

Notes on the national accounts

Johan Lindén

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With translation to Swedish of important concepts

1 The national accounts

The national accounts are an accounting system which aims to describe the state of the economy as a whole: how much goods and services are produced and consumed, what income is generated and how much is traded with other economies.

The economy described by the national accounts is typically a country, but may also be a region within a country or a region consisting of several countries, such as the European Union. It may even be the economy of the whole world.

The accounting period is one year. Measures of flows, such as production, consumption and investment, are accumulated over a year, and prices are averaged over one year. In Sweden and many other countries, simplified and approximate national accounts are also published quarterly.

One of the most important variables calculated within the national accounts is the Gross Domestic Product (GDP), which measures the value of all that is produced within an economy during a year. As will be seen, it also measures the income generated by this production. These notes describe how GDP and related measures are computed.

In these notes, the example used to illustrate the national accounts is the annual accounts for Swedish economy for the year 2013. This year is suitable for illustration because Sweden had a normal business cycle situation at that time, i.e. neither a boom nor a recession.

The construction and organization of the national accounts is to a large extent standardized in international agreements by the United Nations. The UN publication *The System of National Accounts* (SNA) describes this standard. SNA was first published in 1953 and updated 1968, 1993 and 2008. Since the SNA is meant to be used by countries at different stages of development, it leaves many details to be decided by the individual countries. Therefore the European Union has specified some of these details in *European system of accounts* (ESA) published by EU agency Eurostat. The latest version of ESA is from 2010.

The national accounts are usually assembled and published by governmental statistical agencies. In Sweden, the government agency Statistics Sweden (in Swedish: Statistiska Centralbyrån, SCB) are responsible for the Swedish national accounts. As an EU member, Sweden is obliged to follow the ESA as well as the SNA. Statistics Sweden publish the Swedish national accounts, along with a lot of other statistics, on their web site at scb.se

One of the most important uses of the national accounts is for government planing and forecasts, such as the construction of the government budget. It is also used for planing by private firms, organizations and individuals.

2 Macroeconomic payment flows

The national accounts are built around a picture of the economy which is division of the economy as well as a simplification of it. As such, it may be regarded as kind of economic model. This model is well illustrated by diagrams of economic payment flows, showing sectors of the economy and markets, with arrows between these signifying payments. These diagrams will serve as an overview of the national accounting system.

The final version of the diagram of payment flows will have four sectors:

- the household sector
- the firm sector
- the government sector
- the foreign sector

and three markets:

- the goods market for goods and services
- the factor market for labor and capital
- the credit market for loanable funds

Although this is still a simplified version of the model underlying the national accounts, the payment flows between these sectors and markets still make up a rather complex system (as can be seen in Figure 5). The flow diagram will therefore be constructed in stages, starting with a closed private economy, introducing firms and households, but leaving out the government sector and the foreign sector. Then the government sector is introduced in a closed economy, and finally the foreign sector in the full version of the open economy.

2.1 A closed, private economy

2.1.1 Flows of deliveries and payment

Figure 1 show households and firms trading with each other through a goods market and a factor market. "Goods" is used as a short form for the expression "goods and services". Goods are things that can be owned, e.g. food, computers and houses, while services are actions which can be bought and sold but not owned, such as haircuts and bus rides.

Inputs in production may be divided into intermediate goods and factors of production. Intermediate goods are goods which are produced and then used up in further production within a year. Examples are flour used in a bakery to bake bread, or fertilizer used in agriculture to grow wheat. As will be seen later in

