publications.oecd.org/WebBooksV2/30-2006-06-1/52-04EX3.htm[8/2/2011 6:17:33 PM]

Chapter 5: Defining Final Uses of GDP

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:

- Derive the export price index for the period 1995-2002.
- Derive the import price index for the period 1995-2002.
- 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.

	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.

Answer to exercise 4. The terms of trade

To download the answers in Excel, please click the StatLink: <u>http://dx.doi.org/10.1787/827140485500</u>.

To calculate the export and import price indices, we use the data in current prices and in volume.

The method consists of calculating the following ratios:

- Export price index: exports at current prices/exports in volume.
- Import price index: imports at current prices/imports in volume.
- We can then calculate the terms of trade:

terms of trade = export price index/import price index.

It will be seen that a decline in the import price index (assuming that the export price index remains constant) will produce an improvement in the terms of trade. Conversely a decline in the export price index (assuming that the import price index remains constant) will produce deterioration in the terms of trade.

We then have the following price indices (1995 = 100):

	1995	1996	1997	1998	1999	2000	2001	2002
Exports								
Index	100.00	101.65	103.69	102.31	101.137	103.61	103.63	101.95
Imports								
Index	100.00	102.31	103.87	101.23	99.85	105.32	104.21	101.33

The terms of trade during the period will then be:

	1995	1996	1997	1998	1999	2000	2001	2002
Value	100.00	99.35	99.83	101.07	101.29	98.38	99.44	100.61

4 Back

http://publications.oecd.org/WebBooksV2/30-2006-06-1/52-04EX4.htm[8/2/2011 6:17:48 PM]

Understanding National Accounts 2006

Exercises

Exercise 1 True or False?

Exercise 2 Test your knowledge of the household accoun

4 23/48 **>**

 $http://publications.oecd.org/WebBooksV2/30-2006-06-1/62-03EX.htm[8/2/2011\ 6:18:44\ PM]$

Understanding National Accounts 2006

Chapter 6: The household account

Exercise 1: True or False?

- When share prices rise:
- · household disposable income increases;
- household saving declines.

• When a tenant buys the apartment he/she had previously been renting, GDP increases because it now includes an imputed rental income of homeowner-occupiers.

• When, in a given year, the number of road accidents is higher than usual, household *disposable income* also tends to be higher than usual.

• A rise in the rate of income tax automatically leads to a decline in household disposable income.

• A farmer whose olive plantation is destroyed in a storm automatically suffers a decline in his disposable income.

- A cut in the rate of inheritance tax automatically leads to a decline in household saving.
- A cut in the rate of reimbursement of dental care leads to:
- a rise in GDP;
- a decline in household disposable income.

Answer to exercise 1. True or False?

- False. Disposable income excludes holding gains or losses on shares.
- True. Households owning shares in listed companies will tend to increase their spending: household final
- consumption expenditure will increase but saving will fall, since *disposable income* excludes holding gains.
 False. The rent actually paid to the former owner falls but an imputed rent of the same amount is entered, so GDP remains unchanged.
- True. The amounts paid out on non-life insurance claims (which are included in the *other transfers* item in the *resources* column in the *secondary distribution of income account*) will be greater than the net non-life insurance premiums paid (which are included in the *other transfers* item in the uses column in the same account).
- True.
- False. The destruction of property following natural catastrophes reduces the "net worth", but the corresponding losses are not recorded in the sequence of accounts leading to the definition of disposable income.
- False. Inheritance taxes are capital transfers and are included neither in the calculation of *disposable income* nor in that of *household final consumption expenditure*. They therefore have no impact on *saving*, which is calculated as the difference between the two.
- False. Reimbursement of dental care is included in transfers and is counted under flows of secondary income and not primary income. It therefore has no effect on GDP.
- True. Households will receive smaller social security benefits and their disposable income will suffer as a result.

Back

Back

http://publications.oecd.org/WebBooksV2/30-2006-06-1/62-04EX1.htm[8/2/2011 6:19:05 PM]

Chapter 6: The household account

Back

Exercise 2: Test your knowledge of the household account

Enter the transactions described below in the sequence of accounts starting with the production account and going through to the utilisation of disposable income account.

The Devant household consists of Jacques, his wife Monique, their daughter Nicole, Monique's mother Simone, and Jacques' brother Xavier. During the year:

- Jacques receives a salary of 2 000 for his job as store manager. His employer pays 20 in social contributions. Jacques pays 25 in income tax and 15 in social contributions. He spends 100 on meals and transport and 280 to buy a new car. He finances this purchase with a loan and pays 5 in interest during the year as a whole. He hands over the rest of his salary to Monique, who is responsible for the household's accounts.
- Monique is unemployed throughout the year, receiving 350 in unemployment benefit. She spends 1 900 on food, 120 on rent and 15 on household insurance. (Even though Monique is unaware of this, 5 out of this 15 corresponds to remuneration for the service provided by the insurance company).
- Simone receives 45 from a pension fund to which her late husband was affiliated, as well as 265 in the form of a social security pension. She spends 130 on clothes and gives Nicole 25 in pocket money.
- Nicole spends all the pocket money received from her grandmother on sweets. She also receives 30 in pocket money from her parents but saves this in order to buy a bicycle.
- Xavier has no fixed employment, but carries out undeclared painting jobs for neighbours. This brings him 1 500 during the year, but he spends 400 of this on paint and brushes. He occasionally calls on a friend to help him and pays him 40. Once when on a worksite, he parked in an unauthorised space and his van was clamped, costing him 20 to have the clamp removed. He spends 450 on cigarettes, beer and football match tickets. He pays 60 in alimony to his ex-wife.

Uses	Resources				
Intermediate consumption	Gross output				
Value added					
Uses	Resources				
Compensation of employees	Value added				
Wages and salaries					
Employers' social contributions					
Net taxes on production					
Mixed income/operating surplus					
Uses	Resources				
Property income	Mixed income/operating surplus				
Interest	Compensation of employees				
Rents	Wages and salaries				
	Employers' social contributions				
	Property income				
	Interest and dividends				
	Rents				
Balance of primary incomes					
Uses	Resources				
Current taxes on income and wealth, etc.	Balance of primary incomes				
Social contributions	Social benefits other than social transfers in kind				
Employers' social contributions	Social security benefits in cash				

1 5	5
Employees' social contributions	Social assistance benefits in cash
Social contributions by self-employed persons	
Other current transfers	Other current transfers
Net non-life insurance premiums	Non-life insurance claims
Miscellaneous current transfers	Miscellaneous current transfers

Disposable income

Uses	Resources
Household final consumption expenditure	Disposable income
	Adjustment for the change in net equity of households on pension funds
Saving	

Answer to exercise 2. Test your knowledge of the household account

The letters in brackets are the initials of the first names of the members of household concerned.

Important points:

• Transfers between members of the same household are not recorded in the accounts. Only transfers

http://publications.oecd.org/WebBooksV2/30-2006-06-1/62-04EX2.htm[8/2/2011 6:19:38 PM]

between households are recorded. When Jacques hands over to Monique the remainder of his salary or when Simone gives pocket money to Nicole, these are transfers between members of the same household and are not included in the accounts.

- Saving corresponds to the difference between disposable income and consumption expenditure. When Nicole puts her pocket money aside to buy a bicycle, this saving is recorded in the *saving* balancing item of the *use of disposable income account*. However, it is not necessary to make an explicit entry for the sum saved each year, as this is automatically taken into account in the calculation of the balancing item.
- The fact that Xavier's work is undeclared makes no difference as far as national accountants are concerned. His gross output, the value added he generates, his expenditure and everything else has to be recorded in exactly the same way as if the work were "legitimate".

Uses		Resources	
Intermediate consumption	400 (X)	Gross output	1 500 (X)
Value added	1 100		

Uses	Resources	Resources			
Compensation of employees	Value added	1 100			
Wages and salaries	40 (X)				
Employers' social contributions					
Net taxes on production					
Mixed income/ operating surplus	1 060				

Uses		Resources			
Property income		Mixed income/operating surplus	1 060		
Interest	5 (J)	Compensation of employees			
Rents		Wages and salaries	2 000 (J)		
		Employers' social contributions	20 (J)		
		Property income			
		Interest and dividends			
		Rents			
Balance of primary incomes	3 075				

Uses		Resources	
Current taxes on income and wealth, etc.	25 (J)	Balance of primary incomes	3 075
Social contributions		Social benefits other than social transfers in kind	
			350 (M)
Employers' social contributions	20 (J)	Social security benefits in cash	45 (S)
			265 (S)
Employees' social contributions	15 (J)	Social assistance benefits in cash	
Social contributions by self-employed persons			
Other current transfers		Other current transfers	
Net non-life insurance premiums	10 (M)	Non-life insurance claims	
Misselleneous surrent transfors	60 (X)	Missellanseus aurrent transfers	
WISCENAREOUS CUFFERT TRANSFERS	20 (X)	Miscellaneous current transfers	
Disposable income	3 585		

Uses		Resources	
	280 (J)		
	100 (J)		
	1 900 (M)		
Household final consumption expenditure	120 (M)	Disposable income	3 585
	5 (M)		

	130 (5)	
)	25 (N)	
	450 (X)	
Adjustment for the change in net equity of households on		
pension funds		
5	575	Saving

┥ Back

http://publications.oecd.org/WebBooksV2/30-2006-06-1/62-04EX2.htm[8/2/2011 6:19:38 PM]

Understanding National Accounts 2006

L Chapter 7: Business Accounts

Exercises

- Exercise 1 Accounting balances and ratios: from gross to net
- Exercise 2 To see whether you have understood the accounts system
- Exercise 3 Some international comparisons for corporations, year 2000
- **Exercise 4** The calculation of the profit share for non-financial
- **Exercise 5** Producer prices and production costs

4 27/48 🕨

4 27/48 🕨

http://publications.oecd.org/WebBooksV2/30-2006-06-1/72-03EX.htm[8/2/2011 6:20:16 PM]

Chapter 7: Business Accounts

📢 Back

Exercise 1: Accounting balances and ratios: from gross to net

This exercise is based on the French national accounts. It consists of calculating the net accounting balances and ratios starting from the gross balances they provide. First question: find on the INSEE website (<u>www.insee.fr</u>) the annual national accounts table that gives the consumption of fixed capital ("consommation de capital fixe") by non-financial corporations ("sociétés non financières") between 2001 and 2003. Second question: find on the INSEE website the principal gross accounting balances for non-financial corporations over the same period (gross value added – "valeur ajoutée brute" – and gross operating surplus – "excédent brut d'exploitation"). Calculate the net balances. Deduce from these the gross and net profit ratios.

Answer to exercise 1. Accounting balances and ratios: from gross to net

To download the answers in Excel, please click the StatLink: <u>http://dx.doi.org/10.1787/818364763348</u>.

Warning: this answer uses the figures published by INSEE at the beginning of April 2006. They will certainly have been modified since then. Moreover, the calculations have been made with the numbers obtained on the INSEE website in million euros, whereas the following tables use figures rounded to the nearest billion. This means that one will not arrive at exactly the same results if one starts directly with the tables shown below.

Question 1:

On the INSEE website, find "Comptes nationaux annuels/Capital fixe et consommation de capital fixe/tableau 2.607: consommation de capital fixe à prix courants par secteur institutionnel". Extract row S11, non-financial corporations ("sociétés non financières"). This shows (rounded to the nearest billion euros):

Consumption of fixed capital (K1)		2001	2002	2003
S11.	Non-financial corporations	108.9	114.0	116.6

Question 2:

Continuing on the INSEE website, find "Comptes nationaux annuels/secteurs institutionnels/ entreprises non financières/tableau 3.101: comptes des sociétés non financières (S11)". Extract rows B1 "gross value added" (valeur ajoutée brute) and B2 "gross operating surplus" (excédent brut d'exploitation).

Non-fina	ancial corporations (S11)	2001	2002	2003
B1.	Gross value added (GVA)	760.1	784.3	799.3
B2.	Gross operating surplus (GOS)	238.2	240.7	244.5

The net balances are calculated by deducting the consumption of fixed capital from each of these items.

Non-finar	ncial corporations (S11)	2001	2002	2003
B1N.	Net value added (NVA)	651.2	670.3	682.7
B2N.	Net operating surplus (NOS)	129.3	126.7	127.9

The gross profit share (100*GOS/GVA, or using the codes: 100*B2/B1), as well as the net profit share (100*NOS/NVA, or using the codes: 100*B2N/B1N) can then be calculated. The net profit share is much smaller, since the costs of depreciating capital are taken into account. Those not good at maths might care to note that when the same amount is deducted from the numerator and denominator of a ratio, if the numerator is less than the denominator, then the ratio is reduced.

