Economic Pictures, the Tools for a Macroeconomic Analysis

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Abstract

Positioning the national economy in comparison to the rest of the world is possible due to the overall economic picture, and through the input-output table it is possible to achieve, among other things, the analysis of the interdependence between the activity branches of the economy. This paper presents the typical elements of the overall economic picture, respectively of the input-output picture, the useful tools for a macroeconomic analysis, including the efficiency of the use of the production factors and their participation in obtaining the results of the economic activity.

Key words: economic picture, input-output table, macroeconomic analysis
J.E.L. classification: M41, O11

1. Introduction

The System of National Accounts contains, in addition to accounts, a series of pictures, which are the main databases used in economic analysis and in the elaboration of national macroeconomic policies.

The objective of this paper is to identify the possibilities through which the overall economic picture and the input-output picture can contribute to the macroeconomic analysis down at the level of the institutional sectors, respectively the branches of activity in the economy.

In order to achieve this general objective, we considered the opportunity of the following approach:

- presentation of the coordinates of the overall economic picture concerning aspects such as utility, structure, registered operations, restrictions for the data recorded in the table, the functions of the account of goods and services created within the table, the sequence of financial and non-financial accounts
- outlining a panoply image of the input-output table that performs the synthesis of operations with goods and services and contributes to the analysis of production processes, distribution and use of the final products, but also for macroeconomic forecasting. This image is constructed by presenting the contents of the five tables that make up the array of inputs - outputs, respectively: the table of intermediate inputs; the table of production and operating accounts of the branches; the transition table from actual production to distributed production; the table of resources by products; the end-use table.

2. Theoretical background

The overall economic picture and the input-output picture together with the macroeconomic accounts constitute a coherent whole, being the synthetic components of the National Accounts System. The two pictures are important tools for macroeconomic analysis and forecasting, the point of reference is a differentiation between the pictures. If the overall economic picture provides data from the national economy as a whole to the level of institutional sectors, the input-output picture is useful for a macroeconomic analysis up to the level of the industry as homogeneous components of the economy.

If the table of inflows and outflows reflects in detail the operations with goods and services and the operations of primary distribution of income, from production and operating accounts for the branches, the overall economic picture shows all economic operations carried out in the economy at the sector level, being essentially a review of the flow of all national accounts.

The input-output table and the overall economic picture through systematization and centralization of data, has an important role in developing national accounts at the level of branches of activity, at the level of the institutional sectors to the national economy, being the source of data for calculating the Gross Domestic Product. The pictures can also be drawn up at the prices of the previous year together with the final estimate of the national accounts.

The information in the two pictures presented on the one hand by the institutional sectors in the sector accounts and on the other hand by branches of activity can be linked and combined in a cross-classification picture ,,containing a series of common indicators: intermediate consumption, gross added value, employee remuneration, other taxes without subsidies on production, consumption of fixed capital, net operating surplus/net mixed income, production, the formation of the gross fixed capital, the stock of the fixed assets and the labor force indicators" (https://www.infofisc.ro).

3. Research methodology

The present scientific approach falls into the category of the descriptive theoretical research, which is the precursor for the use of the statistical-mathematical tools in performing macroeconomic analyses, designed to emphasize the importance of production factors in the economic growth reflected down to the branch level.

The specialized literature we used in this qualitative scientific approach targets strongly intertwined knowledge segments such as national accounting, statistics, macroeconomics, and the procedures used were the reasoning that required the chain of value judgments regarding the synthesis of the identified data in the literature or the specialized studies, in the regulations at a national, community and international level, the analysis of INSSE publications, their synthesis in order to expose the contribution of the economic picture to the macroeconomic analysis.

Among the four vital elements of a modern scientific research in economics (https://amfiteatrueconomic.ro/), we used concepts and variables that synthetically characterize the investigated economic reality - the national economy, respectively the overall economic picture, the input-output picture, which provides the necessary information supports for the analysis of the economic activity in terms of efficient use of production factors, the contribution of each segment of activity to the development of the national economy; the research being of a descriptive, exploratory narrative type, with critical-evaluative insertions.

4. Findings

4.1.The overall economic picture, the synthesis of the flows in the economy

With the help of the overall economic picture, it is possible to describe in a synthetic way, the achievement of the annual economic balance within the economy. The picture is drawn up at the level of the institutional sectors and the national economy.

The overall economic table is essentially a recapitulation of the flow accounts of the national accounts, constituting the synthesis of economic activities within one year.

The picture has a similar structure to the table of the double-entry financial transactions. The institutional sectors are highlighted on the columns and the operations carried out in the economy are recorded on the lines. So the picture presents two categories of columns, representing on the one hand, the uses (on the left of the picture) and on the other, the resources (on the right of the picture), which are part of an institutional sector, and the lines of the overall economic picture correspond to the accounting balance.

