

Lecture 2: Macroeconomic Accounts

ECON-C3100 Intermediate Macroeconomics I

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Macroeconomic Accounts

- Provide a **quantitative** description of the economy
- Integrated and consistent system that describes the essential macroeconomic phenomena
- National accounts play a central role in macroeconomics
- Distinction between description and analysis

Early History of National Accounts

- Political arithmetics, 17th century (W. Petty, G. King)
- Tableau Economique, 18th century (Quesnay, 1759)
- Work on statistical measurement, 19th century
- Economics, early 20th century
 - Increasing amount of research on national income and wealth (but no commonly agreed concepts)
 - Irving Fisher (The Nature of Capital and Income, 1906)

History of Modern National Accounts

- In 1920s, economics had no common concepts. There was statistical material, but no consistent way of perceiving the macroeconomy
- In the 1930s and 40s, concepts and theory were developed by Clark, Kuznets
- In his book “National Income and Outlay”, in 1937, Colin Clark combined
 - Macroeconomic concepts of production, revenue, private consumption expenditure, public sector revenue and public consumption, capital formation, saving, foreign trade and current account
 - Quantitative estimates for the concepts
 - But did not put results in the form of an accounting system

- Keynes was commissioned to find out “How to pay for the war”
- The statistics were based on Clark's updated figures
- Keynes' basic identity in the study

$$GDP(fp) = C + I + \textit{disbursements on warfare}$$

- The study was completed in 1941. Keynes had two “over-actuaries”: James Meade (Nobel 1969) and Richard Stone (Nobel 1984)

- System of National Accounts: Stone (UK), van Cleeff (Netherlands)
- Background: input-output analysis (Leontief), econometric models describing the whole economy (Jan Tinbergen, Ragnar Frisch and Odd Aukrust) and general theory by Keynes.
- International standardization work:
 - First Handbook (UN 1947) and in particular its Annex (Richard Stone)
 - First Standardized Recommendation (OECD 1953)
 - First UN Recommendation (1953)

The System of National Accounts (SNA)

- Framework that describes the essential phenomena which constitute economic behaviour: production, consumption, accumulation and the associated concepts of income and wealth
- The system is integrated and consistent
 - The same concepts, definitions and classifications are applied to all accounts and subaccounts
 - Each economic flow or stock level appearing in the SNA is measured identically for the parties involved

See <https://unstats.un.org/unsd/nationalaccount/docs/sna2008.pdf>

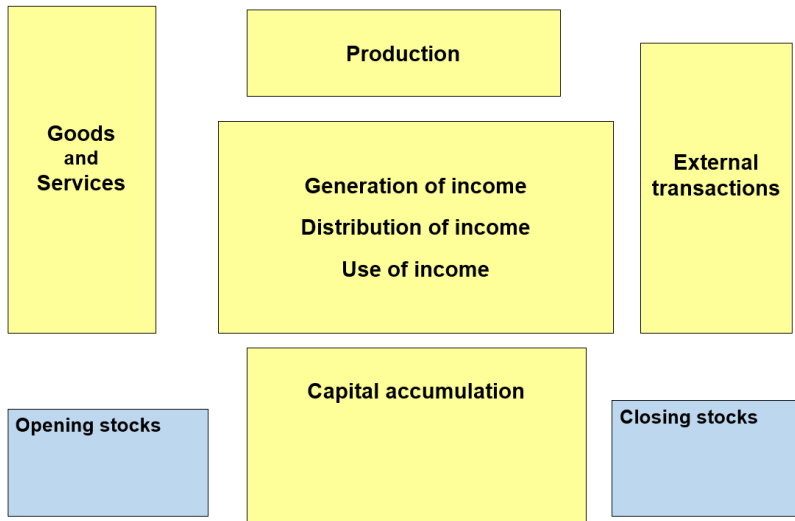
What are National Accounts?