Non-financial corporations (S11)	19	99	2000	2001
GOS/GVA	31.3	30.7	30.6	
NOS/NVA	19.9	18.9	18.7	

http://publications.oecd.org/WebBooksV2/30-2006-06-1/72-04EX1.htm[8/2/2011 6:20:27 PM]

L Chapter 7: Business Accounts

Exercise 2: To see whether you have understood the accounts system

The following is a list of transactions made by an advertising firm. Place these various transactions correctly in the structure of accounts shown further below, and show that the firm's gross saving amounted to 620 K (1 K = 1 000).

Revenue	К\$
1. Sales to customers	4 500
2. Interest on bank account	30
3. Payment of claim for fire damage	10

Expenditure	К\$
4. Paper, Ink and other office supplies used during the year	380
5. Rent paid for additional office space	150
6. Cost of electricity and telephones	60
7. CEO's remuneration	300
8. Gross staff wages and salaries	1 500
9. Employers' social security contributions on staff wages and salaries	800
10. Dividend paid to shareholders	420
11. Profits tax payable	180
13. Purchase of computers and software	240
14. Interest on the bank loan for the purchase of computers	40
15. Payment to the security company for the protection of buildings	70
16. Property tax on office buildings	20

Uses	Resources
P2. Intermediate consumption	P1. Output:
	P11. Market
B1. Gross value added	P12. For own final use

Generation of income account

Uses	Resources
DI. Compensation of employees:	
D11. Wages and salaries	B1. Gross value added
D121. Employers' actual social contributions	
D122. Employers' imputed social contributions	
D29. Other taxes on production	
D39. Other subsidies on production	
B2. Gross operating surplus	

Uses	Resources
	B2. Gross operating surplus
D4. Property income:	D4. Property income:
D41. Interest	D41. Interest
D421. Dividends	D421. Dividends
D43. Reinvested earnings on direct foreign investment	D43. Reinvested earnings on direct foreign investment
D45. Rents on land and sub-soil assets	D45. Rents on land and sub-soil assets
B5. Balance of primary incomes	

Uses	Resources
D51. Taxes on income	B5. Balance of gross primary incomes
	D61. Social contributions:
D622. Private funded social benefits	D611. Actual social contributions
D71. Net non-life insurance premiums	D612. Imputed social contributions
D75. Miscellaneous current transfers	D72. Non-life insurance claims
B6. Gross disposable income	D75. Other current transfers

Uses	Resources
B8. Gross saving	B6. Gross disposable income

Answer to exercise 2. To see whether you have understood the accounts system

To download the answers in Excel, please click the StatLink: <u>http://dx.doi.org/10.1787/611431661478</u>.

Points to note:

• Intermediate consumption includes not only the materials used to produce advertising services but also all the overheads. Therefore, for this firm intermediate consumption therefore covers: the paper, ink and office supplies used during the year (380); the rent paid for additional office space (150); electricity and telephone services (60); and the cost of security guards (70).

• The remuneration of the CEO is regarded as wages. Wages and salaries therefore comprise the wages and salaries of the personnel (1 500) *plus* the remuneration of the CEO (300).

• Be careful: Purchases of computers and software are GFCF and must not be classified as intermediate consumption. In fact, they will not appear in the accounts shown here, which go no further than the saving item. GFCF forms part of the capital account, which is not shown in this exercise.

Uses

Resources

http://publications.oecd.org/WebBooksV2/30-2006-06-1/72-04EX2.htm[8/2/2011 6:20:46 PM]

P1. Output:			
P2. Intermediate consumption	380	P11. Market	4 500
	+150	P12. For own final use	
	+60		
	+70		
B1. Gross value added	3 840		

Uses		Resources	
D1. Compensation of employees:			
D11. Wages and salaries	1 800	B1. Gross value added	3 840
D121. Employers' actual social contributions	800		
D122. Employers' imputed social contributions			
D29. Other taxes on production	20		
D39. Other subsidies on production			
B2. Gross operating surplus	1 220		

Uses		Resources	
		B2. Gross operating surplus	1 220
D4. Property income:		D4. Property income:	
D41. Interest	40	D41. Interest	30
D421. Dividends	420	D421. Dividends	
D43. Reinvested earnings on direct foreign		D43. Reinvested earnings on direct foreign	
investment		investment	
D45. Rent on land and sub-soil assets		D45. Rent on land and sub-soil assets	
B5. Balance of gross primary incomes	790		

Uses		Resources	
D51. Taxes on income	180	B5. Balance of gross primary incomes	790
		D61. Social contributions:	
D622. Private funded social benefits		D611. Actual social contributions	
		D612. Imputed social contributions	
D71. Net non-life insurance premiums		D72. Non-life insurance claims	10
D75. Miscellaneous current transfers		D75. Miscellaneous current transfers	
B6. Gross disposable income	620		

Uses		Resources	
		B6. Gross disposable income	620
B8. Gross saving	620		

http://publications.oecd.org/WebBooksV2/30-2006-06-1/72-04EX2.htm[8/2/2011 6:20:46 PM]

L Chapter 7: Business Accounts

Exercise 3: Some international comparisons for corporations, year 2000

Using the first five rows, calculate three significant corporate ratios for each country: the net profit share (NOS/NVA); the investment rate (GFCF/GVA); and the self-financing ratio (Gross saving/GFCF). Be careful: the profit share you are being asked for is a net rate, whereas the investment rate and the self-financing ratio are gross rates.

	Germany	United States	France	United Kingdom	
	M euros	Billion \$	M euros	Mf	
Gross value added	1 133 570	6 151	770 000	637 967	
Gross operating surplus	357 370	1 709	231 576	213 014	
Saving, net	-13 620	137	22 737	19 674	
Consumption of fixed capital	180 800	740.2	118 782	70 076	
GFCF	246 320	1 104.3	161 041	110 259	
Profit share (net)					
Investment ratio					
Self-financing ratio					

Answer to exercise 3. Some international comparisons for corporations, year 2000

To download the answers in Excel, please click the StatLink: <u>http://dx.doi.org/10.1787/101247761452</u>.

	Germany	United States	France	United Kingdom
Gross value added	1 133 570	6 151	770 000	637 967
Gross operating surplus	357 370	1 709	231 576	213 014
Saving, net	-13 620	137	22 737	19 674
Consumption of fixed capital	180 800	740.2	118 782	70 076
GFCF	246 320	1 104.3	161 041	110 259
Profit share (net)	18.5	17.9	17.3	25.2
Investment ratio	21.7	18.0	20.9	17.3
Self-financing ratio	67.9	79.4	87.9	81.4

In the case of Germany, we have calculated the various rates/ratios as follows:

Profit share (net) = 100*(GOS - CFC)/(GVA - CFC) = 100*(357 370 - 180 800)/(1 133 570 - 180 800) = 18.5Investment ratio: 100*GFCF/GVA = 246 320/1 133 570 = 21.7

Self-financing ratio: 100*Gross saving/GFCF = 100* (CFCF + NS)/GFCF = $(180\ 800 - 13\ 620)/246\ 320 = 67.9$ Note that gross saving, needed for the calculation of the self-financing ratio, is equal to the sum of net saving and consumption of fixed capital.

Therefore, the same method has to be applied for calculating the various rate/ratios for all the countries.

┥ Back

http://publications.oecd.org/WebBooksV2/30-2006-06-1/72-04EX3.htm[8/2/2011 6:21:03 PM]

L Chapter 7: Business Accounts

Exercise 4 (Difficult): The calculation of the profit share for non-financial corporations

Table 27 of the "Informations Rapides", which is the main publication of the French quarterly national accounts (detailed results) contains the following table:

	2001	2002
Profit share (%)	39.9	39.6
Change in the profit share	-0.1	-0.3
Contributions to the change in the profit share		
Labour productivity* (+)	-0.4	0.2
Real wages and salaries (–)	0.0	0.5
Other elements (+)	0.3	0.0

1. Productivity is defined here in terms of value added.

Explain how the change in the profit share can be expressed as a function of the change in labour productivity and growth in real wages and salaries (*plus* other elements). For this purpose, start with the definition of the profit share and the equation GVA = CE + GOS + TNS, where GVA is the gross value added, GOS the gross operating surplus, CE the compensation of employees (including employers' social contributions) and TNS the taxes net of subsidies on production (from now on this last item will not be shown separately but will be included under "other elements"). Use the definition of productivity (value added in volume/employment) and real wage rate (the hourly wage rate divided by the price of value added). Based on these variables, comment on the change in the profit share in 2002. Make the link with the economic principle governing wage bargaining, which says that real wage rates (including employers' social contributions) can increase by the amount of productivity gains.

Answer to exercise 4. The calculation of the profit share for non-financial corporations

To download the answers in Excel, please click the StatLink: <u>http://dx.doi.org/10.1787/473132710367</u>.

The gross profit share is written as GOS/GVA, where GOS = gross operating surplus, and GVA = gross value added. We also have GVA = CE + GOS + TNS, where CE is the compensation of employees and TNS the taxes net of subsidies on production. The TNS will be omitted for the time being, leaving GVA = CE + GOS. We shall now by stages introduce into this accounting equation (approximate because of the omission of the TNS) the productivity and real wage rate variables. First step, divide all the terms by Pva, the price of value added. This gives the first equation:

Equation 1: GVA/Pva = CE/Pva + GOS/Pva

Next, express CE as the number of employees multiplied by the average wage per head (including employers' social contributions), denoted by AWH:

Equation 2: $CE = EMP \times AWH$

Substituting Equation 2 into Equation 1, we get:

Equation 3: GVA/Pva = EMP x AWH/Pva + GOS/Pva

Then, divide all the terms in the Equation 3 by EMP. This gives:

Equation 4: [GVA/Pva]/EMP = AWH/Pva + [GOS/Pva]/EMP

Then, rearrange Equation 4 so that GOS is on the left, resulting in:

Equation 5: [GOS/Pva]/EMP = [GVA/Pva]/EMP – AWH/Pva.

Finally, divide all the terms in Equation 5 by the labour productivity coefficient [GVA/Pva]/EMP. This gives: GOS/GVA = {[GVA/Pva]/EMP – AWH/Pva}/ [GVA/Pva]/EMP.

INSEE estimates that the labour productivity coefficient [GVA/Pva]/EMP equals 0.6. The change in the wage share is therefore expressed as a function equal to 0.6 times the change in productivity (VA/Pva/EMP) and – 0.6 times the change in the real wage (AWH/Pva). This is what we had to prove. However: other elements still have to be taken into account, such as the taxes net of subsidies, and for this reason INSEE adds an additional term: "other elements". The contribution of the "other elements" item is calculated as the difference between the change in the margin rate and the two contributions calculated above.

In 2002, the margin rate fell by 0.3 of a point. This fall was due to a faster rise in real wages (+0.5) than in productivity (+0.2). The economic principle governing the price of labour is often expressed in the following manner: it is justifiable that real wages (including social contributions) rise in line with labour productivity. This principle can be seen here, modulated by the impact on the margin rate (and the other elements), but in a more complete manner: if real wages rise faster than productivity, this will reduce the margin rate; conversely, if real wages rise slower than productivity, the margin rate will rise.

http://publications.oecd.org/WebBooksV2/30-2006-06-1/72-04EX4.htm[8/2/2011 6:21:18 PM]

Chapter 7: Business Accounts

📢 Back

Exercise 5 (Difficult): Producer prices and production costs

Table 26 of the "Informations Rapides" of the French quarterly national accounts (detailed results) includes the following table.

Change in production costs

%

Non-financial corporations	2001	2002
Producer prices	1.6	0.3
Total unit cost	1.4	0.2
Of which, intermediate consumption	0.6	-0.7
Taxes related to production	-1.3	1.4
Wage cost	3.5	2.0
Components of the unit wage cost		
Average wage per head (+)	3.3	2.4
Productivity(-)	-0.8	0.4

1. Productivity is defined here in terms of output.

What is the implicit definition of total cost in this table? How can one deduce from it total unit cost? How does the analysis of total unit cost make it possible to understand the evolution in producer prices? Write down the formula for the relationship between total unit cost and its components. Write down the relationship between unit wage costs and its three component variables (average wage per head, productivity, employers' social contributions). Justify the (+) and the (–). Why does the footnote relating to the productivity variable mention "in terms of production", whereas in the table for the previous exercise it mentioned "in terms of value added"?

Answer to exercise 5. Producer prices and production costs

To download the answers in Excel, please click the StatLink: <u>http://dx.doi.org/10.1787/330480266858</u>.

The total cost is defined as the sum of intermediate consumption (IC), taxes related to production (TP) and the compensation of employees (CE). Denoting the total cost by TC, we therefore have TC = IC + TP + CE. The total unit cost (TUC) can be deduced from this by dividing total cost by output in volume (Pvol): TUC = TC/Pvol. The producer price is the income derived by the producer from the output of one unit of production. It is clear that producers will tend, if possible, to pass on the rise in total unit costs in their producer price, in order to maintain their margins. For example, it can be seen than in 2001, producer prices rose by 1.6%, mainly because of the 1.4% increase in the total unit cost. In this case, the producers were able to offset cost rises by raising sales prices (and hence fuelling inflation). However, if producers are unable to raise their producer prices (for competitiveness reasons), their margins will decline and this is not good for firms and their investment.