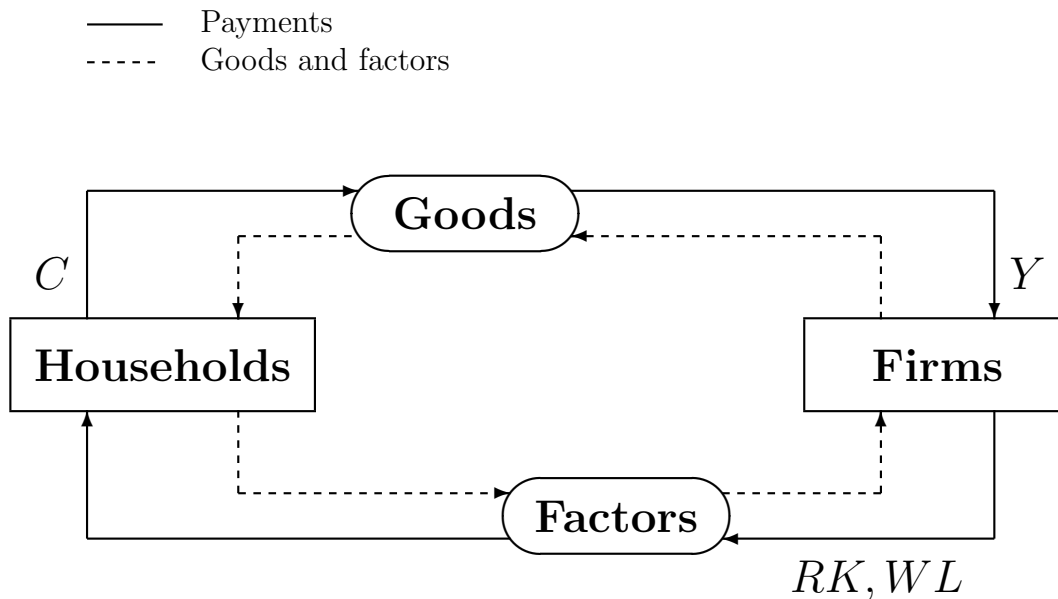


Figure 1: Closed private economy with real flows and payment flows

these notes, intermediate goods are excluded from most measures of production within the national accounts, such as the GDP.

There are three factors of production: labor, capital and natural resources, sometimes simply called "land". Labor, i.e. work for pay in productive occupation, is by far the most important source of income in most households. The term "capital" in these notes refer to physical capital, i.e. buildings, machinery, tools and equipment. More formally, capital is produced goods which is used in further production and renders productive services during a period longer than one year. Natural resources, such as agricultural land, fishing waters and mines, usually generates only a few percent of total income in most modern industrialized economies. They will therefore be ignored, or lumped together with capital, in these notes.

In figure 1, the delivery of physical goods, labor and capital services are shown as dashed arrows, while the payments for these deliveries are shown as solid arrows. Thus dashed arrows show physical goods flowing from the firms that produce them to the households that consume them, and payments for these goods flowing in the opposite direction. Likewise, dashed arrows show labor and capital services flowing from households to firms which use these factors in production, while solid arrows show the payments for these factors flowing in the

opposite direction.

The variable Y denotes the value of production sold by firms, measured as the gross domestic product (GDP), and C the value of household consumption, also called private consumption to distinguish it from public consumption which is introduced in later versions of the diagram. If L stand for the total number of hours worked within the economy, and W is the average hourly wage, WL represents total labor income to households in the economy. Likewise, if K denotes total capital services and R the average rental price of capital, RK is total capital income in the economy. Disregarding natural resources, $RK + WL$ is then total factor income to households.

The diagram shows how payments circulate between households and firms via the markets for goods and factors. This means that basically the same payment flow may be measured at various points in the diagram. As will be shown below, GDP may be measured as the payment to firms for their products, called the production account, or as the payments by households for their consumption, called the expenditure account, or as the income paid by firms to households for use of their labor and capital, called the income account. Since households own the firms, profits retained by firms count as income to households, so $Y = RK + WL$. Thus: production = expenditure = income.

2.1.2 Investments in the closed private economy

Since each delivery flow (dashed arrows) correspond to a payment flow (solid arrows), it's not necessary to show both types of flows in this type of diagram. Customarily It's customary to show only payments flows, since there are payment flows which don't correspond to any delivery. An example is taxes, which will be introduced with the public sector below. Figure 2 show the payments in the closed private economy, with investments (I) added to the diagram.

