

Chapter 2 THE MAIN AGGREGATE CONCEPTS

2.1 Introduction to the main concepts

In this section among other things the meaning of certain fundamental national accounting concepts of aggregate nature will be discussed, i.e. the concepts of product, income and value added. These latter concepts represent alternative measures of the results of the production activities that have taken place in an economy during a certain period of time (normally a year); they form the cornerstones of a country's national accounting system.

In order to facilitate our presentation of certain basic concepts, use will be made of a simple numerical example which refers to a highly simplified model of a hypothetical economy, i.e. the economy of Avancia. The following can be said about this economy.

As far as different kinds of productive activities are concerned (in which private as well as public producers can be involved), three main productive branches (or: productive sectors) are being distinguished, namely Agriculture (A), Manufacturing (M), and Other (O). All output produced in the economy can be allocated between these three productive branches.

The destination of the output of the productive sectors is as follows. As far as the sector Agriculture is concerned, part of its output will be sold to producers belonging to the sector Manufacturing, which require these inputs in order to produce their own outputs (food for processing in one way or another, tobacco for the manufacture of cigarettes, hides for tanning and conversion into footwear, and so forth). Another part of Agriculture's output will be sold to producers belonging to the sector; or again in order to be used as inputs in their production processes. Furthermore a part of the output of Agriculture will be used by producers belonging to the sector itself, i.e. as inputs in their production activities. Yet another part of the output of Agriculture will be consumed by families, and finally, a part of it will be sold abroad -- i.e. will be exported.

With regard to the destination of the output of the sector Manufacturing a similar pattern can be observed. Some of the output will be purchased and used for purposes of further processing, by producers belonging to the sector itself as well as by producers belonging to the other sectors (i.e. Agriculture and Other), while the remainder will be purchased and consumed by households, will be used for investment purposes, and/or will be exported. Finally, the destination of the output of the sector Other will also show a pattern like those described earlier: some of it will be used for further processing, either within the sector itself or by producers belonging to any of the other sectors, while again the remainder will be used for consumption by households, for investment purposes, and/or exported.

Thus, the output of each sector can be said to consist of a part that in the accounting period is used up in other domestic productive sectors, or by the sector in question, and of a part that is supplied for purposes other than further processing within the economy. All output belonging to the former part is usually referred to as intermediate output, and includes mostly raw materials, semi-finished products and also, for example, trade services, transport services, and financial services.

All other output, i.e. all output which has not been used during the accounting period for further processing within the economy, is referred to as final output. It includes anything falling under one of the following headings:

- * Items used for purposes of final consumption by households, i.e. **consumer items**.

- * Items used for investment purposes.

Two categories are normally being distinguished here, namely items in the form of **fixed capital goods** (i.e. machinery, equipment, buildings and constructions), as well as **items used for building up inventories**. Note in this connection that although fixed capital goods render services which can be seen as inputs in the domestic production process, these goods are -- because of their durable nature -- not being used up completely within one accounting period (which is usually a year), for which reason they are considered 'final' rather than 'intermediate'. Items used to build up inventories are considered final output because they are not being further processed in the economy, at least not during the accounting period.

- * **Exports**. Goods and services which are being exported, whatever their nature, are not being further processed in the economy.
- * The **output of public services** produced by government is by convention also included among final output.

Below details have been given, in value terms (i.e billions of Avancian dollars) about the output of sectors A, M and O of Avancia for the accounting period T. Values are the products of quantities and prices. Output values should therefore in principle be thought of as quantities of output (comprising goods as well as services), multiplied by their market prices. (Note however, that not all goods and services produced are being sold in the market. This raises the question what price to use for valuing such output. Cases in point are the output produced by subsistence farmers, and the public services produced by government. In the case of subsistence products the problem is

Sector A		
Value of intermediate output produced for use by:		
Sector A itself	:	4 billions of Av. dollars
Sector M	:	20 "
Sector O	:	6 "
Value of final output produced		
	:	35 "

normally solved by referring to prices of similar products which have actually been sold in the market. In the case of the public services produced by government the cost of production is taken as a measure for the value of this output. More about this issue will be said elsewhere).

Sector M		
Value of intermediate output produced for use by:		
Sector A	:	3 billions of Av. dollars
Sector M itself	:	9 "
Sector O	:	13 "
Value of final output produced		
	:	50 "

Sector O		
Value of intermediate output produced for use by:		
Sector A	:	8 billions of Av. dollars
Sector M	:	11 "
Sector O itself	:	1 "
Value of final output produced		
	:	25 "

The above data may now be arranged in tabular way as follows:

Table 1 : (in billions Av. Dollars)						
Destination of Outputs						
Supplying Sectors	Intermediate goods & services to:			Total intermediate output	Final output	Total output
	A	M	O			
A	4	20	6	30	35	65
M	3	9	13	25	50	75
O	8	11	1	20	25	45
Total	15	40	20	75	110	185

By looking at the rows of Table 1, one obtains information about the total output value, and its breakdown in terms of intermediate and final output. However, by looking at the columns for A, M, and O one is also able to identify the value and composition of the so-called intermediate consumption, i.e. the value of the intermediate inputs used by these sectors.

Producers as belonging to a certain sector make use, in order to be able to produce their output, not only of intermediate goods and services as produced by themselves or by the other domestic sectors, but also of imported intermediate inputs. But in addition, production will not be possible without inputs like the services of labour, capital, land, and entrepreneurship (i.e. the services of the primary factors of production).

Table 1 could be expanded by including in the columns for each sector the values/costs of the various other inputs which have been used in relation to the production activities. As such account must be taken of the following:

- (1) the cost of imported intermediate inputs;

- (2) wages and salaries, i.e. payments for the labour services in compensation for their use in the production process;
- (3) interest and rent, i.e. the returns to the services of capital and land respectively, as provided by others than the owners of the production units, in compensation for their use in the production process;
- (4) profits from production, i.e. the returns to the services of capital, land and entrepreneurship, as provided by the owners of the production units, in compensation for their use in the production process.

Item (4), profits from production, can be seen as a residual item. It refers to the balance which is left after the costs of all other inputs (i.e. the costs of the intermediate inputs, the wages and salaries paid, and interest and rent paid) have been deducted from the output value. This balance is available to the owners of the producing units in compensation for the services of capital, land and entrepreneurship provided by them in connection with the production process.