- National accounts record *activities* (consumption, production, accumulation of assets) carried out by *units* operating in the national economy.
- Institutional units
 - Sectors: non-financial corporations; financial corporations; government units, including social security funds; NPIs serving households (NPISHs); households
 - Industries (main): primary production, manufacturing, construction and services
- Institutional units are decision makers in the national economy. They can carry out transactions with other entities with full rights.
- Transactions: Inter-service interaction or, in some cases, intra-service activities.
- National accounts: Can be compiled for institutional units, institutional sectors and the national economy as a whole

Properties of National Accounts

- National accounts are based on the principle of double entry, as in business accounting: Each transaction must be recorded twice, once as a resource (or a change in liabilities) and once as a use (or a change in assets).
- Prices
 - Basic price = the price the producer receives for the product (perushinta)
 - Buyer price = the price paid by the buyer (ostajanhinta/markkinahinta)
 - At the level of the whole economy: Supply at basic price + taxes on products - minus subsidies on products = supply at purchasers' price
- Taxes on products are taxes that are paid per unit of goods or services exchanged (e.g. VAT). Product subsidies are similar subsidies.
- The accounts can be divided into two main classes: a. The integrated economic accounts; and b. The other parts of the accounting structure

Integrated Economic Accounts



Gross Domestic Product (GDP)

- GDP is a measure of productive activity defined for a particular *geographic* area over a *time* interval, usually a year or a quarter
- It is a *flow* variable (vs. *stock* variables which are defined at a particular point in time)

Three definitions of GDP

- 1 The sum of final sales within a geographical location during a period of time
- 2 The sum of value added – " –
- 3 The sum of incomes earned – " –

Recording flows

Consider three units, A, B and C, each of which makes payments of the same type to the other two; they might be three shopkeepers, for example, who sell different types of goods. Suppose A buys 2 from B and 3 from C; B buys 6 from A and 1 from C; C buys 4 from each of A and B

	A	B	C	Total purchases
A		2	3	5
B	6		1	7
C	4	4		8
Total sales	10	6	4	20

Source: SNA 2008

Nominal GDP

$$\text{Nominal GDP} = P^a Q^a + P^o Q^o$$

- Increases in *nominal* GDP can result from either higher prices or more output
- Increases in *real* GDP correspond to increases in physical output. Real GDP is computed by using prices observed in some agreed base year.0

$$\text{Real GDP} = P_0^a Q_t^a + P_0^o Q_t^o$$

- In the current system of national accounts the base year is redefined *every* year, rendering real GDP effectively a *chain linked index*. More accurate picture of the development of the economy, especially if relative prices change quickly

On chain-linked volumes

- Previously, prices were frozen to a base year (2005, 2010, etc.) and the volume figures were extrapolated from the base year structure (e.g. 2005 structure for 2012 volumes)
 - In the real world often not even the same products sold anymore in the markets
 - When rebasing (2005 -> 2010) the volume growth rates throughout the series changed substantially
 - Economic history rewritten every 5 years

		2005	2006	2007	2008	2009	2010	2011	2012
Haircuts	Prices (P1)	12	14	16	18	20	23	24	26
	Quantities (Q1)	100	101	102	103	104	105	106	107
Computers	Prices (P2)	2000	1800	1600	1400	1200	1000	800	600
	Quantities (Q2)	1	2	3	4	5	6	7	8
Haircuts+Computers	Constant prices 2005	3200	5212	7224	9236	11248	13260	15272	17284
	% change		63%	39%	28%	22%	18%	15%	13%
	Constant prices 2010	3300	4323	5346	6369	7392	8415	9438	10461
	% change		31%	24%	19%	16%	14%	12%	11%

On chain-linked volumes

		2005	2006	2007	2008	2009	2010	2011	2012
Haircuts	Prices (P1)	12	14	16	18	20	23	24	26
	Quantities (Q1)	100	101	102	103	104	105	106	107
Computers	Prices (P2)	2000	1800	1600	1400	1200	1000	800	600
	Quantities (Q2)	1	2	3	4	5	6	7	8

		2005	2006	2007	2008	2009	2010	2011	2012
Haircuts+Computers	Current prices (P _i *Q _i)	3200	5014	6432	7454	8080	8415	8144	7582
	Previous year prices		5212	6828	8048	8872	9300	9438	8968

$$\text{-Previous Year Price vol (PYP)} = (P1_{t-1} \times Q1_t) + (P2_{t-1} \times Q2_t)$$

- The chain-linked volume series only contains the growth rate information
- The series are scaled to some level (reference year) (e.g. index 2005=100) but only 2005 and 2006 refer to real world euros