Firms buy investment goods as well as intermediate goods from other firms, so both of these are transactions within the firm sector. The reason for showing investments but not intermediate goods in this diagram, is that while intermediate goods are used up within the same year, and therefore don't influence the possibilities to consume, investments, on the other hand, last beyond the accounting period and influence the productive capabilities of the economy in future years. Investments are therefore important to keep track of. Note that production (Y) is here used for investments (I) as well as for consumption (C).

2.1.3 The credit market in the closed private economy

Investments are usually financed with loans. Since profits retained by firms are considered household income, even these retained profits count as loans from

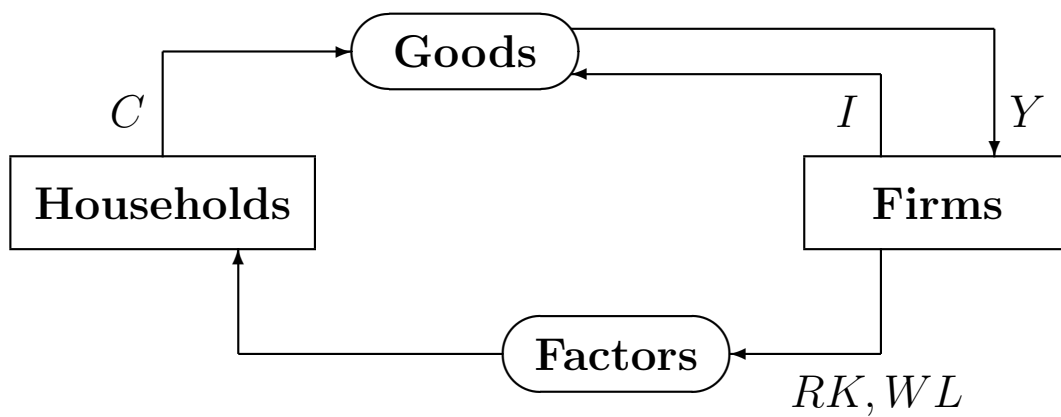


Figure 2: Closed private economy, only payment flows

households to firms in this context. Figure 3 show the closed private economy with a market for credit added.

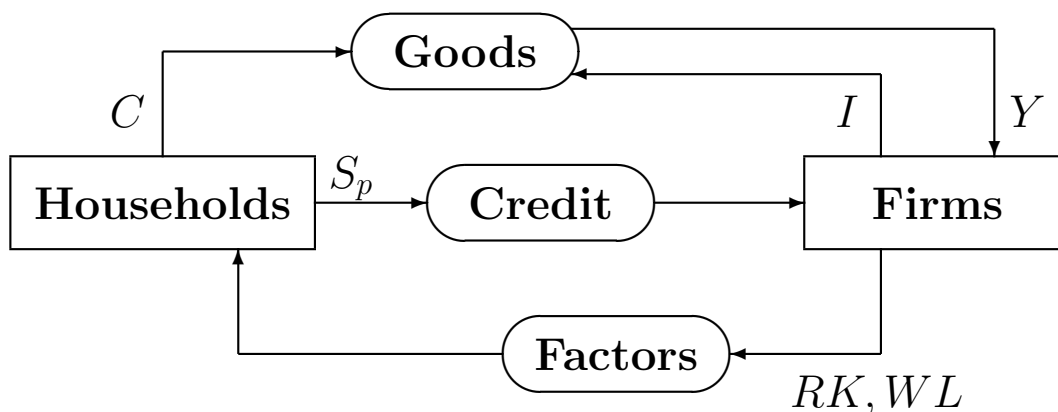


Figure 3: Closed private economy with credit market

The difference between household income and household consumption makes up private savings $S_p = Y - C$. These savings are made available via the credit market to firms for investment. Loans given within the household sector or the firm sector, i.e. loans from households to households or from firms to firms, don't show up in this diagram. Only loans between sectors are shown.