Total unit cost breaks down into three elements: TUC = IC/Pvol + TP/Pvol + CE/Pvol. It can be seen that in 2001 the main increase (+3.5%) was in the unit wage cost (CE/Pvol), while the unit cost of intermediate consumption (IC/Pvol) rose only slightly (+0.6%), and the unit cost of taxes on production (TP/Pvol) fell (-1.3%).

The unit wage cost can itself be broken down into three elements: the average wage per head, productivity and social contributions. In order to see this, it is necessary (as in the previous exercise) to break the compensation of employees down into EMP (employment) and the average wage per head: $CE = EMP \times AWH$. But in this case, we go a step further and break the average wage per head down into the average gross wage excluding employers' contributions (AGW) multiplied by a rate of employers' social contributions (ESC). We then have $CE = EMP \times SBM \times ESC$. Expressed in terms of the unit wage cost, this gives $CE/Pvol = [EMP/Pvol] \times (SBM \times ESC)$. In this way, the change in the unit wage cost is expressed as being dependent on three elements: the inverse of the change in productivity (hence the negative sign attached to the productivity row in the table above); the change in the gross average wage; and the change in the average rate of employers' social contributions. It can be seen that in 2001, the unit wage cost rose strongly (+3.5%) as the net result of a significant rise in the gross hourly wage and a 0.8% decline in productivity! The impact of social contributions was negative (-0.7%), probably reflecting the easing of social contributions on the lowest-paid workers that the French government had introduced.

Definition of productivity: in this exercise, the numerator of the productivity is output, while in the previous exercise it was value-added. It is justifiable to use output rather than value-added in this exercise because the objective is to explain the change in production prices, including the movement in intermediate consumption prices.

http://publications.oecd.org/WebBooksV2/30-2006-06-1/72-04EX5.htm[8/2/2011 6:21:34 PM]

Understanding National Accounts 2006

Chapter 8: The financial balance sheet accounts

Exercises

- Exercise 1 Say whether the following affirmations are true or false
- Exercise 2 Quadruple entry
- Exercise 3 Application of accrual accounting
- **Exercise 4** Calculation of the value of a bond
- **Exercise 5** Treatment of debt cancellation
- **Exercise 6** Calculations of flows using stocks at market value

4 31/48 🕨

http://publications.oecd.org/WebBooksV2/30-2006-06-1/82-03EX.htm[8/2/2011 6:22:24 PM]

Chapter 8: The financial balance sheet accounts

Back

Exercise 1: Say whether the following affirmations are true or false

In the national accounts: *a*) a holding gain adds to agents' income; *b*) a holding loss reduces agents' income; *c*) a transaction is generally recorded four times; *d*) every non-financial transaction has a counterpart recorded as a financial transaction; *e*) every financial transaction has a counterpart recorded in the non-financial accounts,; *f*) the price of an asset remains constant, at its purchase price; *g*) human capital is included in the evaluation of national accounts wealth; *h*) in a closed economy, the sum of the balancing items B9 is zero; *i*) repayment of a loan leads to an increase in recorded assets; *j*) the difference between the net values at 31 December in the current year and 31 December in the previous year is explained entirely by the balancing item B9 of the agents concerned.

Answer to exercise 1. Say whether the following affirmations are true or false

• False.

• False: holding gains and losses do not enter into the calculation of income but are recorded in a special account situated further down the sequence of accounts.

• True.

• Almost true: however, barter transactions are recorded as non-financial transactions and not as financial transactions.

• False: certain transactions aimed at changing the composition of financial balance sheets, such as the sale of shares, are only financial transactions and have no non-financial counterpart.

• False: assets are valued at market prices and therefore their valuation varies from one year to another.

• False: see section "Limitations of the national accounts: The exclusions from the balance sheet accounts".

- True.
- False: it is recorded as a decrease in liabilities.

• False: item B9 enters into this difference, but there are also other factors explaining the difference between the net values, including holding gains and losses, consumption of fixed capital and other changes in volume.

Back

http://publications.oecd.org/WebBooksV2/30-2006-06-1/82-04EX1.htm[8/2/2011 6:22:35 PM]

Chapter 8: The financial balance sheet accounts

Exercise 2: Quadruple entry

Household H is employed by corporation C, a producer/supermarket. To simplify the entries, it will be assumed that all the household's economic relations are with this one corporation. H receives a salary of 40 000 from the corporation and consumes 30 000 in products from the corporation. With the remaining 10 000, the household buys further shares in the corporation for 2 000, and with the remaining 8 000 it pays off part of the debt contracted with the employer the previous year, amounting to 15 000. The corporation pays H a dividend of 200, and H pays the corporation interest on its debt, amounting to 300. Lastly, the corporation grants H another loan of 9 000. Draw up the financial and non-financial T-accounts. Check the accounting identities. Would the recording of the credit of 9 000 to H have been the same if the corporation had been a bank? Among these transactions, find one that is purely financial, and demonstrate that it has no impact on B9 and hence no impact on net worth.

Answer to exercise 2. Quadruple entry

To download the answers in Excel, please click the StatLink: <u>http://dx.doi.org/10.1787/211820836062</u>.

Accounts of household	I H			Accounts	of corporation	on C			
Non-financial transacti	ions			Non-finan	cial transact	ions			
Uses	Resources			Uses	Resources				
Salaries	40 000			Salaries		40	000		
Consumption	30 000				Output			30 000	
Interest	300	Dividend	200	Dividend			200	Interest	300
B9 Net lending/net	±0 000				B9 Net len	ding/net		_0 000	
borrowing	+ 9 900				borrowing			-9 900	
Accounts of household	I H			Accounts of	of corporatio	n C			
Financial transactions				Financial t	ransactions				
? Assets	? Liabilities			? Assets		? Liabilitie	es		
Bank				Bank					
account				account					
+40 000					-40 000				
-30 000					+30 000				
+200					-200				
-300					+300				
-2 000					+2 000				
-8 000					+8 000				
+9 000					-9 000				
- 8 900					= -				
- 0 700					8 900				
Shares +2 000						Shares		+	2 000
	Loans	-8	000		Loans	-8 000			
	+9	000			+9 000				
	= +1	000			=				
		000			+1 000				
	B9 Net lending/ne borrowing	et +9	900			B9 Net le borrowing	nding/	/net _	9 900

We shall comment only on the financial transactions. It is assumed in the answer that the transactions pass through the agents' bank accounts. For example, the salary of 40 000 is credited to the household's account and debited to that of the corporation for the same amount. It is the same, but with opposite signs, for the consumption of 30 000. The recording of interest and dividends is similar. The household buys shares for 2 000, and this is recorded as -2 000 in the bank account and +2 000 as a change in assets in the form of shares. Seen from the side of the corporation, the bank account will be credited with an entry of +2 000 together with an addition of 2 000 to liabilities in the form of shares. The household repays 8 000 on an earlier loan and this is recorded as -8 000 in its bank account and -8 000 as a change in its liabilities, since repayment means a reduction in its debt. As a counterpart, the corporation shows an entry of -8 000 under loans, but this time on the asset side, while on the same side, its bank account increases. The household borrows an additional 9 000 from the corporation. Its liabilities under loans increase while its assets in its bank account increase. The corresponding reverse entries are made for the corporation, entirely on the asset side.

Note that the recording of the loan to the household might not have been the same if the corporation had been assimilated to a bank. In this case, the counterpart of the loan of 9 000 granted by the corporation could have been entered in its liabilities as a means of payment. This would have been the case if the corporation, acting as a bank, had opened a line of credit in the form of drawing rights on the bank account of the household. The banks are the only agents to have means of payment in their liabilities, reflecting their capacity to create

Back

money.

We can now check the accounting identities. First, it can be verified that the balancing item B9 of the nonfinancial account of each agent is equal to the balancing item B9 of its financial account. Second, it can be verified that the sum of the agents' B9s is zero (this example is of a closed economy). It can also be verified that each transaction cancels out between the agents across the rows: for example, the consumption of 30 000 under uses (negative sign) cancels out the output of 30 000 under resources (positive sign). Similarly, in the financial accounts the positive movements in the bank accounts of each agent carry opposite signs in the accounts of each of them. Some financial transactions carry the same sign. For example, the purchase of shares by the household is equal to +2 000, while the creation of shares is also recorded as +2 000 in the corporation's financial accounts. Note, however, that these items are in the one case recorded under assets and in the other under liabilities. They therefore cancel each other out under our convention.

An example of a purely financial transaction is the purchase of shares. This consists simply of the household exchanging a financial asset (cash) for another (shares). No non-financial transaction is involved. It can be verified that a purely financial transaction has no impact on B9, since the exchange of cash for shares is neutral

http://publications.oecd.org/WebBooksV2/30-2006-06-1/82-04EX2.htm[8/2/2011 6:22:47 PM]

from the point of view of the household's B9. In other words, it leaves the household's financial net worth intact. The same is true in the situation of the corporation, since the transaction involved in the creation of shares consists of exchanging a debt (albeit a false one) for cash, leaving the wealth situation unchanged.

http://publications.oecd.org/WebBooksV2/30-2006-06-1/82-04EX2.htm[8/2/2011 6:22:47 PM]

Chapter 8: The financial balance sheet accounts

Back

Exercise 3 (difficult): Application of accrual accounting

Let us suppose that an agent, the central government in this case, undertakes to pay retirement benefits amounting to S for a period of 10 years, in return for the payment by households in year 0 of a sum A, which can be assimilated to a contribution. The aim of the exercise is to record this transaction in the national accounts on an accrual basis.

Question 1: show the relationship between A and the series of payments S, using the calculation of the present value.

Question 2: record the initial transaction and the series of payments S using the T-shaped financial accounts without the introduction of interest.

Question 3: calculate the residual debt of central government at the end of the first period of payment of benefits and show that it is different from the present value of this residual debt. Deduce from this that it is necessary to record interest. Draw up all the corresponding T-shaped accounts. Draw a parallel with a loan. Justify the fact that the B9 of central government is negative. Conclude from this that if interest is recorded the transaction will be neutral as regards agents' wealth.

Answer to exercise 3. Application of accrual accounting Question 1:

Central government receives from households in period 0 a sum A in return for which it undertakes to pay these same households a sum S every year from year 1 to year T. It therefore consists of an exchange over time of two sums. In principle, the transaction should be equitable between the two agents, otherwise they would not make it. As a consequence, sum A has to be equal to the sum of the present values of the flows S that the government must pay households. In other words, $A = \frac{2}{(1 + r)^{t}}$, with t varying from 1 to T(it is assumed that the interest rate r remains constant over the period).

Question 2:

In the framework of accounts on an accrual basis, the government's undertaking to pay pension benefits in the future in return for a contribution today can be analysed as a financial operation. (It is in fact slightly more complicated than this, since the present system of national accounts recommends recording also the nonfinancial subscription and benefit transactions, but we shall ignore this.) The following is the T-account corresponding to the initial year, the one in which the exchange transaction takes place:

Central government				Households			
? Assets		? Liabilities		? Assets		? Liab	ilities
F2 Currency and deposits	+A	Pension rights	+A	F2 Currency and deposits	-A		
				Pension rights	+A		
		B9	0			B9	0

The government receives the sum A, so its currency assets increase by A. At the same time, however, its pension debt rises by the same amount. The corresponding transactions for households are the decrease in their currency assets and also the increase in their assets in the form of pension rights. Note that for both agents the balancing item B9, net lending/net borrowing, is zero (everything else remaining equal). This confirms that the transaction is neutral as regards the agents' net worth. Neither of them is richer as a result of this transaction and this appears to be in conformity with the notion that the transaction is an equitable one.

The T-account for one of the later years is as follows:

Central government				Households			
? Assets		? Liabilities		? Assets		? Liabi	ilities
F2 Currency and deposits	-S	Pension rights	-S	F2 Currency and deposits	+ S		
				Pension rights	-S		
		B9	0			B9	0

The government pays out S in retirement benefits, thus reducing its monetary assets but at the same time reducing its benefit debt. The transactions in the case of households can be deduced accordingly.

Question 3:

Analysis of the previous accounts shows that there is a problem. The government debt at the end of the first period of payment of benefits is equal, according to the above accounts, to A-S. However, this residual debt A'

can also be obtained by calculating the present value of the remaining flows: $A' = \frac{2}{1 + r}^{t}$, with t varying from 1 to T – 1. One can show that A' is not equal to (A – S) but to (A-S + rA). (The complete calculation will be found in the appendix on the following page.) This last term rA is the value of the interest to be paid on the sum A.