Categories (2), (3) and (4) are often referred to as the (primary) factor incomes, since they relate to the incomes earned by the (primary) factors of production, i.e. labour, land, capital, and entrepreneurship, in connection with the use of these factors in the production process.

At the same time these categories are being referred to as the (primary) factor costs, because, as seen from the point of the production process, they represent the costs involved in the use of the primary factors of production.

Note in this connection, that from this point of view also the profit item is being considered a cost category.

Given the fact that the profit item is calculated as a residual, it follows that the aggregate value of all inputs of a sector (i.e. the sum of all costs) is equal to the total output value of that sector.

The sum of items (3) and (4) is in national accounting normally referred to as '**operating surplus**'. It represent the combined returns to property (i.e. land and capital) and entrepreneurship, in compensation for their use in the production process, as received by both the owners and non-owners of the production units.

Thus the operating surplus equals the sum of production-related profits, interest and rent. Since profits are equal to the value of total/gross output minus the sum of intermediate inputs, wages and salaries, and interest and rent, it follows that the operating surplus equals the value of total/gross output minus the sum of intermediate inputs and wages and salaries.

Table 2 below, which is an expanded version of Table 1, includes, among other things, value data for sectors A, M, and O re the use of imported intermediate inputs (2, 5 and 3 billions of dollars respectively); re wages and salaries paid (22, 18 and 14 billions of dollars respectively); and re rent, interest and profits (26, 12 and 8 billions of dollars for the three respective sectors). Finally, the table also shows the importation of 5 billions of dollars of final goods and services.

Table 2 (in billions of Av. dollars)						
Outputs	Intermediate goods and services to:			Sub-total	Final goods and serv.	Total output
	A	M	O			
Inputs	A	M	O			
Domestic sector:						
A	4	20	6	30	35	65
M	3	9	13	25	50	75
O	8	11	1	20	25	45
-----	-----	-----	-----	-----	-----	-----
Imports	2	5	3	10	5	
-----	-----	-----	-----	-----	-----	-----
Wages and salaries	22	18	14			
Rent	3	1	0			
Interest	2	3	1			
Profits	<u>21</u>	<u>8</u>	<u>7</u>			
Operating surplus	26	12	8			
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Total inputs	65	75	45			

Now the overview of the values of the outputs and inputs of the three productive sectors of Avancia in year T is complete. The rows for the sectors A, M, and O refer to the totals of the output values, and their breakdown. The columns show the composition of the input values. The table also brings out the equality of the total output value of a sector to its total input value.

We are now in a position to discuss the meaning of the concepts Domestic Product, Domestic Income, and Value Added. These fundamental concepts provide measures of different sides of the economic process. While the first is supposed to give a measure of the value of the output produced, the second gives a measure of incomes earned in the domestic production process. The Value Added provides a measure of the contribution of each productive sector to the economy.

As will be made clear below, the three concepts are closely interlinked and present, as it were, different sides of the same coin. Below the Domestic Product, the Domestic Income and the Value Added will be discussed.

Domestic Product (DP). This concept may be defined as follows:

The value of all final goods and services produced by the various productive sectors in the economy, corrected for the value of the imports that have been used up in the production processes of these sectors.

As indicated above, this concept aims at providing a measure of production by the domestic productive sectors during the accounting period. Note that in the definition reference is being made to final output rather than to total output, i.e. it excludes the value of intermediate output. This is based on the consideration that intermediate output is of a transitory nature, i.e. it is used up as an input in other productive processes, contributing as such to the production of final output. Thus the final output already embodies the intermediate output. Consequently, by tallying the value of final output only instead of that of all output (i.e. final plus intermediate), one avoids double-counting, and arrives at a more accurate yardstick of the value of domestic production.

It may be recalled in this connection, that final output refers to those goods and services domestically produced which belong to at least one of the following categories: consumer items; fixed capital goods; exports; goods that have been used for purposes of stock formation; public services.

It should be noted however, that the production of the final output is made possible by making use not only of the domestically produced intermediate outputs/inputs, but of imported intermediate inputs as well. As such the function of these imported intermediate inputs in the production process is similar to that of the domestically produced intermediate inputs. The intermediate imports represent production of foreign origin, contributing to the generation of final output in the domestic economy. Therefore, in order to arrive at a truly pure measure of the value of domestic production, their value should be deducted from the value of the final output. The resulting measure is the Domestic Product as defined above.

From the above it will be clear that:

DP = value of final output of domestic sectors - value of intermediate imports.

= (value total output of domestic sectors - value domestic intermediate output) - value intermediate imports.

In terms of the example of Avancia this boils down to:

$$\begin{aligned} \text{DP} &= [(65+75+45) - (30+25+20)] - (2+5+3) \\ &= 185 - 75 - 10 \\ &= 100 \end{aligned}$$

Conceptually it follows from the above that the most direct way to arrive at the DP aggregate would be to take the value of the domestically produced final output, and then to subtract the value of the intermediate imports. However, an alternative way to arrive at an estimate of the DP aggregate is through application of the following identity:

Domestic Product = value of final expenditure - value of total imports.

In this identity 'final expenditure' refers to the value of the purchases of all final goods and services (consumer items, fixed capital goods, public services, goods intended for increasing inventories, all goods and services exported) which have been supplied in the economy. These purchases include not only the final goods and services produced by the domestic productive sectors, but the imported final goods and services as well. Consequently the value of final expenditure will exceed that of the

value of final output of domestic sectors by the value of the imported final goods and services (i.e. imported consumer items, imported capital goods etc.). It can easily be shown that by deducting from the value of the final expenditure that of total imports one arrives again at the value of the domestic product.

$$\begin{aligned} \text{Final expenditure} - \text{Total imports} &= (\text{Final domestic output} + \text{Final imports}) - (\text{Intermediate} + \text{Final imports}) \\ &= \text{Final domestic output} - \text{intermediate imports} \\ &= \text{DP} \end{aligned}$$

In the example of Avancia we observe that:

$$\text{Final expenditure} = (35 + 50 + 25) + 5 = 115$$

$$\text{Total imports} = (2 + 5 + 3) + 5 = 15$$

$$\text{Hence, Final expenditure} - \text{Total imports} = 115 - 15 = 100$$

From the above it will be clear that both expressions for Domestic Product are algebraically equivalent. However, statistical considerations may in practice lead to a preference for application of the second identity rather than the first one in measuring Domestic Product.