The loans passing through the credit market mirror the other payment flows in the sense that these loans can be computed from the other payment flows. The difference between income and expenditure by each sector make up the savings, positive or negative, in that sector.

2.2 A closed economy with public sector

In figure 4, a public sector, or government sector, has been added to the closed economy. The public sector represent the consolidated public sector, i.e. central, regional and local government, along with pension funds which are usually treated as a separate part of the public sector. The public sector collect taxes, pay out transfers and subsidies, and consume a part of total production.

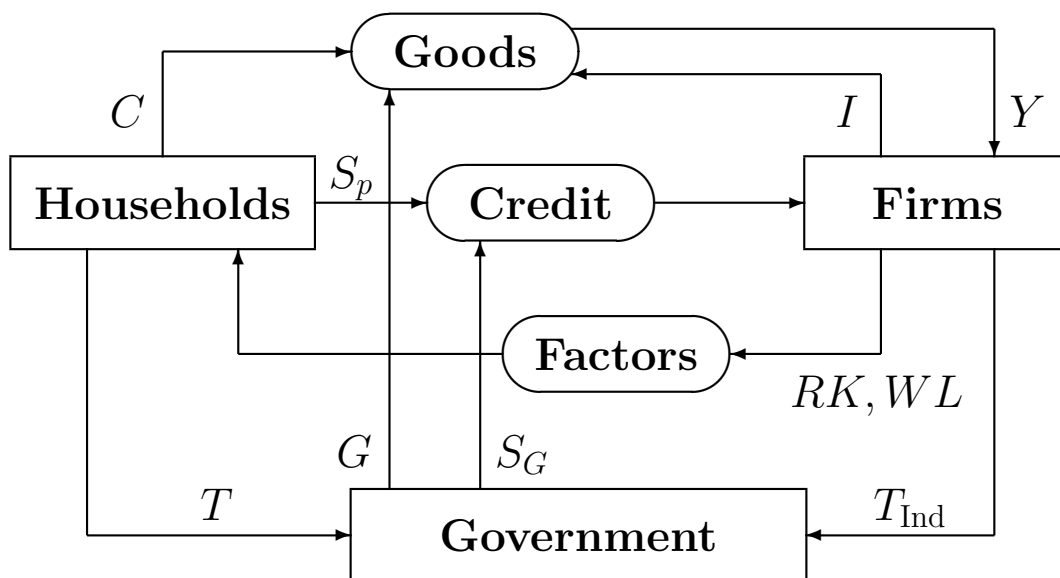


Figure 4: Closed economy with public sector

Households pay taxes and receive transfers, such as unemployment benefits, social benefits, student grants and pensions. The tax flow T from households to the government represents net taxes, i.e. taxes paid net of transfers received. Taxes paid by households are sometimes called direct taxes, to distinguish them from taxes paid by firms. Firms also pay taxes, such as profit tax, and receive subsidies. Taxes paid by firms are called indirect taxes, because firms will usually add these taxes to the price of their goods, so that eventually households end up paying these taxes as well. The tax flow T_{Ind} represent net indirect taxes, i.e. the net of taxes paid by firms and subsidies received.

Public consumption G , also called government purchases, is the value of all goods and services provided by the government to the private sector, such as the national defense, education, health care, roads and so on. In reality, governments produce some of these goods and services, and buy some of it from private firms. An example is that while the government run most primary and secondary schools, there are also private schools paid for by the government, providing education to households at no cost. In these diagrams, and in the simplified version of the national accounts presented here, the productive side of government is lumped together with the firm sector, so that there is only one productive sector. This means that all publicly provided goods and services are treated as privately pro-

duced and then bought by the government. In actual national accounts, firm production and government production are accounted for separately, but added together on the most aggregate level.