Real and nominal GDP in the Euro Area, 2005-2015

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

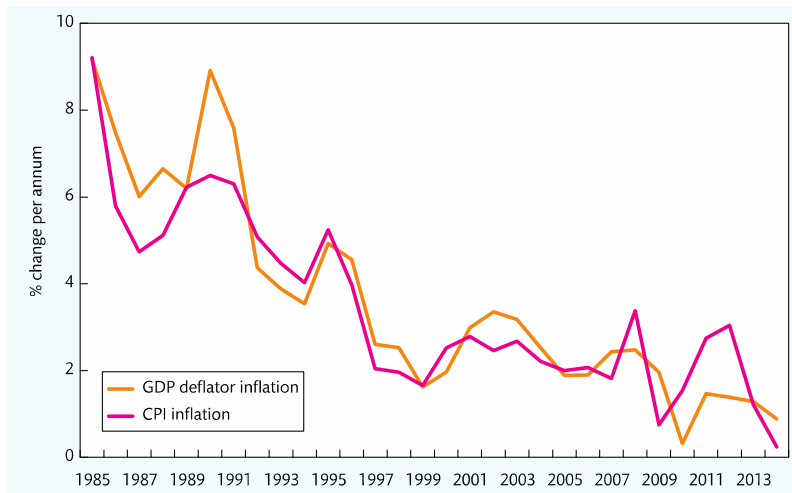
- The GDP deflator

Price level: $\text{GDP deflator} = \text{nominal GDP} / \text{real GDP}$

Inflation: $\text{GDP deflator inflation} = \text{nominal GDP growth} - \text{real GDP growth}$

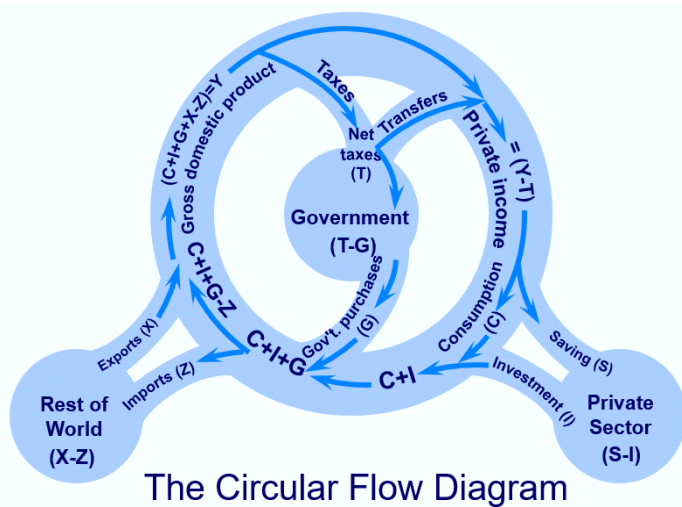
- An alternative measure of inflation is based on an average of prices with fixed weights, called a price index
 - In the euro area, consumer price inflation is measured by the Harmonised Index of Consumer Prices (HICP). The term “harmonised” denotes the fact that all the countries in the European Union follow the same methodology.

Two measures of inflation, Italy 1985-2014



Flows of Incomes and Expenditures

The Circular Flow Diagram



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Summary of the Circular Flow Diagram

- As final sales, GDP, Y , is broken down into four main categories
 - final sales of consumption goods and services C
 - final sales of investment goods and changes in inventory stocks I
 - final sales to the government G
 - final sales to the rest of the world X
 - imports, Z , have to be subtracted

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

- GDP can also be viewed as net incomes earned by the owners of production factors. These owners use the incomes in three ways
 - they pay taxes (net of transfers) T
 - they save S
 - they consume C

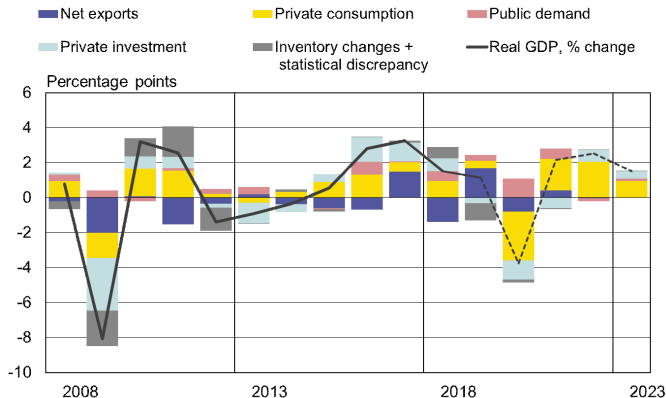
$$Y = C + S + T$$

Components of GDP by Expenditure

(1999-2015, % of GDP)

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

GDP growth and contribution of its demand components



The GDP growth contribution of each demand component has been calculated on the basis of its volume growth and its value share in the previous year. The figures for 2020–2023 are forecasts.