Moving now to the next concept, Domestic Income, the following can be said.

Domestic Income (DI). This concept may be defined as follows:

The sum of all incomes earned by the primary factors of production in compensation for the services rendered by them in the domestic production process.

The meaning of this concept is straightforward. It is a summary statement of all incomes earned in the domestic productive activities, and encompasses as such the sum of all wages, salaries, interests, rents and profits paid by the productive sectors.

In terms of our example (Table 2) this implies:

$$\begin{aligned} \text{DI} &= \text{Factor income A} + \text{Factor income M} + \text{Factor income O} \\ &= (22+26) + (18+12) + (14+8) \\ &= 100 \end{aligned}$$

The value of the Domestic Income thus equals that of the Domestic Product, a point to which we will be coming back after we have discussed the third concept, i.e. that of Value Added.

Value Added (VA): This concept may be defined as follows:

The value of the total output (often also referred to as: gross output) minus the value of the intermediate consumption, i.e. the value of the intermediate inputs (domestic as well as foreign) used up in the production process.

This concept can be applied at any level of aggregation whether that of the individual firm, an industry, a sector, or the economy as a whole. It measures by how much the value of the intermediate inputs have been increased through the transformations that have taken place in the production process. In other words, the concept is a measure of the additional value which has been created through production (by a firm, an industry, a sector, or the economy as a whole).

Applying the above concept to our data for the economy of Avancia, we obtain the following:

Value Added = Total (i.e. gross) output - intermediate consumption

$$\begin{aligned} \text{VA Sector A} &= 65 - (4 + 3 + 8 + 2) &&= 48 \\ \text{VA Sector M} &= 75 - (20 + 9 + 11 + 5) &&= 30 \\ \text{VA Sector O} &= \frac{45 - (6 + 13 + 1 + 3)}{1} &&= \underline{22} \\ \text{VA Avancia} &= 185 - (30 + 25 + 20 + 10) &&= 100 \end{aligned}$$

From the above it is clear that the Value Added for the entire economy, which is equal to 100 billion dollars, can be thought of either as the sum of the Value Added of the individual sectors, or as the difference between the total /gross output of the economy (185 billion dollars) minus all intermediate inputs (85 billion dollars).

By relating the Value Added of a sector to that of the economy as a whole, the contribution of that sector to the total Value Added generated in the economy can be established. In the case of Avancia in year T, the contributions of sectors A, M and O are 48%, 30% and 22% respectively.

In this example for Avancia we have seen that the value of the Domestic Product and of the Domestic Income are both equal to 100 billions of dollars. Moreover, the total Value Added for the economy is equal to this amount as well.

This fact is no coincidence. It illustrates that the value of the final output generated by the domestic productive activities adjusted for intermediate imports (the Domestic Product), finds its way back to the primary factors of production in compensation for their use in the production process (i.e as the Domestic Income received by them). Moreover, in each sector the sum of the factor incomes paid is equal to the difference between the gross output and the various intermediate inputs, which difference has been defined as Value Added. Therefore, also the value of the latter concept, applied to the economy as a whole, will equal the values of the former concepts.

The general equivalence of the concepts Domestic Product (whether calculated as Final Output minus Intermediate Imports or as Final Expenditure minus Total Imports), Domestic Income and Value Added, as shown through the above example for Avancia, can also be demonstrated with the help of simple algebra. One should realize, however, that the equivalence of these concepts only holds in the absence of certain intervening factors, which are in reality normally present -- like the levying of indirect taxes on the outputs or inputs of the productive sectors. Whenever such intervening factor are present, differences in the values of these concepts may arise occur, as will be explained later.

We may present the various outputs and inputs of any productive sector *i* as follows:

Inputs	Sector i	Outputs
b_i		a_i
m_i		f_i
y_i		
x_i		x_i

where,

x_i = value of total output/input sector i

a_i = value of intermediate output produced by sector i

f_i = value of final output produced by sector i

b_i = value of intermediate inputs, of domestic origin, used by sector i

m_i = value of intermediate inputs of foreign origin used by sector i

y_i = value of factor incomes paid by sector i

Summing up the value of all outputs and inputs of all sectors in the economy gives us the aggregate for the economy as a whole.

Inputs	ECONOMY (All sectors)	Outputs
B		A
M		F
Y		
X		X

Where: $X = \sum x_i$ $A = \sum a_i$ $F = \sum f_i$
 $B = \sum b_i$ $M = \sum m_i$ $Y = \sum y_i$

Note that at the level of the economy as a whole the following identity will hold by definition:

$$A(=\sum a_i) = B(=\sum b_i)$$

In words: the aggregate value of intermediate outputs of the domestic productive sectors equals that of the aggregate value of the intermediate inputs of domestic origin.

At the same time it may be noted that at the level of the individual sector, industry etc. there is no logical reason why the value of the intermediate outputs should equal the value of the intermediate inputs of domestic origin, therefore will a_i normally **not be equal to** b_i .

In terms of our example for the economy the various values are:

	value int. outp. (IO)	value int. inp. (II)	
Sector A	30	15	(IO \neq II)
Sector M	25	40	(IO \neq II)
Sector O	20	20	(IO = II; coincidence)
	----	----	
All Sectors	75	75	(IO = II; by definition)

Returning now to our main argument, we can write the following identity for the economy-wide aggregates.

$$B + M + Y = X = A + F$$

$$B + M + Y = A + F$$

$$\begin{aligned} \text{Since } A = B, \quad B + M + Y &= B + F \\ M + Y &= F \\ Y &= F - M \end{aligned}$$

$$\text{Also,} \quad Y = X - (B + M)$$

$$\text{Therefore: } F - M = Y = X - (B + M)$$

$$\begin{aligned} \text{Note that: } F - M &= \text{Domestic Product} \\ Y &= \text{Domestic Income} \\ X - (B + M) &= \text{Value added of the Economy} \end{aligned}$$

Thus: Domestic Product = Domestic Income = Total Value Added

2.2 Alternative Formulations; Related Concepts

Having established the meaning of some fundamental national accounting concepts and their interrelationships, we will now come to a discussion of certain alternative formulations that are being used with regard to the concepts concerned. These alternative formulations concern more in particular expressions in national vs. domestic terms; in gross terms vs. net terms; and in terms of factor costs vs. terms in market prices.