Net taxes form the income of the government sector, and public consumption its expenditure. The difference make up public savings: $S_G = T + T_{Ind} - G$. In the diagram, S_G is shown as a flow of savings into the credit market. Actually government often run deficits. The government budget deficit is simply the negative of public savings, $-S_G$. When public savings are negative, and thus the deficit positive, credits flow from the credit market to the government, i.e. in the opposite direction from that shown in the diagram,

2.3 An open economy

Figure 5 shows the final version of the diagram of payment flows. Here, a foreign sector representing the rest of the world has been added, so the economy shown is open to trade in goods, services, factors and credit. The diagram is rather complex, but only the payment flows going to or from the foreign sector are new, compared to the previous diagram.

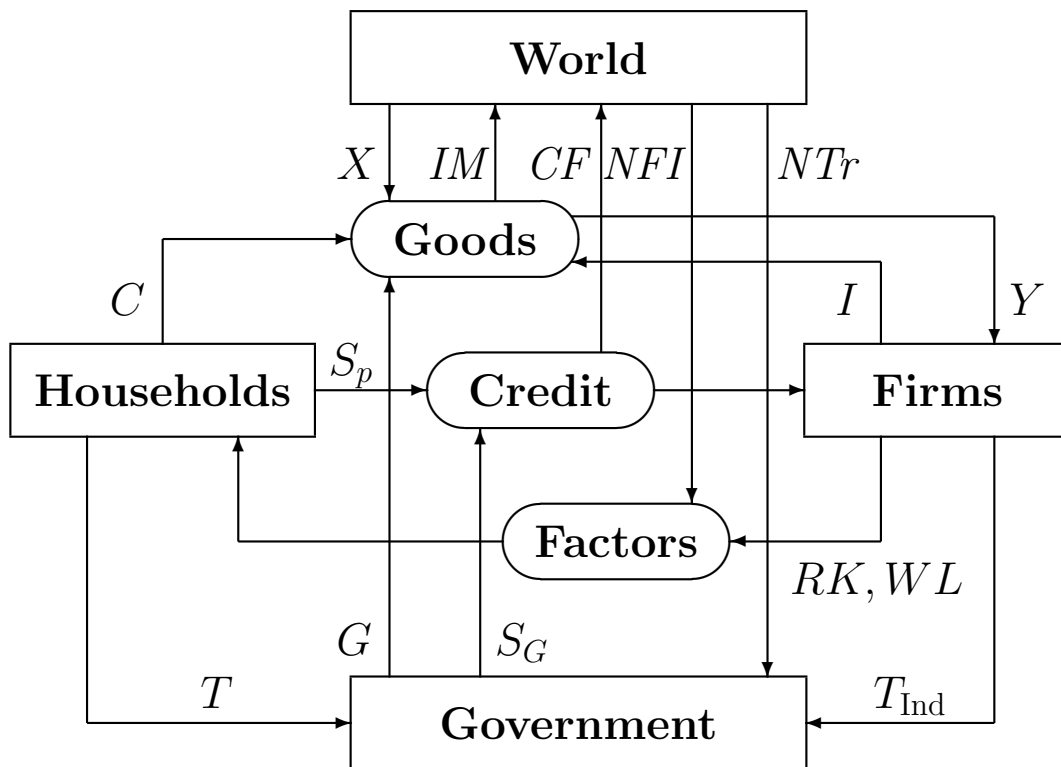


Figure 5: Open economy

Trade in goods and services are shown as export X and import IM . Export is

the value of goods and services sold to other countries, while import is the value of goods and services purchased from abroad. The difference is called net export: $NX = X - IM$, also called the trade balance.

Trade in factors of production, i.e. capital and labor, is represented as net factor income from abroad, abbreviated NFI . Net factor income is also called primary income. It consists mostly of capital income. Only a few percent are labor income. Income flowing into the economy is counted as positive in net factor income from abroad, while income flowing out is counted as negative. An Example of income from physical capital to Sweden would be Swedish households or firms owning buildings abroad and earning rent from them. An example of income from financial capital leaving Sweden would be foreign shareholders in Swedish firms earning dividends on their shares. An example of labor income from abroad would be a Swedish resident living in Malmö commuting to a job in Copenhagen. Note that it is residency that determine where income is accounted, not citizenship.