Hence, the actual entries for this transaction are more complex and introduce non-financial transactions in the form of imputed interest.

Non-financial accounts

Central government		Households	;	
Uses	Resources	Uses	Resources	
Interest			Interest	rA
B9	–rA	B9	+ rA	

http://publications.oecd.org/WebBooksV2/30-2006-06-1/82-04EX3.htm[8/2/2011 6:23:02 PM]

Financial accounts

Central government				Households			
? Assets		? Liabiliti	es	? Assets		? Lia	bilities
F2 Currency and deposits	–S			F2 Currency and deposits	+S		
	Pension rights	–S + rA		Pension rights	–S + rA		
		B9	–rA			B9	+rA

It can be verified that with these accounts one does indeed obtain a value for the residual government debt equal to the present value of the flows remaining to be paid at the end of this first period. Incidentally, note that these accounts necessarily verify the theorem concerning the zero sum of the B9s.

The transaction becomes crystal clear when one draws the parallel with a simple loan transaction. Indeed, one can assimilate this anticipatory payment that we have called a loan made by the households to the government and repayable by means of annual debt service S. This sum S is made up of two elements: first, an interest element paid by the government (equalling rA in the first period) and, second, capital repayment (S – rA).

It can be seen that, contrary to what was said in the reply to Question 2, the transaction does not appear to be equitable, since the B9s are not zero. The government seems to be worse off since its B9 is negative (-rA), whereas the households' B9 is positive by the same amount, meaning that they have become richer. But this fails to reflect the fact that we have recorded only those transactions immediately related to our example. In fact, the government has at its disposal at the beginning a sum A that it can invest (or use to reduce its debt). It will therefore necessarily receive rA in return, but we have not recorded this. Conversely, by paying A to the government, the households have implicitly invested their money with the government. As a consequence, contrary to appearances, the recording of transactions we have proposed here is equitable and neutral as regards the wealth of the two agents. It was the previous recording that was not.

Box 8.1: Appendix: calculation of the difference between A' and A: $A = S/(1 + r) + S/(1 + r)^{2} + S/(1 + r)^{3} + \dots + S/(1 + r)^{T}$ $A' = S/(1 + r) + S/(1 + r)^{2} + \dots + S/(1 + r)^{T-1}$ $A' - A = -S/(1 + r) + [S/(1 + r) - S/(1 + r)^{2}] + [S/(1 + r)^{2} - S/(1 + r)^{3}] + \dots + [S/(1 + r)^{T-1} - S/(1 + r)^{T}]$ Summing and deducting S gives: $A' - A = -S + [S - S/(1 + r)] + [S/(1 + r) - S/(1 + r)^{2}] + [S/(1 + r)^{2} - S/(1 + r)^{3}] + \dots + [S/(1 + r)^{T-1} - S/(1 + r)^{T}]$ $A' - A = -S + rS/(1 + r) + rS/(1 + r)^{2} + rS/(1 + r)^{3} + \dots + rS/(1 + r)^{T}$ $A' - A = -S + r[S/(1 + r) + rS/(1 + r)^{2} + S/(1 + r)^{3} + \dots + S/(1 + r)^{T}]$ $A' - A = -S + r[S/(1 + r) + S/(1 + r)^{2} + S/(1 + r)^{3} + \dots + S/(1 + r)^{T}]$

Back

http://publications.oecd.org/WebBooksV2/30-2006-06-1/82-04EX3.htm[8/2/2011 6:23:02 PM]

Chapter 8: The financial balance sheet accounts

Exercise 4: Calculation of the value of a bond

This exercise is a direct application of the section "Going a step further: the valuation of assets and its relationship to economic theory". The market rate of interest is 4%. Let there be a Treasury bond of \$1 500 issued in 2004 and carrying a coupon of \$60 per year for 10 years.

Question 1: verify that the bond was issued at the market rate and that the issue price of this bond corresponds to the present value of the future income from it.

Question 2: suppose that, in 2007, the interest rate for these same Treasury bonds increases to 6%. What will be the new price of the bond on the secondary market? How will the national accounts record this difference in price for the bondholder and for the issuer of the bond? Comment.

Question 3: return to question 1. Let us suppose that the government issues the same bond at a price of \$1 250. How should the difference *versus* the market price be treated in the national accounts?

Question 4: let us suppose that the government issues this bond in the form of a zero-coupon bond, putting it on sale at a price of \$1 014. How should this case be treated in the national accounts?

Answer to exercise 4. Calculation of the value of a bond

To download the answers in Excel, please click the StatLink: <u>http://dx.doi.org/10.1787/260478121213</u>.

Question 1:

The bond was issued at \$1 500. The coupon of \$60 does indeed represent 4%: 60/1 500 = 0.04. The table below makes it possible to calculate the present value of the future flows brought in by this bond, using the formula $\frac{7t}{1 + r}^{t}$.

The second column sets out the sequence of future flows: \$60 per year for nine years and \$1 560 in the final year (interest of \$60 *plus* capital repayment of \$1 500). The third column shows the series of discounting factors for the period, *i.e.* the term $(1 + r)^{t}$, where r = 0.04 and t is the number of the period. The fourth column corresponds to the division of the second by the third and ends with the calculation of the sum of these present values. It is verified that the issue price of \$1 500 does indeed correspond to the present value of the sequence of future flows.

Period	Future flows	Discounting factors (r = 4%)	Present value
1	60	1.04	57.69231
2	60	1.0816	55.47337
3	60	1.124864	53.33978
4	60	1.169859	51.28825
5	60	1.216653	49.31563
6	60	1.265319	47.41887
7	60	1.315932	45.59507
8	60	1.368569	43.84141
9	60	1.423312	42.1552
10	1 560	1.480244	1 053.88
			Sum of the present values = 1 500.00

Question 2:

In 2007, the market interest rate rises to 6%. The value of the bond will fall on the secondary bond market, since the bond was issued at a rate of 4%, *i.e.* below the new market interest rate. In other words, a bond for \$1 500 issued in 2007 will bring in \$90 per year (6%), and not \$60. To find the new price of the bond, we calculate the present value of the future flows using the new discount rate of 6%, with the help of the following table.

We are at the beginning of 2007, so the bond has only seven years to run. The sequence of future flows is unchanged from that of the previous table. However, the rate of discount has risen to 6%. The sum of the present values is equal to 1 332.5, which is less than 1 500. If the market is perfect, and if the risk of government insolvency is unchanged, this will be the new price of the bond on the secondary market. The holder of the bond therefore suffers a holding loss of (1 500 - 1 332.5) = 167.50.

Period	Future flows	Discounting factors (r = 6%)	Present value
1	60	1.06	56.60377
2	60	1.1236	53.39979
3	60	1.191016	50.37716
4	60	1.262477	47.52562
5	60	1.338226	44.83549
6	60	1.418519	42.29763
7	1 560	1.50363	1 037.489
			Sum of the present values = 1 332.529

📢 Back

The national accounts record this holding loss in the revaluation accounts of the balance sheet accounts of the bondholder. A table dealing just with this bond might then be as follows for the year 2007:

Balance sheet Stock at Consumption of accounts 31/12/2006 fixed capital	Changes	Revaluation	Other changes in volume	Stock at 31/12/2007
---	---------	-------------	----------------------------------	---------------------

http://publications.oecd.org/WebBooksV2/30-2006-06-1/82-04EX4.htm[8/2/2011 6:23:42 PM]

Financial assets	1 500	–167.5	1 332.5
Non-financial			
assets			
Liabilities in			
the form			
of shares			
Liabilities			
(excluding			
shares)			
Net value			
(including			
shares)			

Conversely, the holding loss will be recorded as a diminution in the liabilities of the issuer of the bond, *i.e.* the government. The government will now have a debt of only \$1 332.5 in the national accounts.

Comments: Note that under the Maastricht criteria, debt is in nominal value and not at market prices (see Chapter 9). Debt on this definition will therefore remain at \$1 500, meaning that it no longer corresponds to its economic value in 2000. Even so, the government will have to disburse \$1 500 in 2014. This is why the creators of the Maastricht criteria preferred to use the nominal value.

Question 3:

We now come back to the period of the original issue of the security. However, instead of issuing the bond at \$ 1 500, suppose that the government issues it at \$ 1 250, a difference of \$ 250 compared with the market price, this difference being known as the issue premium (it is also said that the bond was sold "below par"). This difference will be treated in the national accounts as an interest premium of \$ 250, to be spread over the 10 years of life of the bond, *i.e.* \$ 25 per year. The national accounts will therefore enter \$85 as interest paid instead of the \$ 60 on the coupon. The value of the bond in the liabilities of the government will be equal to \$ 1 250 at the time of issue and will be raised each year by the value of the "accrued interest not yet due", represented by \$ 25 per year.

Question 4:

The Treasury sometimes issues so-called zero-coupon bonds. In this case, it does not make annual interest payments but repays a larger amount at the time of maturity of the bond. It is then recorded in the national accounts that the government has implicitly made the issue below par, as in Question 3. For example, the government undertakes to repay \$ 1 500 in 10 years' time, with zero interest. Since interest rates are at 4%, the present value of this 10-year debt is equal to 1 500/1.48 (this being the discount rate over 10 years), which is equal to \$ 1 014. The government will issue the bond at this price, and this is the price that will be recorded in the national accounts at the time of issue. The difference between \$ 1 500 and \$ 1 014 will be entered in the national accounts as interest spread over 10 years, *i.e.* \$ 48.60 per year. This "accrued interest not yet due" will be added each year to the value of the bond, as in Question 3.

┥ Back

http://publications.oecd.org/WebBooksV2/30-2006-06-1/82-04EX4.htm[8/2/2011 6:23:42 PM]

Chapter 8: The financial balance sheet accounts

Exercise 5: Treatment of debt cancellation

Using the principles of quadruple entry, record the transaction by which the Spanish government cancels a debt of 1 000 that it had granted to a corporation that had not paid its taxes. Draw up a simplified financial T-account for the two agents before the transaction, and then describe the transaction in terms of flows. Identify the impact on the B9s of central government and the firm. Justify this economically. Deduce from the accounting identity of the non-financial and financial B9s that it is imperative to enter a counterpart in the non-financial transactions (D99, a capital transfer).

Draw conclusions for the impact on the central government resulting from a debt cancellation granted by Spain to a developing country. Discuss.

Answer to exercise 5. Treatment of debt cancellation

To download the answers in Excel, please click the StatLink: <u>http://dx.doi.org/10.1787/844633432403</u>.

Central government			Corpor	ration		
Assets		Liabilities	s Assets	Liabili	ties	
F79 Other accounts receivable	1 000			F79 C (the t	other accounts payable ax arrears)	1 000
(the tax arrears)						
Central government				Corpora	ation	
? Assets		? Lia	oilities	? Assets	? Liabilities	
F79 Other accounts receivable (the tax arrears)	1	_ 000			F79 Other accounts payable (the tax arrears)	-1 000
		B9	-		B9	+1 000

It will be seen from the next table that the effect of the debt cancellation on the balancing item B9 of the financial account is negative for central government and positive for the corporation. This is as it should be. The government is poorer as the result of cancelling the debt, and the corporation is richer.

1 000

Because of the accounting identity between the B9 in the financial account and the B9 in the non-financial account, the latter necessarily carries the same value, *i.e.* -1 000 for the government and + 1 000 for the corporation. It is therefore necessary to record a non-financial transaction. In this case, the category used is "D99 other capital transfers". We then have the following complete non-financial and financial flow accounts:

Central gover	nment		Corpora	tion		
Uses	Resources		Uses		Resources	
	D99 Other capital transfers	s –1 0	00		D99 Other capital transfer	s +1 000
B9 –1 000			B9? +	1 000		
Central gover	nment			Corpora	ation	
? Assets			? Liabilities	? Assets	? Liabilities	
F79 Other acc arrears)	counts receivable (the tax	_ 1 000			F79 Other accounts payable	-1 000
					(the tax arrears)	
			B9 1 000		B9	+1 000

If Spain cancels debt owed to it by a developing country, the same mechanism will be used, with the same economic justification: Spain (in other words, the Spanish central government) has become poorer and the developing country has become richer. A debt cancellation therefore leads to an increase in the public deficit, measured by B9 (see Chapter 9). Remembering that the European Stability and Growth Pact aims to reduce public deficits (the Maastricht criteria), this shows the dilemma facing the Spanish treasury: by being generous to the developing country, it runs the risk of displeasing Brussels (the town where is located the European Commission).