National vs. Domestic

Some of the services of the primary factors of production (labour, capital, etc.) used in the domestic production process may be supplied by foreigners rather than by residents of the country. Since foreigners receive some of the income generated in the country, the value of domestic production will then no longer equal the income of residents. Similarly, to the extent that the nation's residents contribute factor services to foreign countries, residents' incomes will diverge from the value of domestic production. The existence of these international flows of income -- flows taking the form of wages, interest, dividends or branch profits -- indicates the need for distinguishing between Domestic Product and Income, and National Product and Income.

The value of the goods and services produced within the country is the Domestic Product, and the total of the incomes arising in the process is the Domestic Income. The domestic concept is essentially geographic since no account is taken of the nationality of those supplying the labour or capital. When factor income from abroad is added and factor income paid abroad deducted, the result is National Product or Income. In this case we are measuring the value of the product attributable to the factors of production supplied by the normal residents of the country.

The distinction between the two concepts is clearly of greater importance for some countries than for others. In the case of a number of developing countries, where a large part of services of the primary factors of production is being supplied by non-residents, the distinction can be especially considerable.

Thus the relationship between the national and domestic concepts may be described as follows:

$$\begin{aligned} \text{National Product/Income} &= \text{Domestic Product/Income} \\ &+ \text{foreign factor income (to be) received (FFIR)} \\ &- \text{foreign factor income (to be) paid (FFIP)}. \end{aligned}$$

$$\text{For short: NP/NI} = \text{DP/DI} + \text{FFIR} - \text{FFIP}$$

The difference between FFIR and FFIP (i.e. FFIR - FFIP) may furthermore be referred to as: Net Foreign Factor Income (to be) received (NFFI), yielding the following relationship:

$$\begin{aligned} \text{National Product/Income} &= \text{Domestic Product/Income} \\ &+ \text{Net foreign factor income (to be) received} \\ &\quad \text{(NFFI)} \end{aligned}$$

$$\text{Or, for short: NP/NI} = \text{DP/DI} + \text{NFFI}$$

It may be noted that if FFIR is smaller than FFIP, i.e. when NFFI is negative, National Product/Income will be smaller than Domestic Product/Income.

If in the case of Avancia $FI = 3$, and $FO = 6$, then National Product/Income will be equal to:

$$\text{Domestic Product/Income} + (3 - 6) = 100 + (3 - 6) = 97$$

Gross vs. Net

In order to determine the contribution of an industry, or a sector to the output generated in the economy, one must deduct the cost of the intermediate inputs used in the production process from the value of its total output, as has been argued above. However, in addition to using up these inputs, producers use up fixed capital like buildings and equipment. These investment goods are distinct from intermediate inputs in that they continue to render useful services over their economic lifetime, a period measured in years. In the circumstances, the cost of capital goods has to be written off gradually rather than all at once. When an allowance has been made for capital depreciation in the national income accounts, the resulting measure is called "net" income or product; otherwise it is "gross". The allowance for depreciation is a charge against profits and lowers factor income accordingly. The total expenditure on the National Product is a gross measure unless it is reduced by the amount of depreciation so as to include, not the total value of the capital goods produced (gross investment), but the addition to the nation's stock of capital after replacement needs have been met (net investment).

Depreciation is caused by wear and tear of the stock of fixed capital in the process of production. Also, some of the equipment, while not physically worn out, may have lost its value because of obsolescence. The general rule in national accounting is that depreciation should be estimated on a replacement basis. However, individual enterprises use different practices with respect to their computation of depreciation, due to which depreciation estimates are liable to significant variation. Partly for this reason, the gross concept is more often used in economic analysis than the net concept.

Summarizing the above, we can say that:

$$\text{Net Product (Income, Value Added)} = \text{Gross Product (Income, Value Added)} - \text{Depreciation.}$$

The value of 100 billion dollars for the Domestic Product (Income) in our example of Avancia is a gross concept, since depreciation has not yet been deducted from it. If the depreciation allowance is equal to 14 billion dollars, the Net Domestic Product (Income) will be equal to 100 billion dollars minus 14 billion dollars = 86 billion dollars. Also, the Net National Product (Income) will be equal to 97 billion dollars minus 14 billion dollars = 83 billion dollars.

Market Prices vs. Factor Costs

This distinction is of relevance when the government levies indirect taxes on the outputs and/or inputs of producers.

Indirect taxes are usually defined as taxes that are levied on goods and services. Examples of indirect taxes are: turnover taxes; excise duties; value added tax (VAT); import duties; export taxes. As such, these taxes have in an indirect way an impact on the income position of economic units (persons, households, enterprises etc.). This in contrast with direct taxes (such as for example: income taxes; wage taxes; company taxes; inheritance taxes etc.), which affect the income (or wealth) position of economic units directly.

The indirect taxes, which are included in one way or the other in the prices of the products sold, are to be paid by producers to the government out of their sales revenues, reducing actual profits. Consequently not all value added (i.e the value of the gross output minus the value of the intermediate consumption) will be paid out to the primary factors of production: a part of the nominal profits will actually be used for the payment of indirect taxes.

In other words, the total income of the primary factors of production actually earned in the domestic production process is not any longer equal to the value added economy-wide, but less by the amount of indirect taxes. Since the value added economy-wide is equal to the domestic product, it follows that a discrepancy has arisen between the total actual earnings of the primary factors of production on the one hand, and the domestic product on the other.

Note, that in the above reasoning it has been assumed (as we have always done so far) that the concepts of value added and domestic product involve the use of market prices, i.e prices actually paid in the market. Such prices will include, among other things, indirect taxes. In order to make explicit this valuation base, the expression 'at market prices' may be added to the concept in question. This yields for example the terms 'domestic product at market prices' or 'value added at market prices'. The values of these concepts equal the value of the 'domestic income at market prices', the latter concept referring of the total factor income including indirect taxes, i.e. before deducting the indirect taxes from the nominal profits.