In addition to payments for goods, services and factors, payments are also made between countries in the form of transfers. In the diagram, net transfers from abroad is denoted by NTr . Actually, transfers are made between all domestic and foreign sectors, but the largest amounts by far are payed between governments. Therefore, net transfers from abroad are shown as a flow from the rest of the world to the domestic government. In the calculation of net transfers from abroad, transfers into the domestic economy are counted as positive and transfers to the rest of the world are counted as negative. However, in Sweden, net transfers from abroad are always negative. The prime examples are Swedish foreign aid and the Swedish membership fee to the European Union. The Swedish government and Swedish firms receive grants and subsidies from the EU too, but always less than the membership fee.

The sum of net exports, net factor income from abroad and net transfers from abroad is called the current account, CA . Thus, $CA = NX + NFI + NTr$. The current account represents an economy's surplus from trade and transfers. This surplus may equally well be negative as positive. The sum of current accounts for all countries in the world would be zero, if it weren't for some systematic accounting errors and asymmetries, since a surplus in one country must be a deficit somewhere else. The current account surplus is lent to the rest of the world, or borrowed, if it is a deficit. The negative of the current account is called the net capital outflow and denoted by CF in the diagram. Note that in calculating net exports, net factor income from abroad and net transfers from abroad, payments into the domestic economy are counted positive, while payments out of the domestic economy are counted negative. For the net capital outflow, the opposite is true.

3 The calculation of GDP and related measures

In order to show how the gross domestic product (GDP) are calculated, along with some closely related measures, viz. the net domestic product (NDP), the gross national product (GNP) and the net national product (NNP), also called the net national income (NNI), some examples with data from the Swedish national accounts will be presented. The examples will demonstrate how to calculate GDP from the production account, the expenditure account and the income account.

The numbers in the examples are in billion SEK. The data come from the Swedish national accounts for the year 2013. This year, Sweden had a normal business cycle situation, having recovered from the financial crises of 2008, but before entering the boom later in the decade, which was then interrupted by the Corona epidemic in 2020.

In order to aid Swedish speaking students to acquire the Swedish terminology, the Swedish names of the items in the accounts are also shown in the tables .

3.1 Definition of GDP as value added

The definition of the gross domestic product (GDP) is the market value of all goods and services produced within the borders of a country or other region, during an accounting period, usually one year, and sold for final use.

The concept of final use needs clarification. It includes consumption by households or the government, as well as investment and exports, but not the use as intermediate input in further production. The exclusion of intermediate goods serves to avoid double counting of goods that is never made available for consumption.

An example may illustrate this. Consider an economy with only three firms: a farm, a mill and a bakery. Suppose the farm produces wheat and sells all of it to a mill for 1 SEK. The mill produces flour from the wheat, and sells some of it for 1 SEK directly to households for consumption, and the rest to the bakery for 2 SEK. The bakery produces bread from the wheat it buys from the mill and sells it to households for consumption for 5 SEK.

The value added at each stage in the production process is the value of sales minus the value of input goods. Table 1 illustrates this.

As seen in the table, value added can be calculated for each firm as sales minus intermediate goods, or, in the last row, as total sales minus the total value of all intermediate goods. It is also apparent that total value added (6) is equal to total sales for final use. GDP may thus be defined as total value added in the economy or, as above, as total sales for final use. If this is the whole economy, $GDP = 6$.

Calculation of value added				
Firm	Sales	Input goods	Value added	Sales for final use
Farm	1	0	1	0
Mill	3	1	2	1
Bakery	5	2	3	5
Sum	9	3	6	6

Table 1: Calculation of value added, example

3.2 GDP and NDP from the production account

The total value of all that is produced in the economy, including goods used as intermediate goods in further production, is called gross production. It corresponds to the sum of sales in the second column of table 1. Intermediate goods is the sum of all goods and services used in further production, and corresponds to the sum of input goods in the third column of table 1. Note that only goods used up within one year counts as intermediate goods, while goods which last longer than that count as capital goods and is not included in intermediate goods.