Back

Back

http://publications.oecd.org/WebBooksV2/30-2006-06-1/82-04EX5.htm[8/2/2011 6:23:55 PM]

Chapter 8: The financial balance sheet accounts

Back

Exercise 6: Calculations of flows using stocks at market value

The sources for the financial accounts are largely bank balance sheets. The difference from one year to another in these balance sheets ($S^t - S^{t-1}$) can be used to calculate the flow (F), but as we have seen, it is necessary to make a distinction between a flow and a revaluation. Each of these two elements has to be estimated, using simple assumptions. This exercise will illustrate the calculation. The starting point is the following equation: $S^t = S^{t-1} + vS^{t-1} + F + (v/2)F$, where v denotes the change in price between t – 1 and t. This equation expresses the fact that the stock at the end of the period S^t is equal to the stock at the beginning of the period S^{t-1} plus the revaluation of the stock held at the beginning of the period vS^{t-1} plus the transaction (F) plus the revaluation for the transaction (v/2)F. The assumption is made that transaction F takes place in the middle of the period, hence the term v/2.

Use this equation to calculate F in the following case of loans denominated in US\$. We suppose $S^{t - 1}$ (in euros) = 1 000; $S^{t} = 1$ 500; US\$/euro exchange rate in t - 1 = 1; US\$/euro exchange rate in t = 0.8.

▼ Answer to exercise 6. Calculations of flows using stocks at market value v = -20% (0.8/1), or -0.2 . S^t = S^t - ¹-0.2S^t - ¹+ F - 0 .1F

Hence F = $(S^{t-0.8S^{t-1}})/0.9 = (1\ 500 - 800)/0.9 = 777$

┥ Back

http://publications.oecd.org/WebBooksV2/30-2006-06-1/82-04EX6.htm[8/2/2011 6:24:10 PM]

L. Chapter 9: The genral governement account

Exercises

Exercise 1 Updating the first table

- **Exercise 2** MCQ: Are the following propositions true or false?
- Exercise 3 Identifying general government expenditure in the general government account (a tricky exercise)
- **Exercise 4** Moving from expenditure to revenue
- **Exercise 5** Moving from revenue to compulsory levies (a tricky exercise)
- Exercise 6 Deficit and debt as recorded in the T-shaped accounts
- **Exercise 7** (A follow-up to 6, but slightly more complicated)
- Exercise 8 Converting debt as defined in the national accounts into "Maastricht" debt
- Exercise 9 Calculation of tax revenue on an accrual basist

http://publications.oecd.org/WebBooksV2/30-2006-06-1/92-03EX.htm[8/2/2011 6:24:39 PM]

Chapter 9: The genral governement account

📢 Back

Exercise 1: Updating the first table

Go to the INSEE website, <u>www.insee.fr</u>. Using the pages devoted to the annual national accounts for general government, find the amounts in million euros in recent years for the following: general government net lending/borrowing (B9A); the public debt; public expenditure; taxes and compulsory contributions. Also find GDP at current prices. Using these figures, update the four indicators in of this chapter.

Answer to exercise 1. Updating the first table

On web site <u>www.insee.fr</u>, look for "annual national accounts", then "institutional accounts", and then for "administrations publiques" which is French for "general government".

Back

http://publications.oecd.org/WebBooksV2/30-2006-06-1/92-04EX1.htm[8/2/2011 6:24:52 PM]

Understanding National Accounts 2006

Chapter 9: The genral governement account

┥ Back

Exercise 2: MCQ: Are the following propositions true or false?

- The "deficit" is the same as "net lending".
- All output of general government is non-market.
- Social benefits are financed out of social contributions.
- The convention in the national accounts is that general government consumes its non-market output.
- B9A is the official code of the net lending/net borrowing item of the non-financial accounts.
- The sum of the B9 items of the institutional units making up general government is less than the B9 of general government.
- In France, the state monopoly generating and distributing electricity (EDF) is an institutional unit forming part of general government.
- Non-market output is sold at economically significant prices.
- The gross operating surplus of general government is zero.

Answer to exercise 2. MCQ: Are the following propositions true or false?

False. It corresponds to "net borrowing".

False. There is also a small amount of market output of general government.

False. In France, as in many countries, the benefits are also financed out of general taxes and through borrowing.

True.

True.

False. The two are exactly equal (see box "Tricks of the trade").

False. EDF is classified in the enterprise sector.

False. It is not sold and certainly not at economically significant prices.

False. It is the net surplus that is zero, the gross surplus is a positive amount equal to the consumption of fixed capital.

┥ Back

http://publications.oecd.org/WebBooksV2/30-2006-06-1/92-04EX2.htm[8/2/2011 6:25:05 PM]

Chapter 9: The genral governement account

Exercise 3: I dentifying general government expenditure in the general government account (a tricky exercise)

The following table shows INSEE's calculation of total French general government expenditure in 2003. On the basis of this model, find the principal elements of this calculation (those in bold type), using the full set of general government accounts included in the text and other information. Explain why total final consumption expenditure of general government is not included in the expenditure figure, despite being the largest "use" item of general government. Explain why the consumption of fixed capital is not included.

Table of expenditure of general government

2003	
Intermediate consumption	82.1
Compensation of employees	215.6
Other taxes on production	7.2
Property income other than interest (D4 excluding D41)	0.0
Current taxes on income, wealth, etc. (D5)	0.0
Interest	45.6
Social benefits other than social transfers in kind (D62)	280.2
Social benefits in kind of market goods and services (D63-part)	88.2
Subsidies (D3)	26.0
Other current transfers (D7)	41.9
Capital transfers (D9 excluding D91, D995)	12.9
Gross fixed capital formation	49.6
Net acquisitions of non-financial assets	1.9
Total expenditure	851.3

Source: INSEE.

Answer to exercise 3. Identifying general government expenditure in the general government account

To download the answers in Excel, please click the StatLink: <u>http://dx.doi.org/10.1787/018340873785</u>.

The object of this exercise is to reconstitute the above table of general government expenditure from the standard national accounts table. Expenditure is shown in the shaded parts of the simplified diagram, *i.e.* actual monetary expenditure flows. The table does indeed show in bold in the standard accounts the main items of expenditure: intermediate consumption (P2) at e 82.1 billion; compensation of employees (D1) (civil servants' wages and salaries and social contributions) at e 215.6 billion; interest on the public debt (D41) at e 45.6 billion; social benefits other than social transfers in kind (D62) at e 280.2 billion; GFCF at e 49.6 billion, and net acquisitions of non-financial assets at e 1.9 billion. As explained in the text, part of the final consumption of general government includes "social benefits in kind of market goods and services" which form part of D63. This figure does not appear in the standard table, but it is indeed part of actual expenditure, being benefits in kind. The sum involved is e 88.2 billion (as shown in the memorandum item D631 of the accounts). The other expenditure amounts in the table are small, and we shall not comment on them.

The expenditure table does not show the totality of general government's final consumption because (according to accounting convention) much of this consumption is considered to be equal to non-market output and does not correspond to actual expenditure. Including it would in fact have been double counting, since the corresponding expenditure has already been recorded, consisting mainly of intermediate consumption and compensation of employees.

Consumption of fixed capital is not actual expenditure but an imputed amount calculated for the purpose of the accounts and so has no place in a table whose objective is to measure actual expenditures.

In principle, this table was designed to show strictly monetary expenditure – this is in fact its raison d'être. There are two exceptions, however: 1) the imputed social contributions, corresponding mainly to employers' pension contributions, are included in the figure for compensation and hence in total expenditure, even though no actual payment has been made; 2) own-account output of software by general government (programmes made by IT experts in the civil service) is included in GFCF and hence in total expenditure, even though no payment has in fact been made.

http://publications.oecd.org/WebBooksV2/30-2006-06-1/92-04EX3.htm[8/2/2011 6:25:20 PM]

L Chapter 9: The genral governement account

Exercise 4: Moving from expenditure to revenue

Total expenditure was shown in the previous exercise (e 851.3 billion). How can the figure for revenue be very easily obtained from the general government account?

Answer to exercise 4. Moving from expenditure to revenue

Net lending/net borrowing is equal to revenue *minus* expenditure. This means that revenue is equal to net lending/net borrowing *plus* expenditure. Since net lending/net borrowing is -e 66.6 billion, revenue is (851.3 – 66.6) or e 784.7 billion.

Back

http://publications.oecd.org/WebBooksV2/30-2006-06-1/92-04EX4.htm[8/2/2011 6:25:37 PM]

L Chapter 9: The genral governement account

Exercise 5: Moving from revenue to compulsory levies (a tricky exercise)

Compulsory levies are the sums raised by government (and EU institutions, for EU) from households and firms in the form of taxes and compulsory social contributions. They therefore correspond to government revenue. This exercise consists of attempting to move from the general government revenue (shown below) to total compulsory levies in the case of France, using subsidiary information. Use two principles: 1) do not include imputed social contributions; 2) include taxes paid directly to the European institutions. The result you are looking for is e 658.8 billion.

Revenue of general government

2001	
Output of market branches and residual sales (P11)	45.0
Output for own final use (P12)	1.6
Partial payments by households (P13-part)	6.2
Other subsidies on production (D39)	0.3
Interest (D41)	4.6
Property income other than interest (D4 excluding D41)	4.9
Taxes on production and imports (D2)	221.4
Current taxes on income, wealth, etc. (D5)	185.0
Capital taxes (D91)	8.2
Social contributions (D61)*	267.5
Taxes and social contributions assessed but unlikely to be collected, net (D995)	-5.6
Other current transfers (D7)	12.0
Capital transfers (D9 excluding D91, D995)	0.4
Total revenue	751.3
* Including imputed social contributions	
For information:	
Imputed social contributions received by general government	26.6
Customs duties and VAT received by EU institutions	8.9
	·

Source: INSEE.

Answer to exercise 5. Moving from revenue to compulsory levies

To download the answers in Excel, please click the StatLink: <u>http://dx.doi.org/10.1787/421341161254</u>.

Only taxes and compulsory contributions are included in "compulsory levies", meaning that the other items of revenue are not. We therefore add together D2 "Taxes on production and imports", D5 "Current taxes on income, wealth, etc.", D91 "Taxes on capital" and D61 "Social contributions". But what do we do with row D995 "Taxes and social contributions due but not recoverable, net"? We have to go to the section "Going a step further" to see that this amount has to be added (meaning in fact that its absolute value has to be deducted, since it is negative). As an added complication, INSEE's revenue table (like its expenditure table) includes the imputed social contributions that are not in fact ever actually paid by households or firms. These therefore have to be excluded from compulsory levies, so the figure of e 26.6 billion in the "For information" row has to be subtracted. Conversely, we have to add the taxes paid directly to the EU institutions, amounting to e 8.9 billion. Altogether, these changes give (221.4 + 185 + 8.2 + 267.5 - 5.6 - 26.6 + 8.9), equalling the e 658.8 billion we were asked to find.

┥ Back

http://publications.oecd.org/WebBooksV2/30-2006-06-1/92-04EX5.htm[8/2/2011 6:25:50 PM]

Chapter 9: The genral governement account

📢 Back

Exercise 6: Deficit and debt as recorded in the T-shaped accounts

The object of this exercise is to illustrate the difference between "above the line" and "below the line" transactions. This exercise is training in the use of T-shaped accounts, which are an excellent instrument that any national accountant should use before replying to what is a difficult question.

Let us first suppose that the State sells shares worth e 10 billion in order to pay off part of its debt. Show that this has no impact on the deficit, by completing the non-financial and financial T-shaped accounts below.

Uses	Resources
B9A Net lending/net borrowing	
Changes in assets	Changes in liabilities
Currency and deposits	Currency and deposits
Securities other than shares	Securities other than shares
Shares and other equity	
	B9B Balance on the financial account

Show, using the same accounts, that the sale of property for e 10 billion, again for the purpose of reducing the debt, has an impact on B9A. Draw conclusions.

Answer to exercise 6. Observations and forecasts

First case. The non-financial account is not concerned. The sale of shares is recorded as a negative change in the assets of general government. The corresponding repayment of debt is recorded as a negative change in liabilities. The two transactions, recorded on the left and on the right, cancel each other out so that the balance, and hence the amount of B9A, is unaffected.

Uses	Resources
B9A Net lending/net borrowing	

Changes in assets		Changes in liabilities	
Currency and deposits		Currency and deposits	
Securities other than shares		Securities other than shares	-10
Shares and other equity	-10		
		B9B Balance on the financial account	

Second case. The sale of property is recorded as negative GFCF. This transaction affects net lending borrowing (B9A), which is increased correspondingly. The reduction of e 10 billion in the debt is recorded, but it does not result from a change in assets as in the previous case, but from a reduction in the balancing item B9B, which by definition is equal to B9A.

Conclusions. The first transaction (sale of shares) is purely financial and concerns only the financial assets and liabilities. It is therefore entirely "below the line" and the deficit is not affected. The second transaction (sale of property) is not entirely financial since it involves GFCF (which is "above the line"). It therefore affects the deficit. As explained in the section "Tricks of the trade", there is no symmetry between non-financial and financial assets from the point of view of the B9A item.