Sources: Statistics Finland and Bank of Finland.

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The system of production in the SNA

Three definitions of GDP

Supply = demand

$$O + Z = IC + C + G + I + X$$

GDP through 'net' output / value added or through 'net demand' / final sales

$$GDP = Y = O - IC = C + G + I + X - Z$$

GDP = W + R: compensation for labour (L) and capital (K), i.e. sum of incomes

$$GDP = Y = O - IC = W + R$$

O = gross output

IC = intermediate uses / intermediate inputs

Z = imports

X = exports

C = private final consumption

G = general government final consumption

I = gross capital formation

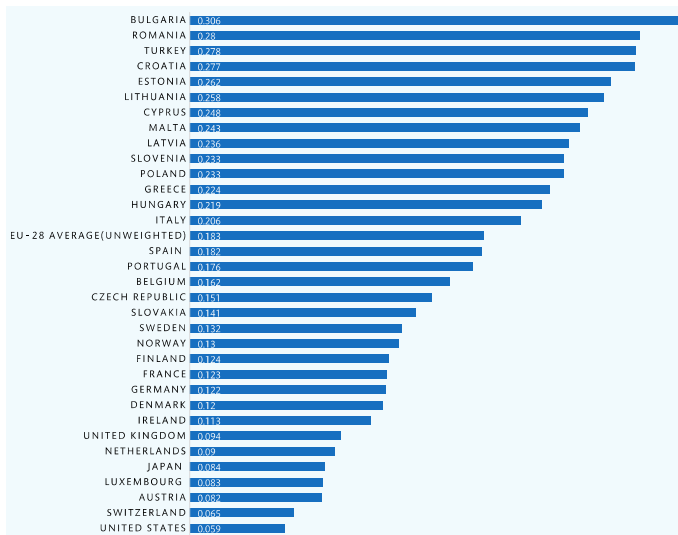
W = labour compensation

R = operating surplus (or mixed inc.)

Measuring GDP in practice

- GDP is measured by statistical authorities (for Finland, see https://www.stat.fi/tup/statfin/index_en.html) using different sources, e.g. tax authorities' data
 - Firms report sales (1st definition)
 - Individuals report incomes (3rd definition)
 - Intermediate and final sellers report value added when they pay VAT (2nd definition)
- Challenges
 - All incomes are not reported
 - A large number of transactions are not recorded
 - Collecting the data is time consuming \implies lags in getting accurate numbers (flash estimates)

Estimates of the Size of the Underground Economy, as a share of 2015 GDP

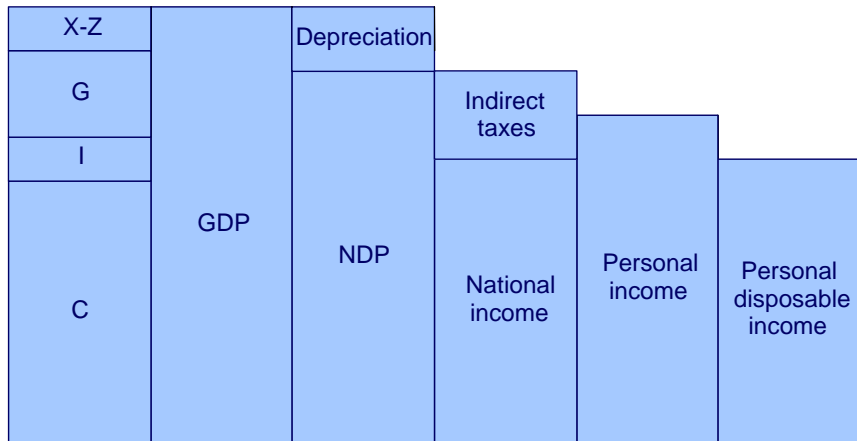


GDP and Household Income

A large share of GDP does not reach individual households

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

From Expenditure to Income to Personal Disposable Income



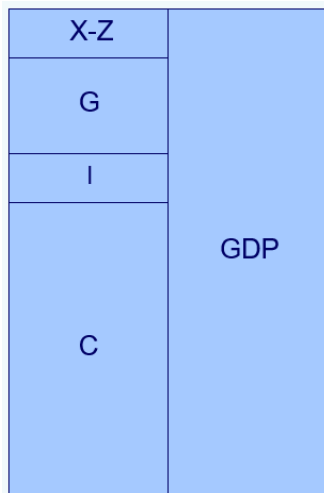
From Expenditure to Income to Personal Disposable Income