As shown in table 2, gross production minus intermediate goods yields GDP.

GDP from the production account BNP från produktionsidan	
Gross production Bruttoproduktion	7101
- Intermediate goods Insatsförbrukning	3460
= Gross Domestic Product (GDP) Bruttonationalprodukt (BNP)	3641
- Capital depreciation Kapitalförslitning	487
= Net Domestic Product (NDP) Nettonationalprodukt (NNP)	3154

Table 2: GDP from the production account

The distinction between capital goods and intermediate goods is somewhat arbitrary, as shown by the following example. Before Sweden adopted the ESA after joining the EU in 1995, goods lasting for more than three years counted as capital goods in the Swedish national accounts. The value of a machine lasting for two years was thus subtracted from gross production in calculating GDP before 1995 but not after this year. The result was that Swedish GDP increased for pure accounting reasons when Sweden adopted the ESA.

Though capital goods last for longer than a year, it is eventually worn out. The

value loss from annual wear and tear of capital is called capital depreciation. If capital depreciation is subtracted from GDP, the result is the net domestic product, NDP, which is theoretically a better measure of what can be sustainably consumed in an economy, without depleting its capital stock. In the calculation of NDP, intermediate goods and capital goods are treated more consistently, avoiding double counting of capital as well as other inputs.

The reason GDP is more often used in comparisons over time or across countries, is that measuring capital depreciation is difficult and error prone. Firms report a measure of capital depreciation in their tax forms, but this measure often depend on the specific accounting rules and tax rules of the country at the time. To achieve comparable measures of depreciation, statistical offices make their own estimates of depreciation, using rules of thumb and some guidelines in the NSA.

3.3 GDP from the expenditure account

GDP can also be computed as the sum of all expenditure on consumption, investment and net export.

One way to see this is to consider the payments into and out from the goods market in figure 5. The payments leaving the goods market in the figure are GDP (Y) and imports (IM). Together, these represent all resources available for use. The payments entering the goods market are private consumption (C), gross investments (I), public consumption (G) and exports (X), which together make up the total use of resources.

Thus, setting total resources equal to total use:

$$Y + IM = C + I + G + X$$

Subtracting imports from both sides of the equation yields and expression for GDP from the expenditure account:

$$Y = C + I + G + X - IM$$

Table 3 show the calculation of GDP according to this accounting formula.

GDP from the expenditure account	
BNP från användningssidan	
Private consumption	1765
Privat konsumtion	
+ Gross investment	670
Bruttoinvesteringar	
+ Public consumption / Government purchases	999
Offentlig konsumtion	
+ Export	1668
Export	
- Import	1461
Import	
= Gross Domestic Product (GDP)	3641
Bruttonationalprodukt (BNP)	

Table 3: GDP from the expenditure account

3.3.1 Categories of investment

The national accounts report several different categories of investment. A small but theoretically important part of investments is investment in inventories. The reason these investments play a special role in some macroeconomic theories is that they may be involuntary. If firms fail to sell their products as planned, their inventories of finished products increase. These inventory increases are accounted for as investments. Other investments are called investments in fixed capital.

Investments are also divided into net investments and replacement investments. Since capital depreciates, i.e. is worn out, some investments are needed just to maintain the capital stock. This level of investments are called replacement investments and are equal to the capital depreciation that they replace. The rest of investment, i.e. gross investments minus capital depreciation, are called net investments. Net investments are added to the current capital stock.

Table 3 show the division of investment into investment in fixed capital and inventory investment, as well as the division into net investments and replacement investments.