Uses		Resources	
GFCF	-1	0	
B9A Net lending/net borrowing	+	10	
Changes in assets		Changes in liabilities	
Currency and deposits		Currency and deposits	
Securities other than shares		Securities other than shares	–10
Shares and other equity			
	B9B Balance financial account	+10	



http://publications.oecd.org/WebBooksV2/30-2006-06-1/92-04EX6.htm[8/2/2011 6:26:05 PM]

Chapter 9: The genral governement account

< Back

Exercise 7: (A follow-up to 6, but slightly more complicated)

The object of this exercise is to complete the T-shaped tables below with the following information. The government sells property for e 5 billion and equities for e 3 billion, issues long-term Treasury notes for e 30 billion and buys in short-term Treasury notes for e 10 billion. By how much will its deficit be reduced? How will its debt change? Recapitulate the variation in general government net worth.

Uses	Resources
	GFCF
	B9A Net lending/net borrowing
Change in assets	Change in liabilities
Currency and deposits	Currency and deposits
Short-term securities	Short-term securities
Long-term securities	Long-term securities
Shares and other equity	
	B9B Balance of the financial account

Answer to exercise 7. (A follow-up to 6, but slightly more complicated)

The sale of property is recorded as negative GFCF (-5). This increases net lending by 5. All the other transactions are recorded "below the line" in the financial account. Among changes in liabilities, there is an increase in issuance of long-term securities (+30) and a reduction in short-term debt (-10). The sale of equities is recorded as a decrease in assets (-3). The money generated by the issuance of securities, by the sale of equities and the sale of property, *minus* the sums used to buy in the short-term securities, is recorded as a change in assets on deposit (in the Treasury account). In total, the government reduces its deficit by e 5 billion but increases its debt by e 20 billion. It is interesting to note that the State has not become poorer, since its net worth is unchanged.

Uses	Resources
GFCF	-5
B9A Net lending/net borrowing	+5

Change in assets		Change in liabilities	
Currency and deposits	+30 + 5 - 10 + 3 = +28	Currency and deposits	
Short-term securities		Short-term securities	-10
Long-term securities		Long-term securities	+30
Shares and other equity	-3		
-10		B9B Balance financial account	+5

Change in wealth:

Non-financial assets: -5

Financial assets: +25

Financial liabilities: +20

Net worth: 0

Back

http://publications.oecd.org/WebBooksV2/30-2006-06-1/92-04EX7.htm[8/2/2011 6:26:18 PM]

Chapter 9: The genral governement account

┥ Back

Exercise 8: Converting debt as defined in the national accounts into "Maastricht" debt

Comment on the published by INSEE for France.

Million euros	2001
Debt as recorded in the national accounts	
Total general government	1 059 401
The move to consolidated debt (1)	
AF 2 Consolidation of deposits	35 419
AF33 Consolidation of securities other than shares	15 780
AF 4 Consolidation of loans	16 214
The move to nominal value (2)	
AF 33 Valuation difference on bonds	39 100
Exclusion of other accounts payable and of accrued interest not paid (3)	
AF 7 Other accounts payable	109 585
AF 28, 38, 48 Accrued interest not paid	3 372
Statistical adjustments (5)	654
Maastricht debt = Debt as recorded in the national accounts minus (1) minus (2) minus (3)	
minus (5)	
Total general government Maastricht debt	839 277

Answer to exercise 8. Converting debt as defined in the national accounts into "Maastricht" debt

To download the answers in Excel, please click the StatLink: <u>http://dx.doi.org/10.1787/112514677258</u>.

We start with the debt as defined in the national accounts, which is estimated to be e 1 059 billion at 31 December 2001. As indicated in the text, the move to the Maastricht debt is based on three operations: *a*) consolidation; *b*) a move to nominal prices; *c*) the exclusion of certain debts.

Consolidation. (This is the technical term used to indicate that cross-claims within the sector are cancelled out). Aggregates are in fact rarely consolidated in the national accounts – especially not debts. It seems logical, however, that the Maastricht criterion should exclude what are not really elements contributing to the overall public debt. The largest part of this consolidation involves the elimination of the debt owed by central government to local authorities, which are obliged to deposit their liquid assets with the Treasury (AF2, amounting to e 35 billion).

The move to nominal values. In the national accounts, items in the balance sheet account are valued at market prices. This means that bonds issued by the State are revalued each year based on interest rates. However, the political decision-makers who drew up the Maastricht criterion probably wanted to prevent the criterion from being affected by variations in market prices that governments were unable to influence directly. For this reason, they preferred valuation at nominal prices, in other words, face values. In 2001, this led to a reduction of e39 billion compared with debt as defined for the national accounts.

Elimination of certain debts. These are debts with very short maturities and not backed by assets recognised by the market. Examples are the debts owed by government to suppliers of intermediate consumption items and payable at the end of a given period. These are known as commercial credits. The people who created the Maastricht criteria did not want to include debts that are of no strategic interest in analysing the situation of governments. It is also to be noted that the Maastricht debt does not include interest accrued but not paid. Also to be noted is that the Maastricht debt excludes pension debt. However, because the French national accounts do not record pension debt for government, this does not appear in the above calculation.

📢 Back

http://publications.oecd.org/WebBooksV2/30-2006-06-1/92-04EX8.htm[8/2/2011 6:26:32 PM]

L Chapter 9: The genral governement account

┥ Back

Exercise 9: Calculation of tax revenue on an accrual basis

The shows a quarterly series for the receipts of VAT (Value-Added Tax) by the Treasury. Calculate the amount of VAT as recorded in the national accounts for the year, remembering that it is assumed that there is a lag of six weeks between the generation of the VAT (the purchases by households) and receipt by the Treasury. Suppose that the government raises the VAT rate by 2 percentage points at the beginning of November. Show why the series on an accrual basis is more useful in macroeconomic terms than the series on a cash basis.

Q1	Q2	Q3	Q4	Q1	Q2
15 420	16 658	14 548	16 510	18 540	19 870

Answer to exercise 9. Calculation of tax revenue on an accrual basis				
To download the answers in Excel, please click the StatLink: <u>http://dx.doi.org/10.1787/321200473648</u> .				
Q1	Q2	Q3	Q4	
16 039	15 603	15 529	17 525	

First, the timing of the series is advanced by six weeks, by taking the averages of two successive quarters. For example, $16\ 039 = (15\ 420 + 16\ 658)/2$; $15\ 603 = (16\ 658 + 14\ 548)/2$; and so on. In this way we obtain an annual value of 64 696 (16\ 039 + 15\ 603 + 15\ 529 + 17\ 525). Concerning the November increase in the VAT rate, it can be seen that the increase in the cash based series takes place only in Q1 of the following year, whereas on an accrual basis it first affects the figures for Q4 of the year in question. This means that in the national accounts the rise in the VAT rate will be seen as an increase in the consumer prices paid by households as of Q4, and this is the truer reflection of economic reality.

📢 Back

http://publications.oecd.org/WebBooksV2/30-2006-06-1/92-04EX9.htm[8/2/2011 6:26:47 PM]

Understanding National Accounts 2006

L Chapter 10: The input-output table and integrated economic accounts

Exercises

Exercise 1 Reconstitution of an input-output table using "copy and paste"

Exercise 2 Reconstitution of the accounts of institutional sectors

Exercise 3 Creating an integrated economic account

Exercise 4 Use of the input-output table in a so-called Léontieff model

4 39/48 🕨

http://publications.oecd.org/WebBooksV2/30-2006-06-1/102-03EX.htm[8/2/2011 6:27:12 PM]

L Chapter 10: The input-output table and integrated economic accounts

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)!

┥ Back

http://publications.oecd.org/WebBooksV2/30-2006-06-1/102-04EX1.htm[8/2/2011 6:27:26 PM]
L Chapter 10: The input-output table and integrated economic accounts

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
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	11		
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:

2
21
14
59
3
6
14
13
36
10

Here are certain indications that will be useful for the exercise:

• the data shown in the first table above are not complete, and additional figures will have to be reconstituted;

• 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;

social benefits are by definition received by households;

• social contributions received by corporations and general government are paid by households;

• the adjustment for the change in the net equity of households in pension fund reserves applies to households, by definition;

• 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

http://publications.oecd.org/WebBooksV2/30-2006-06-1/102-04EX2.htm[8/2/2011 6:27:44 PM]

	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	Adjustment for the change in the net equity of households in pension fund
expenditure	reserves
Saving	

Use of adjusted dispo	sable 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		

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

http://publications.oecd.org/WebBooksV2/30-2006-06-1/102-04EX2.htm[8/2/2011 6:27:44 PM]

	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 kin	d 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	

Answer to exercise 2. Reconstitution of the accounts of institutional sectors

To download the answers in Excel, please click the StatLink: <u>http://dx.doi.org/10.1787/631056102537</u>.

Households			
Generation of income account			
Uses		Resources	
Compensation of employees		62 Value added	561
Gross wages and salaries		51	
Employers' social contributions		11	
Other taxes minus subsidies on production		2	
Operating surplus		65	
Mixed income		432	
Allocation of primary income account			
Uses		Resources	
		Gross operating surplus and mixed income	497
		Compensation of employees	766
		Gross wages and salaries	573
		Employers' social contributions	193
Property income	47	Property income	157
Interest	20	Interest	56
Income from land and sub-soil assets	27	Dividends	13
		Withdrawals from income of quasicorporations	44
Balance of primary incomes	1 373	Income from land and sub-soil assets	21

Secondary distribution of income account			
Uses		Resources	
Current taxes on income, wealth, etc.	178	Balance of primary incomes	1 373
		Social benefits other than social transfers	
Social contributions	322		332
		in kind	
Other current transfers	73	Other current transfers	72
Disposable income	1 204		

Other property income

21 23

Use of income account			
Uses		Resources	
		Disposable income	1 204
Final consumption	1 021	Adjustment for the change in net equity of households in pension	11
expenditure	1 0 3 1	fund reserves	11
Saving	184		

Use of adjusted disposable income account							
Uses		Resources					
		Adjusted disposable income	1 423				
Actual Adjustment for the change in net equity of households in pension fund							
consumption	1 250	reserves	11				
Saving	184						
Corporations							
Generation of ind	come accol	int					
Uses		Resources					
Compensation of	f employee	s 560 Value added	780				
Gross wagos and	d calarios	131					

Gross wages and salaries431Employers' social contributions129

http://publications.oecd.org/WebBooksV2/30-2006-06-1/102-04EX2.htm[8/2/2011 6:27:44 PM]