The operations recorded on the lines correspond to the order of the accounts in the complete sequence for each institutional sector composed of: operations in the accounts of production, operation, income, use of income, capital and financial accounts.

The picture induces from the the sector accounts, the related equilibrium relations, uses = resources, or net receivables flows = net debt flows (for financial accounts), so that each line remains balanced.

As each resource of an institutional sector is also a use for another institutional sector, distribution and financial operations are balanced line by line.

In terms of operations with goods and services, the overall balance between the amount of resources and that of uses is achieved.

The data recorded in the picture must comply with three important restrictions (Ramanauskas *et al*, 2018, p.8):

- a vertical restraint, which requires each sector to be in balance, which means that the part of the sector's expense that exceeds its income must be financed by reducing net financial assets.

- an horizontal restriction requiring the data from the sector to be added to the total economy (for example: the disposable national income is equal to the sum of disposable income in all institutional sectors).

- a restriction related to the coherence of the stock flow which implies that the opening and the closing of the balance sheets (balance sheet accounts) must be linked to the transactions recorded in the accumulation accounts.

In order to strike a balance on transactions with goods and services, a goods and services account was created within the picture, the structure of which was positioned separately on a use column and the other on a resource column. The goods and services account works as a "mirror" account with the following functions:

- To record intermediate consumption related to the production of banking services. The production of banking services is mainly related to the activity of financial intermediation being given by the financial income obtained, consisting mainly of interest and dividends, from which there is a deduction of the interest paid on deposits received and loans contracted. As it will be seen in the input-output picture, this type of production cannot be quantitatively affected by other institutional sectors (or other branches of activity in the input-output picture), which is why, by artifice, it is considered that this production is fully distributed to a fictitious sector (being an intermediate consumption for the fictitious sector). The production of the fictitious sector being considered zero, determines a negative added value equal in absolute value with the production of the banking services;

- To reflect taxes on production and imports. Purchases of goods and services of an institutional sector are recorded for uses in the form of final consumption (especially for the household sector) without being individualized, at the purchase price which also includes taxes on products (eg VAT, customs duties). Those taxes are recorded separately in the resources part of the picture for the institutional sector of public administration. So, through the "mirror" type account, the balance of operations with goods and services is thus achieved, by recording the same amounts both in terms of uses and resources of the picture;

- Identification of operations of goods and services dispersed in different accounts;

- The achievement in general of the balance afferent to each line, from the composition of the picture, being an imposed balance, for accounting reasons, or of symmetry (Ionascu, 1995, p.68). The balance through the account is also achieved globally in the economy, respecting the condition: Uses = Resources.

- The operation of the goods and services account as a "mirror" account means that any operation recorded in the uses of the account of an institutional sector is recorded with the same value in the resources section in the goods and services column of the picture. Conversely, if the operation is recorded as a resource on behalf of the institutional sector, we have the same value, on the same line on the uses side, in the column of goods and services. - In the table, the balances, or macroeconomic indicators of results (gross value added, gross operating surplus, gross disposable income, gross economy), related to the sectors for each line are in balance, because the flow accounts of the sectors are built in cascade (for which the accounting balance recorded in the uses of one account is identical to the accounting balance recorded in the resources of the next account).

- The balance of the sequence of non-financial accounts, presented in the table, shows the financing capacity (with a plus), or the need for financing (with a minus) for each institutional sector as well as at the level of the national economy.

The financing capacity or the need for financing is conventionally recorded on the use side of the table, opposite to that of the rest of the world sector, recorded in resources.

The table also records the summary of operations, included in the financial account, which shows how to cover the financing capacity or the need for financing. In other words, economic actions carried out in the "real" sphere of the economy have consequences in the "financial" sphere (Fassler *et al*, 2012, p.6). The balance of the capital account and the balance of the financial account are balanced for all sectors and the rest of the world.

4.2. The inputs – outputs picture, synthesis of the operations with goods and services

The input-output table provides information on the structure of the domestic production during an accounting period, summarizing the operations with goods and services. Also, the data contained in the tables that form the architecture of the picture, allow in-depth analyses of the processes of production, distribution and use of final products, but also the performance of the macroeconomic forecast calculations. The analyses have an applicability both at the level of the national economy as a whole and at the level of its component elements.

The input-output picture is a synthesis component of the National Accounts System, which systematically describes the macroeconomic interdependencies (Anghelache *et al*, 2007, p.44). The interdependence is manifested by a cumulative approach to the relationships between branches of activity, which means that to achieve an additional unity of a product in one branch, it requires a higher cumulative production in all branches of the economy (Cornille *et al*, 2005, p.34[)].