Begin by adding up (i.e. aggregating) all expenditures on final goods and services produced domestically



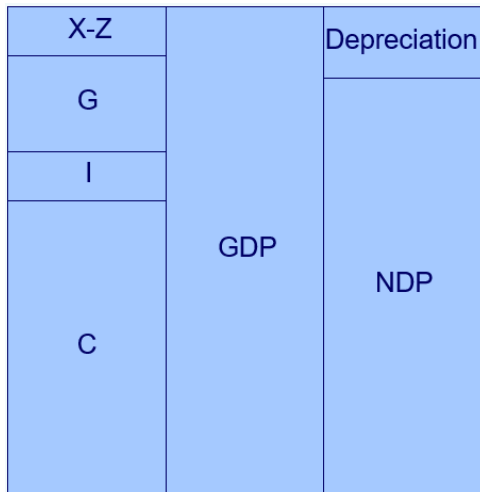
From Expenditure to Income to Personal Disposable Income

This sum is defined as the gross domestic product, GDP (1st definition)



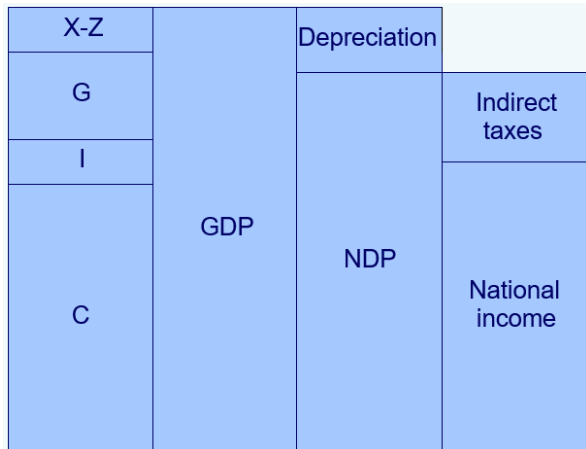
From Expenditure to Income to Personal Disposable Income

Deduct depreciation to obtain **net** domestic product



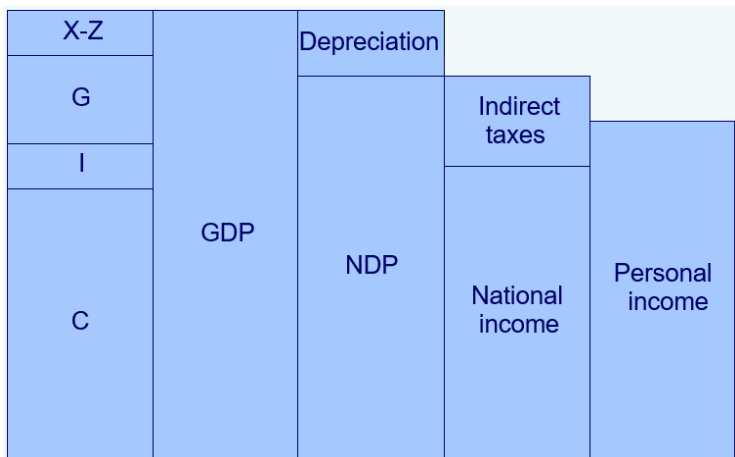
From Expenditure to Income to Personal Disposable Income

National income is what is distributed to the factors of production after indirect taxes (and subsidies)