Other taxes minus subsidies on production				54	
Operating surplus				166	
Allocation of primary income account					
			Posour	2005	
Droporty incomo		200	Oporat		166
		302	Operat		100
Dividende		102	Dropor	ty income	227
		60	Proper		227
withdrawais from income of quasi- corporat	ions	24	Interes	St	139
Income from land and sub-soil assets		31	Dividei	nds	28
Other property income		25	Income	e from land and sub-soli	4.4
Other property income		25	accete		44
			Other	proporty income	17
Delence of primary incomes		01	Uther	property income	10
Balance of primary incomes		91			
Secondary distribution of income account					
Uses			Resourc	ces	
Current taxes on income, wealth, etc.		34	Balance	e of primary incomes	91
Social benefits other than social transfers					
		43	Social c	contributions	54
in kind					
Other current transfers		57	Other c	urrent transfers	59
Disposable income		70			
Use of income account					
				Posourcos	
Adjustment for the change in not equity of				Resources	
Adjustment for the change in het equity of			11	Disposable income	70
bousebolds in pension fund reserves			11	Disposable income	70
Saving			50		
Saving			57		
General government					
General government					
General government Generation of income account					
General government Generation of income account Uses				Resources	_
General government Generation of income account Uses Compensation of employees				Resources 140 Value added	158
General government Generation of income account Uses Compensation of employees Gross wages and salaries				Resources 140 Value added 87	158
General government Generation of income account Uses Compensation of employees Gross wages and salaries Employers' social contributions				Resources 140 Value added 87 53	158
General governmentGeneration of income accountUsesCompensation of employeesGross wages and salariesEmployers' social contributionsOther taxes minus subsidies on production				Resources 140 Value added 87 53 2	158
General government Generation of income account Uses Compensation of employees Gross wages and salaries Employers' social contributions Other taxes <i>minus</i> subsidies on production Operating surplus				Resources 140 Value added 87 53 2 16	158
General government Generation of income account Uses Compensation of employees Gross wages and salaries Employers' social contributions Other taxes <i>minus</i> subsidies on production Operating surplus				Resources 140 Value added 87 53 2 16	158
General government Generation of income account Uses Compensation of employees Gross wages and salaries Employers' social contributions Other taxes <i>minus</i> subsidies on production Operating surplus Allocation of primary income account				Resources 140 Value added 87 53 2 16	158
General government Generation of income account Uses Compensation of employees Gross wages and salaries Employers' social contributions Other taxes minus subsidies on production Operating surplus Allocation of primary income account Uses		Resources		Resources 140 Value added 87 53 2 16	158
General government Generation of income account Uses Compensation of employees Gross wages and salaries Employers' social contributions Other taxes minus subsidies on production Operating surplus Allocation of primary income account Uses Property income	42	Resources Operating surp	lus	Resources 140 Value added 87 53 2 16	158
General government Generation of income account Uses Compensation of employees Gross wages and salaries Employers' social contributions Other taxes minus subsidies on production Operating surplus Allocation of primary income account Uses Property income Interest	42	Resources Operating surp	lus	Resources 140 Value added 87 53 2 16	158
General government Generation of income account Uses Compensation of employees Gross wages and salaries Employers' social contributions Other taxes minus subsidies on production Operating surplus Allocation of primary income account Uses Property income Interest Income from land and sub-soil assets	42 35 7	Resources Operating surp	lus	Resources 140 Value added 87 53 2 16 00 production and imports	158 16
General government Generation of income account Uses Compensation of employees Gross wages and salaries Employers' social contributions Other taxes minus subsidies on production Operating surplus Allocation of primary income account Uses Property income Interest Income from land and sub-soil assets Other property income	42 35 7	Resources Operating surp Taxes minus su	lus ubsidies (Resources 140 Value added 87 53 2 16 on production and imports on products	158 158 16 191 133
General government Generation of income account Uses Compensation of employees Gross wages and salaries Employers' social contributions Other taxes minus subsidies on production Operating surplus Allocation of primary income account Uses Property income Interest Income from land and sub-soil assets Other property income	42 35 7 0	Resources Operating surp Taxes minus su Taxes minus su Other taxes mi	lus ubsidies ubsidies	Resources 140 Value added 87 53 2 16 on production and imports on products sidies on production	- 158 16 191 133 58
General government Generation of income account Uses Compensation of employees Gross wages and salaries Employers' social contributions Other taxes minus subsidies on production Operating surplus Allocation of primary income account Uses Property income Interest Income from land and sub-soil assets Other property income	42 35 7 0	Resources Operating surp Taxes minus su Taxes minus su Other taxes mi	lus ubsidies ubsidies inus subs	Resources 140 Value added 87 53 2 16 on production and imports on products sidies on production	158 158 16 191 133 58 32
General government Generation of income account Uses Compensation of employees Gross wages and salaries Employers' social contributions Other taxes minus subsidies on production Operating surplus Allocation of primary income account Uses Property income Interest Income from land and sub-soil assets Other property income	42 35 7 0	Resources Operating surp Taxes <i>minus</i> su Taxes <i>minus</i> su Other taxes <i>mi</i> Property incom	lus ubsidies ubsidies inus subs	Resources 140 Value added 87 53 53 2 16 16 on production and imports on products sidies on production	158 158 16 191 133 58 32 14
General government Generation of income account Uses Compensation of employees Gross wages and salaries Employers' social contributions Other taxes minus subsidies on production Operating surplus Allocation of primary income account Uses Property income Interest Income from land and sub-soil assets Other property income	42 35 7 0	Resources Operating surp Taxes <i>minus</i> su Taxes <i>minus</i> su Other taxes <i>mi</i> Property incom Interest	lus ubsidies ubsidies inus subs	Resources 140 Value added 87 53 2 16 0n production and imports on products sidies on production	158 16 16 191 133 58 32 14 5
General government Generation of income account Uses Compensation of employees Gross wages and salaries Employers' social contributions Other taxes minus subsidies on production Operating surplus Allocation of primary income account Uses Property income Interest Income from land and sub-soil assets Other property income	42 35 7 0	Resources Operating surp Taxes <i>minus</i> su Taxes <i>minus</i> su Other taxes <i>mi</i> Property incom Interest Dividends Withdrawals fro	lus ubsidies ubsidies inus subs ie	Resources 140 Value added 87 53 2 16 on production and imports on products sidies on production	158 158 16 191 133 58 32 14 5 12
General government Generation of income account Uses Compensation of employees Gross wages and salaries Employers' social contributions Other taxes minus subsidies on production Operating surplus Allocation of primary income account Uses Property income Interest Income from land and sub-soil assets Other property income Balance of primary incomes	42 35 7 0	Resources Operating surp Taxes <i>minus</i> su Taxes <i>minus</i> su Other taxes <i>mi</i> Property incom Interest Dividends Withdrawals fro	lus ubsidies ubsidies inus subs ie	Resources 140 Value added 87 53 53 2 16 16 on production and imports on products sidies on products 10 sidies on production 10	158 158 16 191 133 58 32 14 5 13 0
General government Generation of income account Uses Compensation of employees Gross wages and salaries Employers' social contributions Other taxes minus subsidies on production Operating surplus Allocation of primary income account Uses Property income Interest Income from land and sub-soil assets Other property income Balance of primary incomes	42 35 7 0 	Resources Operating surp Taxes <i>minus</i> su Taxes <i>minus</i> su Other taxes <i>mi</i> Property incom Interest Dividends Withdrawals fro Other property	lus ubsidies ubsidies inus subs ie om incon income	Resources 140 Value added 87 53 53 2 16 16 on production and imports on products sidies on production sidies on production	158 158 16 191 133 58 32 14 5 13 0
General government Generation of income account Uses Compensation of employees Gross wages and salaries Employers' social contributions Other taxes minus subsidies on production Operating surplus Allocation of primary income account Uses Property income Interest Income from land and sub-soil assets Other property income Balance of primary incomes	42 35 7 0 197	Resources Operating surp Taxes <i>minus</i> su Taxes <i>minus</i> su Other taxes <i>mi</i> Property incom Interest Dividends Withdrawals fro Other property	lus ubsidies inus subs ie om incon income	Resources 140 Value added 87 53 2 16 00 production and imports on products sidies on production ne of quasicorporations	158 16 191 133 58 32 14 5 5 13 0
General government Generation of income account Uses Compensation of employees Gross wages and salaries Employers' social contributions Other taxes minus subsidies on production Operating surplus Allocation of primary income account Uses Property income Interest Income from land and sub-soil assets Other property income Balance of primary incomes Secondary distribution of income account	42 35 7 0	Resources Operating surp Taxes <i>minus</i> su Taxes <i>minus</i> su Other taxes <i>mi</i> Property incom Interest Dividends Withdrawals fro Other property	lus ubsidies ubsidies inus subs ie om incon income	Resources 140 Value added 87 53 53 2 16 16 on production and imports on products sidies on products 10 ne of quasicorporations 10	158 158 16 191 133 58 32 14 5 32 14 5 13 0
General government Generation of income account Uses Compensation of employees Gross wages and salaries Employers' social contributions Other taxes minus subsidies on production Operating surplus Allocation of primary income account Uses Property income Interest Income from land and sub-soil assets Other property income Balance of primary incomes Secondary distribution of income account Uses	42 35 7 0 197	Resources Operating surp Taxes <i>minus</i> su Taxes <i>minus</i> su Other taxes <i>mi</i> Property incom Interest Dividends Withdrawals fro Other property	lus ubsidies inus subs ie om incon income	Resources 140 Value added 87 53 2 16 00 production and imports on products sidies on production ne of quasicorporations	158 16 191 133 58 32 14 5 13 0
General government Generation of income account Uses Compensation of employees Gross wages and salaries Employers' social contributions Other taxes minus subsidies on production Operating surplus Allocation of primary income account Uses Property income Interest Income from land and sub-soil assets Other property income Balance of primary incomes Secondary distribution of income account Uses	42 35 7 0 197	Resources Operating surp Taxes minus su Taxes minus su Other taxes mi Property incom Interest Dividends Withdrawals fro Other property Resources	lus ubsidies ubsidies inus subs ie om incone income rces ce of prin	Resources 140 Value added 87 53 53 2 16 16 on production and imports on products sidies on products 10 ne of quasicorporations 10 nary incomes 10	158 158 16 191 133 58 32 14 5 32 14 5 13 0
General government Generation of income account Uses Compensation of employees Gross wages and salaries Employers' social contributions Other taxes minus subsidies on production Operating surplus Allocation of primary income account Uses Property income Interest Income from land and sub-soil assets Other property income Balance of primary incomes Secondary distribution of income account Uses	42 35 7 0 197	Resources Operating surp Taxes <i>minus</i> su Taxes <i>minus</i> su Other taxes <i>mi</i> Property incom Interest Dividends Withdrawals fro Other property Cother property	lus ubsidies inus subs ie om incone income rces ce of prin nt taxes of	Resources 140 Value added 87 53 53 2 16 16 on production and imports on products sidies on products sidies on production ne of quasicorporations nary incomes on income, wealth, etc.	158 158 16 191 133 58 32 14 5 13 0 0 197 212
General government Generation of income account Uses Compensation of employees Gross wages and salaries Employers' social contributions Other taxes minus subsidies on production Operating surplus Allocation of primary income account Uses Property income Interest Income from land and sub-soil assets Other property income Balance of primary incomes Secondary distribution of income account Uses Social benefits other than social transfers	42 35 7 0 197	Resources Operating surp Taxes minus su Taxes minus su Other taxes mi Property incom Interest Dividends Withdrawals fro Other property Resources Balance Currer	lus ubsidies inus subsidies inus subsidies income income rces ce of prin	Resources 140 Value added 87 53 53 2 16 16 on production and imports on products 16 sidies on production 10 ne of quasicorporations 10 nary incomes on income, wealth, etc. 10	158 158 16 191 133 58 32 14 5 5 32 14 5 5 13 0 0
General government Generation of income account Uses Compensation of employees Gross wages and salaries Employers' social contributions Other taxes minus subsidies on production Operating surplus Allocation of primary income account Uses Property income Interest Income from land and sub-soil assets Other property income Balance of primary incomes Secondary distribution of income account Uses Social benefits other than social transfers	42 35 7 0	Resources Operating surp Taxes minus su Taxes minus su Other taxes mi Property incom Interest Dividends Withdrawals fro Other property Resources Balance Currer 289 Social	lus ubsidies ubsidies inus subsidies inus subsidies	Resources 140 Value added 87 53 53 2 16 16 on production and imports on products sidies on producton 10 ne of quasicorporations 10 nary incomes on income, wealth, etc. 10	158 158 16 191 133 58 32 14 5 32 14 5 32 13 0 0

Use of income account

Other current transfers

Disposable income

Uses		Resources	
Final consumption expenditure	368	Disposable income	338
Saving	-30		

159

338

Other current transfers

Use of adjusted income account			
Uses		Resources	
Actual consumption	149	Adjusted disposable income	119
Saving	-30		

┥ Back

109

 $http://publications.oecd.org/WebBooksV2/30-2006-06-1/102-04EX2.htm [8/2/2011\ 6:27:44\ PM]$

L Chapter 10: The input-output table and integrated economic accounts

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:

Total	Rest of the world	economy	Corporations	General government	Households	Production account	Corporations	General government	Households	Total economy	Rest of the world	Total
		economy		-				-		_		
						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				133		133
						products				135		100
1 632		1 632	780	158	561	Value-added/GDP						
-41	-41					Trade balance (goods and						
	• •					services)						
						Generation of income						
						account						
						compensation of						
						Cross wages and salaries						
						Employors' social						
						contributions						
						Taxes minus subsidies						
						On products						
						Other taxes						
						Operating surplus						
						Mixed income						
Total	Rest of the world	Total economy	Corporations	General government	House- All holds ac	location of primary income count	Corporations	General government	Households	Total economy	Rest of the world	Total
					Ор	erating surplus/mixed income						
					Со	mpensation of employees						
					Gre	oss wages and salaries						
-					Err	ployers' social contributions						
					Tax	kes minus subsidies						
					On	products						
					Oti	her taxes on production						
					Pro	perty income						

Total	Rest of the world	Total economy	Corporations	General government	House- holds	Allocation of primary income account	Corporations	General government	House
						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			

http://publications.oecd.org/WebBooksV2/30-2006-06-1/102-04EX3.htm[8/2/2011 6:28:04 PM]

 Back 	<
1	

SourceOECD Understanding National Accounts 20	2006 - 01	
---	-----------	--

					I	nterest			
					L	Dividends			
					Ι	ncome from quasi-corporations			
					Ι	ncome from land and sub-soil			
	assets								
	Other property income								
					E	Balance of primary			
					i	ncomes/National Income			
Total	Rest of the world	Total economy	Corporations	General government	Households	Secondary distribution of income account	Corporations	General government	House
						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			

▼ Answer to exercise 3. Creating an integrated economic account

To download the answers in Excel, please click the StatLink: <u>http://dx.doi.org/10.1787/036735545534</u>.