By deducting the indirect taxes (to be) paid by producers from the above market prices concepts we obtain values which equal that of the total income of the primary factors of production actually earned. Reference to the corresponding concepts is being made by means of the terms: domestic product / value added / domestic income 'at factor costs'

Governments, in order to stimulate certain kinds of production activities for example, may make grants to producers through the provision of production-related subsidies. Such subsidies increase factor incomes, more in particular actual profits, for which reason their impact is more or less opposite to that of indirect taxes. Therefore, they may, from an analytical point of view be considered as negative indirect taxes, obviously also leading to a difference between the total actual earnings of the primary factors of production on the one hand, and the domestic product on the other.

Taking account of indirect taxes, as well as of production-related subsidies, the complete relationship between concepts at market prices and concepts at factor costs may now be established as follows:

$$\begin{aligned}\text{Concept at factor costs} &= \text{concept at market prices} - \text{indirect taxes} \\ &\quad + \text{subsidies} \\ &= \text{concept at market prices} - (\text{indirect taxes} - \text{subsidies}) \\ &= \text{concept at market prices} - (\text{net indirect taxes})\end{aligned}$$

Note that the expression 'indirect taxes minus subsidies' has been referred to as 'net indirect taxes' (NIT).

Assuming that the value of the domestic product of Avancia of 100 billion dollars is expressed at market prices, and furthermore that indirect taxes equal 10 billion dollars, while subsidies are equal to 3 billion dollars, the domestic income at factor costs will be equal to:

$$\begin{aligned} & \$100 \text{ billion} - \$10 \text{ billion} + \$3 \text{ billion} = \\ & \$100 \text{ billion} - (\$10 \text{ billion} - \$3 \text{ billion}) = \$93 \text{ billion} \end{aligned}$$

The alternative ways in which the various aggregate concepts can be expressed may now be summarised as follows:

- * Domestic - National: Concept in domestic terms + net foreign factor income (NFFI) = concept in national terms
- * Gross - Net: Concept in net terms = concept in gross terms - depreciation (D)
- * Factor Costs - Market Prices: concept in factor costs terms = concept in terms of market prices - net indirect taxes (NIT)

By combining the different alternative ways of expressing the values of the aggregate accounting concepts, the following set of alternative product and income concepts may be obtained:

CONCEPT:

- [1] Domestic Product (Income)/ Value Added, gross, at market prices = Value total/gross output - value all intermediate inputs
= Value final output - value intermediate imports
= Value final expenditure - value total imports
- [2] National Product (Income), gross, at market prices = [1] + NFFI
- [3] Domestic Product (Income)/Value Added, gross, at factor costs = [1] - NIT = sum primary factor incomes incl. D, excl. net indirect taxes
- [4] National Product (Income), gross, at factor costs = [2] - NIT = [3] + NFFI
- [5] Domestic Product (Income)/Value Added, net, at market prices = [1] - D

- [6] National Product (Income), net, at market prices = [2] - D = [5] + NFFI
- [7] Domestic Product (Income)/Value Added, net, at factor costs = [1] - D - NIT = sum primary factor incomes, excl. D, excl. net indirect taxes
- [8] National Product (Income), net, at factor costs = [2] - D - NIT = [7] + NFFI

We will apply the above concepts to the case of Avancia, while recalling the following values for year T (all in billions of dollars):

Value total/gross output	= 185;	Value all intermediate inputs	= 85;
Value final output	= 110;	Value final expenditure	= 115;
Value intermediate imports	= 10;	Value total imports	= 15;
NFFI	= -3;	D	= 14;
NIT	= 7;	Total wages and salaries, etc.	= 54;
Other factor income (excl. depreciation, excl. net indirect taxes)	= 25;		

The following results will now be obtained:

- [1] = value total/gross output - value all intermediate inputs - value intermediate imports
= 185 - 85 = 110 - 10
= 115 - 15 = 100
- [2] = [1] + NFFI
= 100 + (-3) = 97
- [3] = [1] - NIT = sum primary factor incomes, including D
= 100 - 7 = 54 + (25 + 14) = 93
- [4] = [2] - NIT = [3] + NFFI
= 97 - 7 = 93 + (-3) = 90
- [5] = [1] - D
= 100 - 14 = 86
- [6] = [2] - D = [5] + NFFI
= 97 - 14 = 86 + (-3) = 83
- [7] = [1] - D - NIT = sum primary factor incomes, excl. D, excl. NIT
= 100 - 14 - 7 = 54 + 25 = 79
- [8] = [2] - D - NIT = [7] + NFFI
= 97 - 14 - 7 = 79 + (-3) = 76

As can be seen from the above example, we can derive the values of the various concepts in more than one way. As will be discussed later in more detail, also in practice the values of the national accounting concepts may be estimated in several ways. By attempting to make different estimates simultaneously, cross checks of the estimated values can be obtained.

The concept of **National Disposable Income** is one which is closely related to that of National Income, as the term already suggests. It aims at providing a measure of the income which is ultimately available to the nation for final consumption and saving. As such, it takes account not only of the (net) foreign factor incomes earned, but also of other current transfers (net) received from abroad. These other transfers refer to transfers from and to the rest of the world that are of a current character, meaning that they are being made from the current income of the economic unit making the transfer payment. They differ from factor income payments in that they do not represent income flows paid/received in compensation for the supply of factor services (labour, capital etc.) Examples of current (non - factor income) transfers are: remittances made regularly by emigrants to their countries of origin; certain types of transfers between governments; contributions of governments to/from international organisations, etc. Like the factor incomes from abroad the other current transfers increase the total available income of the recipient country, while they decrease that of the country from where the transfer comes.

Note, that any transfer which is not being made from an economic unit's current income but rather from its stock of wealth is a so-called capital transfer. The latter should not be included in the National Disposable Income.