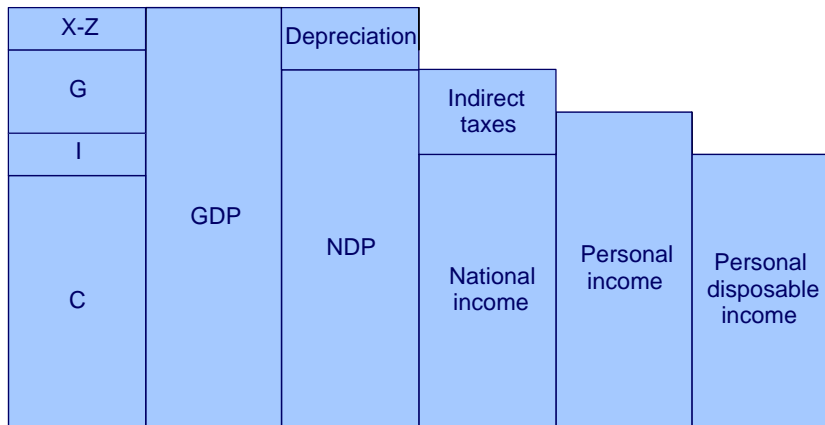
From Expenditure to Income to Personal Disposable Income

Personal income = national income - retained earnings by firms, corporate taxes, social insurance contributions



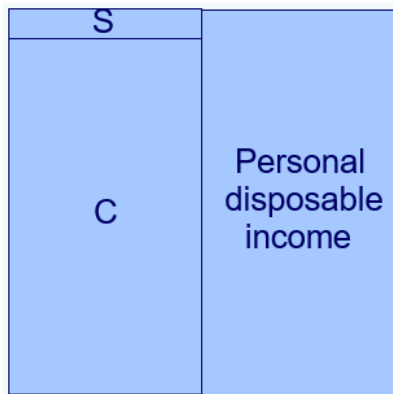
From Expenditure to Income to Personal Disposable Income

Personal disposable income = personal income - personal taxes plus transfers



Use of personal disposable income

Personal disposable income can be either consumed or saved



A Key Accounting Identity

- Combining definitions 1 and 3 of GDP (from slide 18) yields

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

- Rearranging gives

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

- Each of these three net flows: private sector's net saving, public sector's net saving and net exports, can be thought of as a form of saving or withdrawal from the circular flow

The Accounting Identity in 2010

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

Source: Burda & Wyplosz / OECD

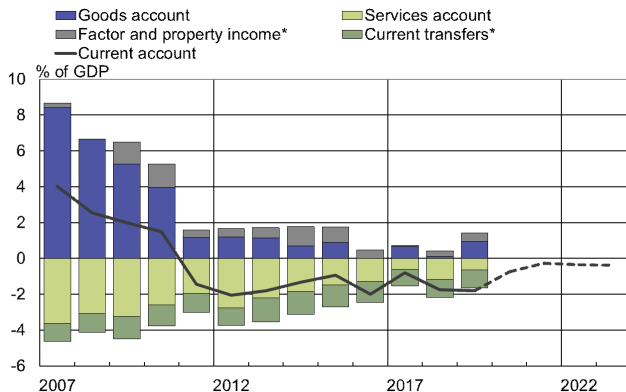
Obs. $(X - Z) \neq CA$, we haven't taken into account international income and transfers yet

The Balance of Payments

The balance of payments accounts record all economic transactions between a geographical entity and the rest of the world

- I. Current Account
 - a. Goods and Services
 - 1. Goods
 - 2. Services
 - b. International Income Account
 - 1. Primary Income
 - 2. Secondary Income
- II. Capital Account
- III. Financial Account
 - 1. Direct Investment
 - 2. Portfolio Investment
 - 3. Other Investment
 - 4. Reserve Assets
- IV. Errors and Omissions

The Current Account



*Balance between Finland and other countries (net).

Source: Statistics Finland.

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Net Borrowing or Lending

- Rewrite the national income decomposition $Y = C + G + I + X - Z$ in terms of **net exports**

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

where $A = (C + I + G)$ is "absorption" or total **domestic** spending on goods and services by domestic and foreign households, firms and government agencies

- Net lending is defined as the sum of the balance on goods and services ($X - Z$) and the **income account balance** (IAB). It follows that (ignoring the capital account)

$$\text{Net lending} = CA = X - Z + IAB = Y + IAB - A = Y^D - A$$

where $Y^D = Y + IAB$ is the Gross National Disposable Income

- Net lending is the excess of income Y^D over spending A and thus indicates whether the country is a net borrower or a net lender