Total	Rest of the world	Total economy economy	Corporations	General government	Households	Production account	Corporations	General government	Households
						Imports			
540	540					Exports			
						Output	1 708	410	1 264
1 883		1 883	928	252	703	Intermediate consumption			
133						Taxes <i>minus</i> subsidies on products			
1 632		1 632	780	158	561	Value-added/GDP			
-41	-41					Trade balance (goods and services)			
						Generation of income			
						account			
						Value added	780	158	561

http://publications.oecd.org/WebBooksV2/30-2006-06-1/102-04EX3.htm[8/2/2011 6:28:04 PM]

	Total	Rest of	
ehold	s economy	the world	d ^{Total}
shlo	Total	Rest of the	e Total
oras	economy	world	Total
		40	0 400
		49	7 477
264	3 382		3 382
_ 2 .	5 002		
	100		100
	133		133

1 632

1 632

SourceOECD Understanding National Accounts 2006 - 01

762	762	560	140	62	Compensation of employees
569	569	431	87	51	Gross wages and salaries
193	193	129	53	11	Employers' social contributions
191	191	187	2	2	Taxes minus subsidies
133	133	0	0	0	On products
58	58	54	2	2	Other taxes
247	247	166	16	65	Operating surplus
432	432			432	Mixed income

Total	Rest of the world	Total economy	Corporations	General govern-ment	Households	Allocation of primary income Corporations		General government	Households	Total economy	Rest of the world	Total
						Operating surplus/mixed income	166	16	497	679		679
6	6					Compensation of employees			766	766	2	768
6	6					Gross wages and salaries			573	573	2	575
						Employers' social contributions			193	193		193
						Taxes minus subsidies		191		191		191
						On products		133		133		133
						Other taxes on production		58		58		58
454	63	391	302	42	47	Property income	227	32	157	416	38	454
230	13	217	162	35	20	Interest	139	14	56	209	21	230
60		60	60			Dividends	28	5	13	46	14	60
60	36	24	24			Income from quasi-corporations		13	44	57	3	60
65		65	31	7	27	Income from land and sub-soil assets	44		21	65		65
39	14	25	25			Other property income	16		23	39		39
1 661		1 661	91	197	1 373	Balance of primary incomes/National Income						

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	91	197	1 373	1 661		1 661
212		212	34		178	Current taxes on income, wealth, etc.		212		212		212
322		322			322	Social contributions	54	268		322		322
332		332	43	289		Other social benefits			332	332		332
299	10	269	57	159	73	Other current transfers	59	109	72	240	59	299
1 612		1 612	70	338	1 204	Disposable income						
						Use of income account						
						Disposable income	70	338	1 204	1 612		1 612
1 399		1 399		368	1 031	Final expenditure						
11		11	11			Change in pension fund equity			11			

http://publications.oecd.org/WebBooksV2/30-2006-06-1/102-04EX3.htm[8/2/2011 6:28:04 PM]

SourceOECD U	Inderstanding National A	accounts 2006 - 01				
	213	2	213 59	-30	184	Saving
	-21	-21				Current-account balance

┥ Back

L Chapter 10: The input-output table and integrated economic accounts

📢 Back

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: • calculate the matrix [A] of technical coefficients;

• 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).

Answer to exercise 4. Use of the input-output table in a so-called Léontieff model

Question 1

The technical coefficients matrix [A] is determined by the ratio of intermediate consumption to output for the various types of products. With the help of the intermediate consumption and output matrices [M] and [X], we

$$[A] = \begin{pmatrix} 5/50 & 20/60 & 20/120 \\ 5/50 & 60 & 120 \\ 5/50 & 60 & 120 \\ 10/6 & 6/60 & 120 \\ 10/6 & 6/60 & 120 \\ 10/6 & 60 & 120 \\ \end{bmatrix}$$

then have:
$$[A] = \begin{pmatrix} 0.1 & 0.333 & 0.166 \\ 0.1 & 0.166 & 0.1 \\ 0.2 & 0.1 & 0.125 \\ \end{pmatrix}$$

Question 2

To find the impact on output of a rise of 20 in consumption, we shall use the Equation 7:

 $\begin{bmatrix} \hat{I}^{"}X \end{bmatrix} = \begin{bmatrix} I - A \end{bmatrix}^{-1} \cdot \begin{bmatrix} \hat{I}^{"}Y \end{bmatrix}$ $\begin{bmatrix} I - A \end{bmatrix} = \begin{pmatrix} 0.9 & -0.333 & -0.166 \\ -0.1 & 0.833 & -0.1 \\ -0.2 & -0.1 & 0.875 \end{pmatrix}$ As:

 $\begin{bmatrix} I - A \end{bmatrix}^{-1} = \begin{pmatrix} 1.2357 & 0.5299 & 0.2959 \\ 0.1847 & 1.2959 & 0.1833 \\ 0.3036 & 0.2692 & 1.2314 \end{pmatrix}$ Thus:

$$\begin{bmatrix} [I - A]^{-1} & & [\Delta Y] \\ 1.2357 & 0.5299 & 0.2959 \\ 0.1847 & 1.2959 & 0.1833 \\ 0.3036 & 0.2692 & 1.2314 \end{bmatrix} \begin{pmatrix} [\Delta Y] \\ 0 \\ 0 \\ 20 \end{pmatrix} = \begin{pmatrix} 5.92 \\ 3.66 \\ 24.63 \end{pmatrix}$$
Finally:

A rise of 20 in demand for consumer goods will therefore lead to a change of 24.63 in the output of consumer products, a change of 3.66 in the output of capital goods and a change of 5.92 in the output of intermediate

products.



http://publications.oecd.org/WebBooksV2/30-2006-06-1/102-04EX4.htm[8/2/2011 6:28:19 PM]

SourceOECD Understanding National Accounts 2006 - 01

Understanding National Accounts 2006

L Chapter 11: The national accounts machinery : compilation and reporting

Exercises

Exercise 1 Quarterly versus annual results

Exercise 2 Annualisation, year-on-year changes, statistical carryover

Exercise 3 Calibration/fitting: the French method for calculating the quarterly accounts

http://publications.oecd.org/WebBooksV2/30-2006-06-1/112-03EX.htm[8/2/2011 6:28:58 PM]

L Chapter 11: The national accounts machinery : compilation and reporting

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.

Year 1	
AQ1	600.00
AQ2	420.00
AQ3	300.00
AQ4	150.00
BQ1	180.00
BQ2	250.00
BQ3	380.00
BQ4	450.00

Answer to exercise 1. Quarterly versus annual results

To download the answers in Excel, please click the StatLink: <u>http://dx.doi.org/10.1787/784028020420</u>.

The average for year A Is 367.5; the average for year B is 315.0. The requested graph is shown below. It will be seen that although the annual average for the second year is lower than for the first, the within-year situation in the second year is good (upswing), whereas that of the first year is bad (recession). The picture thus given by the annual averages is misleading, and quarterly accounts are essential to show that an upswing has started in the beginning of year B.



Back

http://publications.oecd.org/WebBooksV2/30-2006-06-1/112-04EX1.htm[8/2/2011 6:29:10 PM]

Chapter 11: The national accounts machinery : compilation and reporting

📢 Back

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.

	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	

Answer to exercise 2. Annualisation, year-on-year changes, statistical carryover

To download the answers in Excel, please click the StatLink: <u>http://dx.doi.org/10.1787/131258702172</u>.

Question 1:

The annual GDP for 2001 and 2002 is obtained by summing the four quarters. This is because an annual flow is equal to the sum of the component flows (ignoring the complications discussed in the text regarding working-day adjustments).

	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	
Annual GDP = sum of the four GDP quarters	1 384.97	1 401.98	

Question 2:

Presentation of the quarterly flows for 2001 at "annual level": each flow is multiplied by 4 in order to give, for each quarter, a value paramount to an annual value.

	2001
Q1	1 383.00
Q2	1 383.12
Q3	1 388.88
Q4	1 384.88

Question 3:

In the presentation at "annual level", the annual GDP no longer equals the sum of the quarters, but it is equal to the mean of the quarters, *i.e.*, the sum divided by 4.

	2001
Q1	1 383.00
Q2	1 383.12
Q3	1 388.88
Q4	1 384.88
Annual GDP = mean of the four GDP quarters	1 384.97

In answering Question 1, the annual GDPs for 2001 and 2002 were calculated. The annual change (or the annual average change) is calculated by taking the ratio 1 401.98/1 384.97. This gives a growth rate of 1.23%.

Questions 5 and 6: the quarterly change between Q2 2003 and Q3 2003 is obtained similarly from the ratio 350.98/349.68 = 1.0037, giving an increase of 0.37%. The presentation at annual rate (or "annualisation") consists of raising this ratio to the power of 4, *i.e.*, $(1.0037)^4 = 1.015$, a growth rate of 1.5%. One may simply multiply the growth rate by 4: 0.37 x 4 = 1.48, but this is an approximation.

Question 7: the year-on-year rise in Q3 2003 is equal to the change between Q3 2002 and Q3 2003, also described as "Q/Q-4". In other words, one compares the current quarter with the corresponding quarter of the previous year. This gives: 350.98/351.70 = 0.998, a decline of 0.2%.

Question 8: the statistical carryover for growth in Q3 2003 is obtained by comparing an annual average for 2003 (calculated with the final quarter equal to the third quarter), and the average for 2002. First, calculate this fictitious annual average for 2003 (the missing quarter to be estimated is shown in italics).

http://publications.oecd.org/WebBooksV2/30-2006-06-1/112-04EX2.htm[8/2/2011 6:29:23 PM]

	2003
Q1	350.91
Q2	349.68
Q3	350.98
Q4 = Q3	350.98
Fictitious annual GDP	1 402.55

The statistical carryover is therefore equal to $1 \ 402.55/1 \ 401.98 = 1.0004$, an increase of 0.04%, or virtual stability.

┥ Back

http://publications.oecd.org/WebBooksV2/30-2006-06-1/112-04EX2.htm[8/2/2011 6:29:23 PM]

Chapter 11: The national accounts machinery : compilation and reporting

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.

	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
Y1		Y2	Y3	Y4	Y5
	6 658.1	6 813.2	7 435.4	7 455.9	7 302.4

Answer to exercise 3. Calibration/fitting: the French method for calculating the quarterly accounts

To download the answers in Excel, please click the StatLink: <u>http://dx.doi.org/10.1787/215303011077</u>.

Stage 1:

the annual average is calculated for each indicator.

	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
AI annual average	105.1	106.8	115.9	118.1	114.6

Stage 2:

a graph is made with the five points of abscissa AI and ordinate AA. One can verify that it is possible to imagine a straight-line regression linking AA and AI of the type $AA = a^*AI + b$.



use the ordinary least squares method to estimate the parameters of this regression line (we have used Excel's LINEST formula):

This gives: a = 63.98, b = -38 (your results may be slightly different, owing to rounding).

Stage 4: the non-fitted quarterly series are calculated by applying the formula QA = (a/4) QI + b/4. This gives the table below. Annual residuals are obtained as the difference between AA and the annual sums of QAs:

	Y1	Y2	Y3	Y4	Y5
Q1	1 673.2	1 652.4	1 774.0	1 871.6	1 850.8
Q2	1 697.2	1 684.4	1 865.2	1 879.6	1 842.8
Q3	1 658.8	1 714.8	1 866.8	1 895.6	1 817.2
Q4	1 657.2	1 743.6	1 870.0	1 868.4	1 782.0
Annual sum	6 686.4	6 795.2	7 376.0	7 515.2	7 292.8
Annual residual	-28.3	18.0	59.4	-59.3	9.6

http://publications.oecd.org/WebBooksV2/30-2006-06-1/112-04EX3.htm[8/2/2011 6:29:38 PM]

Stage 5:

calculate the quarterly residuals by dividing the annual residuals by 4 (note that it is clearly possible to find a better method of distributing these residuals: a frequently used method is based on minimising the difference of the squares of the residuals, under the constraint of equality with the annual sum).

	Y1	Y2	Y3	Y4	Y5
Q1	-7.1	4.5	14.8	-14.8	2.4
Q2	-7.1	4.5	14.8	-14.8	2.4
Q3	-7.1	4.5	14.8	-14.8	2.4
Q4	-7.1	4.5	14.8	-14.8	2.4

Stage 6:

the final quarterly accounts series are calculated by summing the non-fitted series obtained in stage 4 and the quarterly residuals obtained in stage 5:

	Y1	Y2	Y3	Y4	Y5
Q1	1 666.1	1 656.9	1 788.9	1 856.8	1 853.2
Q2	1 690.1	1 688.9	1 880.0	1 864.8	1 845.2
Q3	1 651.7	1 719.3	1 881.6	1 880.8	1 819.6
Q4	1 650.1	1 748.1	1 884.8	1 853.6	1 784.4

By definition, the annual sums of these series are now equal to the annual figures (with slight differences due to rounding).

┥ Back

http://publications.oecd.org/WebBooksV2/30-2006-06-1/112-04EX3.htm[8/2/2011 6:29:38 PM]