The relationship between the National Disposable Income and the National Income may now be formalized as follows:

$$\begin{aligned} \text{National Disposable Income} &= \text{National Income} \\ &+ \text{foreign current transfers (to be) received (FCUTR)} \\ &- \text{foreign current transfers (to be) paid (FCUTP)}. \end{aligned}$$

$$\text{For short: NatDispInc} = \text{NatInc} + \text{FCUTR} - \text{FCUTP}$$

The difference between FCUTR and FCUTP (i.e. FCUTR - FCUTP) may be referred to as: Net Foreign Current Transfers (to be) received (NFCUT), yielding the following relationship:

$$\begin{aligned} \text{National Disposable Income} &= \text{National Income} \\ &+ \text{Net Foreign Current Transfers (to be)} \\ &\quad \text{received (NFCUT)} \end{aligned}$$

$$\text{Or, for short: NatDispInc} = \text{NatInc} + \text{NFCUT}$$

It may be noted that the National Disposable Income concept can be gross or net (i.e inclusive of exclusive of depreciation), but that it is normally defined in terms of market prices, i.e. inclusive of net indirect taxes.

Applying the concept to the case of Avancia, while assuming that the current transfers received from the rest of the world are equal to 6 billion dollars and those paid to the rest of the world equal to 2 billion dollars so that the value of the net foreign current transfers equals +4 billion dollars, we obtain the following values (in billions of dollars):

$$[9a] \text{ National Disposable Income, gross} = [2] + \text{NFCUT} = 97 + 4 = 101$$

$$\begin{aligned} [9b] \text{ National Disposable Income, net} &= [6] + \text{NFCUT} = [9a] - D = 83 + 4 \\ &= 101 - 14 = 87 \end{aligned}$$

2.3 Example: The Aggregate Concepts Applied to Sri Lanka

Having completed our presentation of the meaning of the main national accounting aggregates, and the way they are interrelated, we will now illustrate the application of some of these concepts by taking the concrete case of Sri Lanka as an example. Reference is being made to Tables 3 to 5. The data on which these tables are based, and which apply to the year 1989, have been taken from: 'National Accounts of Sri Lanka 1989', published by the Department of Census and Statistics, Ministry of Policy Planning and Implementation. The items in Tables 3 to 5 largely follow the terminology used in the national accounting system developed by the United Nations, the System of National Accounts (SNA). This system, which, as said already earlier, has been adopted by the majority of the countries of the world in one way or the other, has also been implemented in Sri Lanka.

TABLE 3: Domestic Product and Income Aggregates, Sri Lanka 1989

<u>Rs million</u>	
(1) Private final consumption expenditure	184 378.7
(2) Government final consumption expenditure	32 584.8
(3) Increase in stocks	4 421.1
(4) Gross fixed capital formation	50 968.4
(5) Exports of goods and services	68 485.7
(6) Minus: Imports of goods and services	92 608.7
	----- +
(7) Gross Domestic Product, market prices	248 230.0

(8) Compensation of employees	110 032.7
(9) Operating Surplus (net, factor costs)	92 191.9
	----- +
(10) Net Domestic Income, factor costs	202 224.6
(11) Consumption of Fixed Capital	10 193.7
(12) Net Indirect Taxes	35 811.7
	----- +
(13) Gross Domestic Income, market prices	248 230.0

Table 3 shows, among other things, the value and composition of the Gross Domestic Product (GDP) in market prices, calculated as the expenditures on different categories of final goods and services, minus the total imports.

Item (1), private final consumption expenditure, basically refers to the purchase of consumer items, domestically produced as well as imported, by households (and by private non-profit institutions) in the domestic market.

Included in this item is also any direct payments made by households in connection with services rendered by government. It includes furthermore the estimated value of auto-consumption (by the household of the producer) of agricultural output. Finally, the item also includes - in line with SNA recommendations -, an estimate of the imputed rent value associated with the use of owner-occupied dwellings (see section 3.2).

Item (2), government final consumption expenditure, refers to that part of the value of the output of services produced by the government which is rendered 'free of charge' to the general public, i.e. for which government did not receive any direct payment. This part of the value of the output of government services is from a national accounting point of view being considered final consumption expenditure by government. This, because the government has to bear in a direct sense the costs of these services by itself. (Of course, since the income of government is largely composed of taxes, it is ultimately the general public which is paying these services, but only in an indirect way.) See on this point also section 3.2

Item (3), increase in stocks, refers to investments that have taken place in inventories of raw materials, semi-finished products, and finished products.

Item (4), gross fixed capital formation, represents the other investment component, namely the value of the investments in fixed assets. It is among other things composed of the value of the supply of machines and equipment (including vehicles and other transport equipment), and of dwellings (residential as well as non-residential) and constructions in the economy. In addition it includes the value of land improvement and plantation development.

Item (5), the last of the final expenditure categories normally distinguished, refers to the value of the goods and services exported. By subtracting the value of the imports of goods and services (item (6)) from the sum of items (1) to (5), we obtain then an estimate of the GDP (item (7)). Its estimated value equals an amount of Rs 248 230.0 million in the year 1989.

Bearing in mind the basic relationship between the Domestic Income and the Domestic Product, the lower part of Table 3 shows how the GDP is divided up over the different factor income categories and other components.

The factor income categories distinguished are (8), compensation of employees, and (9) operating surplus (net). The first category represents basically the labour income as paid out by the domestic producers to their employees, while the second refers to all other factor incomes (net of depreciation) generated in the domestic productive activities, i.e. interests, rents and net profits. Categories (8) and (9) together give an estimate of the value of the Net Domestic Income at factor cost (item (10)).

Item (11), consumption of fixed capital, refers to an estimate of depreciation of the domestic capital stock. If its value, together with that of the Net Indirect Taxes (item (12)) is added to that of the Net Domestic Income at factor costs, we obtain the value of the Gross Domestic Income, or Product, at market prices (item (13)).