The central element of the input-output picture is the branch of activity according to the CANE Rev 2 nomenclature of activities up to the two-digit level (divisions) and the classification of CPSA products at the three-digit level, the two classifications being absolutely consistent. The number of branches or their level of aggregation determines the size of the picture. The essential characteristic of the branches is the homogeneity, an aspect followed also in the case of the aggregation of the branches regardless of their level. Several aggregation criteria can be used:

- the criterion of equivalence of raw materials consumed;
- the criterion of equivalence of the technological processes used;
- the criterion of similarity of the products obtained;
- the criterion of the common destination of the manufactured products.

A homogeneous branch comprises a grouping of economic entities producing goods and services described in the same classification.

The input-output picture has the structure of a double-input picture, in the form of a matrix by industry and product, with rows and columns, highlighting the volume of inputs and outputs, corresponding to flows of material goods and services between the branches of the national economy. The columns show the elements of the production and operation accounts of the branches, thus providing information on the structure of the production costs and revenues obtained from the production process. The lines of the table highlight the balance between the resources and uses of each product, including the flows of goods and services abroad.

The input-output array consists of five tables articulated with each other:

- the table of intermediate inputs;
- the table of production and operating accounts of the branches;
- the transition table from actual production to the distributed production;
- the table of resources by products;
- the table of end-use.

The table of intermediate inputs reflects the activity of each branch viewed in two respects, both as a supplier's and a consumer's branch in relation to the other branches contained in the table. So the table has the ability to highlight the interdependence relationships between branches seen as producing entities (Anghelache *et al*, 2013, p.441).

Each column of the table refers to a specific branch of activity (according to CANE Rev 2) and contains the values of intermediate consumption or inputs for each product or service delivered (according to CPSA) by a specific branch of activity, including the product or service performed by that branch to which the column refers to.

This is the case of the production made and consumed within the branch, whose value is arranged on the diagonal of the table. So the index column indicates the combination of inputs required by each branch to achieve its production (Szabó, 2015, p.45). Intermediate consumption is the goods and services used in the production process of the various branches, being valued at the purchase price excluding VAT.

Each line of the table refers to a specific product or service and contains the output values provided to the other branches. It is also an intermediate consumption, but related to a product or service delivered in different

The interdependence of the activity branches is highlighted in the table by the dependence of the production value of one branch on the size of the production values of the other branches. This aspect is materialized by analyzing the correlations between the value of the output of a branch (table line) and the value of inputs in the branch of activity (column of the table, containing the value of products and services delivered by other branches of activity).

The table also includes the trade branch whose entry on the column is represented by the values of the intermediate consumption represented by the goods and services used in the trading activity. So the intermediate consumption of the trade branch does not include the value of the goods sold, but only the consumption generated by the sale of goods such as: expenses for packaging, transport of goods, rents for commercial space, water consumption, expenses for advertising services, etc. The outputs of the trade branch, represented by the services delivered to the other branches are zero, as a result the line corresponding to the trade service is empty. This is because the trade does not perform an identifiable service, creating only gross margins, equivalent to the difference between the selling price and the purchase cost of the goods.

The table contains a fictitious branch corresponding to the banking activity whose entry is given only by the intermediate consumption delivered by the financial services without the insurance services (financial intermediation services), no other transaction being registered. The branch of the fictitious unit appears in the table due to the fact that the production imported by the banking activity cannot be imputed to the users.

The table of production accounts and exploiting the branches reflects the structure of the production costs of each branch of activity, being in fact a continuation of the columns in the table of intermediate inputs, being articulated by it by taking over the intermediate consumption of each branch. The intermediate consumption of a branch is obtained by summing up all the inputs of goods and services, necessary for that branch to obtain the production of the exercise.

The table contains all the flows recorded in the production and exploiting accounts of the branches. The part of the table corresponding to the production flows, shows the transition from the intermediate consumption of goods and services to the actual production of the branches, through the gross added value.

The gross value added is recorded at a basic price due to the fact that the concept of value added at factor cost is not used in national accounts. The value added at basic price is given by the difference between production at basic price and intermediate consumption at purchase price excluding the VAT. The basic price of the production of goods and services considered as outputs is a price set by the producer from which any tax paid and the costs of transport are deducted (which are taken into consideration separately by the producer), to which grants are added.

On the column corresponding to the fictitious branch, related to the banking activity, the value of the actual production is zero, as a result, the gross added value is considered equal and of opposite sign with the intermediate consumption of the branch.