3.4 GDP from the income account

GDP is firm revenue from sales for final use. Some of this revenue is payed out as wages to labor and some is payed as indirect taxes to the government. The rest is profit, part of which may be payed out to owners as capital income to households. The rest is retained profits which may be use, along with loans, to finance investments. Thus, if total profits, retained or payed out, is added to wages and

Investment categories Kategorisering av investeringar	
	Investment in fixed capital 668
	Fasta bruttoinvesteringar
+	Investment in inventories 2
	Lagerinvesteringar
=	Gross investment 670
	Bruttoinvesteringar
-	Capital depreciation 487
	Kapitalförslitning
=	Net investment 183
	Nettoinvesteringar

Table 4: Investment categories

indirect taxes, a production measure results. This measure is not GDP but NDP, because in the definition of profits, capital depreciation is deducted. In order to arrive at GDP, depreciation has to be added back. Thus, $GDP = \text{profits} + \text{wages} + \text{indirect taxes} + \text{capital depreciation}$.

Table 5 shows the calculation of GDP in the income account.

In an open economy, income accrues not only from domestic production but also from production abroad using domestic labor and capital. Adding net factor income from abroad to GDP yields the Gross National Product, GNP. Table 5 shows the calculation of GNP. One way to express the difference between GDP and GNP, is that while Swedish GDP measures the value of production within the Swedish borders, Swedish GNP measures the value of production by the labor and capital of Swedish residents. In most countries, including Sweden, the difference between GDP and GNP is small, a few percent at most. In some small countries, however, like Luxembourg, net factor income from abroad make up a significant portion of GNP.

3.4.1 GDP and related measures of production and income

Just like subtracting capital depreciation from GDP yields NDP, subtraction capital depreciation from GNP results in the net national product (NNP), also called the net national income (NNI) or just national income (NI).

Thus, there are four related measures of production and income: GDP, NDP, GNP and NNI. Table 6 shows how they are related.

GDP from the income account	
BNP från inkomstsidan	
Profits	568
Vinster	
+ Wages	1958
Löner	
+ Indirect taxes	628
Indirekta skatter	
= Net Domestic Product (NDP)	3154
Nettonationalprodukt (NNP)	
+ Capital depreciation	487
Kapitalförslitning	
= Gross Domestic Product (GDP)	3641
Bruttonationalprodukt (BNP)	
+ Net factor income from abroad	103
Nettofaktorinkomster från utlandet	
= Gross National Product (GNP)	3744
Bruttonationalinkomst (BNI)	

Table 5: GDP from the income account

3.5 The current account

The national accounts also summarize the economic relations between an economy with the rest of the world. The principal summary of the balance of trade and transfers with the rest of the world is the current account (CA), shown in table 7.

The current account is the sum of three sources of income from abroad, counted positive when payments are made into the economy and negative when payments are leaving the economy. The first is the trade balance, also called net exports, i.e. exports minus imports, which accounts for trade in goods and services. The second is net factor income from abroad, i.e. the difference between GNP and GDP, accounting for trade in labor and capital services. The third is net transfers, accounting for transfer payments, such as foreign aid and membership fees to international organizations. So, the current account, $CA = \text{net exports} + \text{net factor income from abroad} + \text{net transfers}$.

GDP, NDP, GNP and NNI BNP, NNP, BNI och NNI	
	Net Domestic Product (NDP) 3154
	Nettonationalprodukt (NNP)
+	Capital depreciation 487
	Kapitalförslitning
=	Gross Domestic Product (GDP) 3641
	Bruttonationalprodukt (BNP)
+	Net factor income from abroad 103
	Nettofaktorinkomster från utlandet
=	Gross National Product (GNP) 3744
	Bruttonationalinkomst (BNI)
-	Capital depreciation 487
	Kapitalförslitning
=	Net National Product (NNP) 3257
	or Net National Income (NNI)
	Nettonationalinkomst (NNI)

Table 6: GDP, NDP, GNP and NNI

The current account Bytesbalansen	
	Net export 207
	Nettoexport
+	Net factor income from abroad 103
	Nettofaktorinkomster från utlandet
+	Net transfers from abroad -64
	Nettotransfereringar från utlandet
=	Current account 246
	Bytesbalans

Table 7: The current account