Table 4a gives, for the years 1987 to 1989, details about the contribution the various branches of activity (i.e. the productive sectors) have made to the GDP. These contributions have been established with the help of the Value Added approach, in which the value of the intermediate consumption (i.e. the value of all intermediate inputs, i.e. of domestic as well as foreign origin) is deducted from that of the Gross Output. The sum of the Value Added for the various branches gives the Value Added for the economy as a whole. Apart from an adjustment which is related to import duties, the Value Added for the

TABLE 4.a – DERIVATION OF VALUE ADDED BY KIND OF ACTIVITY (ISIC) MAJOR DIVISIONS
(CURRENT PRICES)

		(Rs. Million)		
		1989		
ISIC Code	Activities	Gross Output	Intermediate Consumption	Value Added
<u>Industries</u>				
01	Agriculture, Hunting, Forestry and Fishing	70537.4	13763.4	56,774.0
02	Mining and Quarrying	3961.1	356.1	3,605.0
03	Manufacturing	87,457.2	46,042.5	41,414.7
04	Electricity, Gas and Water	4,601.7	352.0	4,249.7
05	Construction	31422.2	13916.9	17,505.3
06	Wholesale and Retail trade, Restaurants and Hotels	56179.6	11616.1	44,563.5
07	Transport and Communication	45,636.4	21759.2	23,877.2
08	Finance, Insurance, Real Estate and Business Services	15545.3	812.8	14,732.5
09	Community, Social and Personal Services	39687.6	14390.1	25,297.5
	Total, Industries, including industries of general government	355,028.5	123,009.1	232,019.4
10	Other producers	502.8		502.8
	Sub total	355,531.3	123,009.1	232,522.2
	Imports duties	15707.8		15707.8
	Total	371,239.1	123,009.1	248,230.0

TABLE 4.b – COST COMPONENTS OF VALUE ADDED – 1989

(Rs. Million)

	Compensation of Employees	Gross Operating Surplus * 1	Indirect Taxes	Less Subsidies	Value Added
Agriculture Forestry and Fishing	21,680.1	35,378.6	0.9	285.6	56,774.0
Mining and Quarrying	1,072.9	2,518.7	13.4		3,605.0
Manufacturing	24,160.1	11,767.7	6,054.3	567.4	41,414.7
Construction	11,171.8	5,962.7	366.5	1.7	17,505.3
Electricity, Gas and Water	833.1	3,263.9	152.7		4,249.7
Transport and Communication	8,414.3	16,680.7	309.3	1,527.1	23,877.2
Wholesale and Retail trade, Restaurants and Hotels (X)	11,190.5	20,433.2	28,647.6		60,271.3
Banking, Insurance, Real Estate etc.	8,273.1	2,630.3	682.0		11,525.4
Ownership of Dwellings		2,881.9			2,881.9
Government Services	19,705.2			30.7	19,674.5
Private Services	3,531.6	861.9	1,997.5		6,391.0
Gross Domestic Product	110,032.7	102,385.6	38,224.2	2,412.5	248,230.0

* Figures were compiled using information obtained from Socio-Economic Survey 1981/1982, Electricity Board, C.G.R., C.T.B., State Accounts and Budgets of Development Corporations such as Mahaveli Development Board, National Housing Authority, Water Resources Board, Urban Development Authority etc.

(X) Includes Import Duties

1 Gross operating surplus includes consumption of fixed capital

economy in 1989 equals that of the GDP 1989 as presented in the previous table, i.e. 248 230.0 Rs million. The adjustment arises from the fact that the way in which import duties have been dealt with in the estimates of the Value Added is somewhat different from that used in the estimates of the GDP. Therefore, an adjustment is required to establish full equality between the two concepts.

Referring to the year 1989, table 4a makes clear that the branch of Agriculture, Hunting, Forestry and Fishing has, with 56774.0 Rs million, made the largest contribution to GDP of the various branches distinguished in this table. Its share is equal to about 24.4% of all Value Added generated in the economy (exclusive of import duties), which is almost a quarter. Second in position is the branch of Wholesale and Retail trade, Restaurants and Hotels. Its share in the Value Added (exclusive of import duties) amounts to 19.2%. On the other hand, the table also shows that the role of the sector Mining and Quarrying is rather modest, at least as far as its contribution to the GDP is concerned. Its share amounts for the year 1989 to about 1.5% of total Value Added (exclusive of import duties).

In table 4b details with regard to the breakdown of the Value Added per branch in terms of Compensation of Employees, Operating Surplus (gross), Indirect Taxes and Subsidies are being presented, with reference to 1989. The data for most branches in this table can be compared directly to the data in table 4a, in spite of some branch-wise re-grouping.

Estimates of the National Income and the National Disposable Income are given in Table 5. As explained earlier, the former concept takes into account the factor incomes from and to the rest of the world, while the latter considers in addition the other (i.e non-factor income) current transfers from and to the rest of the world.

<u>TABLE 5 : National Income and National Disposable Income, Sri Lanka, 1989</u>	
<u>Rp Millions</u>	
(1) Compensation of employees	110 032.7
(2) Operating surplus (net)	92 191.9

(3) Net Domestic Income, Factor Costs	202 224.6
(4) Net indirect taxes	35 811.7

(5) Net Domestic Income, Market Pr.	238 036.3
(6) Compensation of employees --- from rest of world, net	(-) 5 906.1
(7) Other factor income --- from rest of world, net	-----
Net National Income, Market Pr.	232 130.2
(9) Other current transfers from rest of world, net	10 844.4
(10) Net National Disposable Income	242 974.6

By adding together the compensation of employees and the operating surplus (net of depreciation and of net indirect taxes), the value of the Net Domestic Income at Factor Costs is obtained (i.e., 202 224.6 Rs million). By adding to this the indirect taxes one arrives at the Net Domestic Income value in Market Prices (i.e. 238 036.3 Rs million).

Now the net foreign factor income is being added to this. In 1989 this flow, which can be seen equal to the sum of the net compensation of employees from abroad and net other factor income (i.e. interest, dividends and other forms of entrepreneurial and property income) from abroad has been negative, i.e. - 5906.1 Rs million. In other words, in that year there was a net outflow of 5906.1 Rs million of factor income. Because of this net outflow, the value of the National Income is lower than that of the Domestic Income.

By adding to the value of the National Income, net, at market prices the value of the net other current transfers from the rest of the world (i.e 10 844.4 Rs million in 1989), one obtains the value of the National Disposable Income, net. Because the value of the net transfers was positive in 1989 (i.e. there was a net inflow of transfers), the National Disposable Income exceeded the National Income.