Summing up the different definitions of income

- The Gross Domestic Product (GDP) refers to incomes earned within the country's borders, whereas the Gross National Income (GNI) concerns earnings by domestic residents (irrespective of where the income has been earned)

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

- The Gross National Disposable Income is in turn

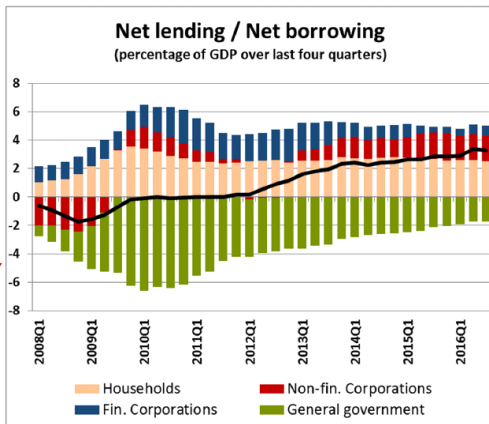
$$GNDI = GNI + \text{secondary income account balance}$$

- Thus, to the extended definition of income, GNDI, relative to GDP, corresponds the extended definition of trade as we move from the balance on goods and services to the current account balance

$$\begin{aligned}GDP &= Y = (X - Z) + A \\GNDI &= Y^D = CA + A\end{aligned}$$

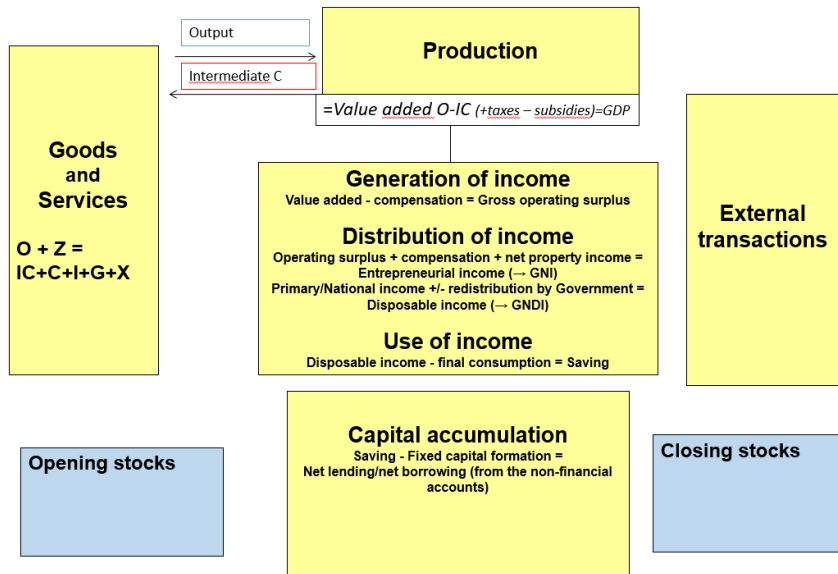
Net Lending in the Euro Area

Net lending (-):
savings <
non-financial
investment

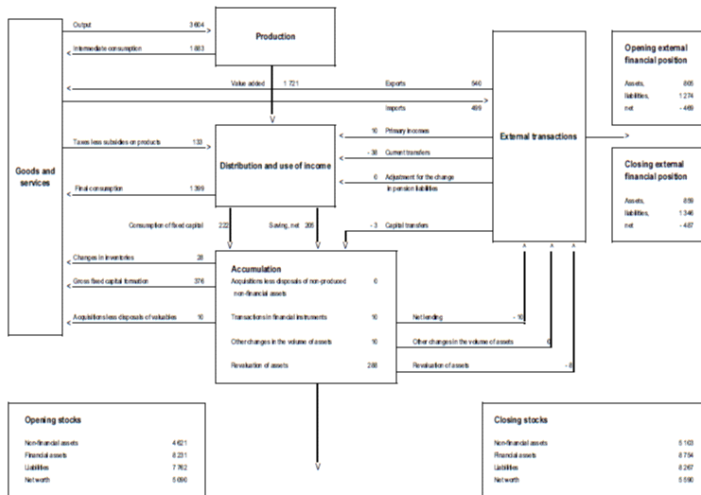


Net lending (+):
savings >
non-financial
investment

Integrated Economic Accounts



Integrated Economic Accounts



Source: SNA 2008 Handbook, see also p. 326-327 for a very useful summary of the current accounts