In this overview for the year 1989 of the values of a number of national accounting aggregates for Sri Lanka, not all concepts as discussed earlier were included. However, it will be quite simple -- with the help of the data given in the tables -- to derive the values of certain other concepts as well. For example, the values of the National Income and the National Disposable Income in Table 5 are in net terms. By adding to them the value of the Consumption of Fixed capital (see for example table 3, which gives as its value 10 193.7 Rs million), we obtain estimates for these aggregates in gross terms. In a similar way the values of some other concepts can be derived.

2.4 Aggregates at Current and at Constant Prices

As far as the values of the various aggregates discussed above is concerned, it can be said that these generally speaking can be expressed either at current prices or at constant prices. About the meaning of these terms the following can be said. In order to arrive at estimates of the values of the various concepts one has, generally speaking, to make use of quantities (of outputs, inputs, etc.) and of prices (of outputs, inputs, etc.). If, in the estimation of the value of a certain aggregate for a given year, the quantities for that year are valued at prices applying to that same year, the resulting values are said to be at current prices, i.e. expressed in prices as prevailing in that year. Thus a GDP estimate at current prices for 1988 is based on calculations in which the quantities of goods and services for 1988 have been valued at prices prevailing in the year 1988. In a similar vein, the GDP estimate at current prices for 1989 will involve quantities applying to 1989, as well as prices applying to 1989. The data as presented earlier for Sri Lanka are all expressed in current price terms.

Instead of expressing the national accounting aggregates at current prices, it is also possible to have them expressed in so-called constant price terms. This means, that the quantities of a given year t are not valued at prices for that same year t , but at prices that prevailed in a certain fixed year of reference. This year is normally further back in the past than the year t . Thus, if we refer to an estimate of a country's GDP for 1989 at (constant) prices of 1985, this implies that the quantities of goods and services of 1989 have been valued at prices for these goods and services as applying to 1985.

The different value expressions referred to above may in general terms be formalized as follows:

$$\text{Value in year } t, \text{ current prices : } V_{t, cu} = \sum Q_t P_t$$

$$\text{Value in year } t, \text{ constant prices : } V_{t, co} = \sum Q_t P_0$$

Furthermore:

$$\text{Value in reference year, current prices : } V_{0, cu} = \sum Q_0 P_0$$

$$\text{Value in reference year, constant prices : } V_{0, co} = \sum Q_0 P_0$$

Note, that

$$Q_t = \text{quantity in year } t ; Q_0 = \text{quantity in reference year}$$

$$P_t = \text{price in year } t ; P_0 = \text{price in reference year}$$

Estimates of Product at constant prices (sometimes called 'Real GDP') are made in order to eliminate the impact of price changes. In this way a better picture can be obtained of the growth of GDP in volume terms.

By way of example we have given in table 6 estimates of the GDP and its expenditure components for the years 1975 and 1989, at current prices as well as at constant prices for Sri Lanka. The figures have again been taken from the publication 'National Accounts of Sri Lanka 1989' by the Department of Census and Statistics.

The table makes clear that in the reference year no difference exists between the current price estimates and the constant price estimates because for that year both kinds of estimates use the same valuation basis, in this case prices applying to 1975. For the other years, however, the estimates differ, because different valuation bases are used. The current price estimates for 1989 refer to prices applying to 1989 as their valuation base, while the constant price estimates for 1989 refer to prices applying to 1975 as their valuation base since the year 1975 has been selected as the reference year. By comparing the two kinds of estimates for 1989 to each other, while relating these figures to those for 1975, the role of price increases on the various components and aggregates will become very clear.

<u>Table 6: Gross Domestic Product at Current Prices and</u>				
<u>at Constant Prices (reference year 1975)</u>				
Rs Millions				
	1975 (reference year)		1989	
	Current Prices	Constant Prices	Current Prices	Constant Prices
Gov. Final Cons. Exp.	2696.7	2696.7	32584.8	5530.7
Priv. Final Cons. Exp.	21678.5	21678.5	184378.7	48018.1
Increase in Stocks	1110.5	1110.5	4421.1	- 5459.3
Gross Fixed Cap. Form.	3539.8	3539.8	50968.4	6239.6
Exports of G & S	7306.0	7306.0	68485.7	13090.5
Minus Imports of G & S	- 9291.0	- 9291.0	- 92608.7	-17109.3
Gross Domestic Product, <u>Market Prices</u>	27040.5	27040.5	248230.0	50310.3

The example presented above demonstrates clearly that estimates at constant prices can differ considerably from those at current prices when prices in the economy are subject to considerable change. As indicated already earlier, constant price estimates are under such circumstances better indicators for measuring changes in volumes of output.

In relation to the above we may finally mention the following indices:

(1) **Real GDP Index ($I_{Q\text{ GDP}}$) = $[\text{GDP}_{\text{cost}} / \text{GDP}_0] * 100$**

Where $\mathbf{GDP_{co;t}}$ = GDP at constant prices, year t
 $\mathbf{GDP_0}$ = GDP reference year

This index is a volume index which expresses the GDP at constant prices for year t as a percentage of the GDP in the reference year. The difference between the index value for year t and the reference year value (by definition equal to 100%) gives an measure of the change in the volume component of GDP between the reference year and year t.

For the above example the value of the index is:

$$(I_{Q_{RP}}) = [50310.3 / 27040.5] * 100 = 186$$

In other words, between 1975 and 1989 the level of Real GDP has increased by 86%.

(2) GDP Deflator ($I_{P_{GDP}}$) = $[GDP_{cu;t} / GDP_{co;t}] * 100$

Where $\mathbf{GDP_{cu;t}}$ = GDP at current prices, year t
 $\mathbf{GDP_{co;t}}$ = GDP at constant prices, year t

This index is a kind of price index which is obtained by expressing the GDP at current prices for year t as a percentage of the GDP at constant prices for year t. The resulting figure is a measure in percentage terms of the average price level of the economy for year t in comparison to that of the reference year (100%). The difference between the two figures gives an indication of the change in the average price level between the reference year and year t.

For the above example the value of the index is:

$$I_{P_{GDP}} = [248230.0 / 50310.3] * 100 = 493$$

In other words, between 1975 and 1989 the average price level in the economy has increased by 393%.