The part of the table corresponding to the values of the flows of the operating accounts of the branches reflects the distribution operations, the gross value added and the operating subsidies, between the direct participants in obtaining the production, composed of: the economic agent recovering the gross operating surplus and the mixed gross income, employees with wages and the state with taxes related to production and imports exclusively VAT.

The transition table from the actual production to the distributed production is drawn up based on the finding of the existence of a large number of economic entities, which in addition to the basic production, which includes them in the branch profile, produce two or more types of non-profit products. correspond to that branch.

In order for the interdependence relationships established between the branches to be really characterized, the aim is to obtain pure branches containing enterprises with homogeneous production. For this purpose, the extra-profile productions are removed, with a lower specific gravity than the basic production, and then they are transferred in the production of the branches that correspond to the profile (Anghelache *et al*, 2019, p.418).

The line in the table for each branch contains the value of the net transfers received from the other branches with the plus sign, and with minus the value of the net transfers submitted to the other branches. When discussing the economy in genral the of transfers related to all branches is zero.

The table of resources by products contains on each line the resources of goods and services from the production distributed by origin, and on the column the breakdown of resources, distinguishing between domestic production and imports.

The end-use table shows for each line of goods and services, distinct in each column, their various uses (excluding outputs of intermediate consumption, broken down by the industry, which is part of the table of the intermediate inputs):

- The final consumption is a possible use only for the household sector and for the public and private administrations, valued at purchase prices including VAT. The purchase price for domestic products is composed of the production price, VAT and related trade margins, and for imported products the price is composed of the CIF (cost insurance and freight) price, customs duties, trade margins and VAT. The CIF price consists of the value of the goods at the exporter's frontier with the insurance and international transport costs, so that these goods pass from the exporter's border to the importer's border;

- the gross fixed capital formation, consists of investments made to obtain new fixed assets or to modernize existing ones, being valued at the purchase price excluding VAT or at the cost of production for those manufactured in-house. It should be noted that at the level of institutional sectors, gross fixed capital formation also includes the purchase or sale of existing fixed assets;

- change in inventories, valued at the acquisition cost, excluding VAT;

- exports, are valued under the condition of the FOB (free on board), excluding VAT. The FOB price represents the value of the goods at the national border plus the transport and the insurance costs up to the national border. The VAT that is levied on the exported goods is subsequently reimbursed to the exporters.

In order to be integrated into the end-use table all uses must be able to be broken down by product according to classification.

In order to ensure the coherence of the values entered in the input-output table, it is necessary to verify some fundamental equality. Thus at the level of the table of intermediate entries we have the equality:

$$\text{Sum of total inputs for each branch} = \text{Sum of total outputs for each product} \quad (1)$$

Both terms of the equation (1) are identical to intermediate consumption in the economy.

For the table of production and operating accounts of the branches we have the equalities:

$$\text{Intermediate consumption of the branch} = \text{Actual production per branch} - \text{Gross value added of the branch} \quad (2)$$

and also for each branch:

$$\text{Gross value added} = \text{Remuneration of employees} + \text{Other taxes on production} - \text{Other subsidies on production} + \text{Gross operating surplus (Gross mixed income)} \quad (3)$$

Other taxes on production are taxes that companies pay as producers regardless of the value or quantity of goods or services produced or sold.

Other subsidies on production are the funds that companies receive depending on their production activity.

At the level of the product the resources table and the end-use table, the equality of each product line must be respected:

$$\text{Resources} = \text{Uses} \quad (4)$$

or:

Production (P) + Imports (I) = Intermediate consumption (IC) + Final consumption expenditure (CF) + Gross fixed capital formation (GFCF) + Change in stocks (LV) + Exports (E) (5)

The sum of the total inputs for each branch = The sum of the total outputs for each product (1)

Both terms of the equation (1) are identical to the intermediate consumption of the economy.

For the table of the production and operating accounts of the branches we have the equalities:

Intermediate consumption of the branch =
= Actual production per branch - Gross value added of the branch (2)

And also for each branch:

Gross value added = Remuneration of the employees + the other taxes on production –
- Other subsidies on production + Gross operating surplus (Gross mixed income) (3)

The other taxes on production are the taxes that the companies pay as producers regardless of the value or quantity of goods or services produced or sold.

Other subsidies on production are the funds that companies receive depending on their production activity.

At the level of the product resources table and the end-use table, the equality of each product line must be respected:

or:

Production (P) + Imports (I) = Intermediate consumption (IC) + The expense for the final consumption (CF) + The gross formation of the fix capital (GFFC) + The variation of the stocks (VS) + Exports (E) (5)

Imposing equality (4) makes it possible to identify gaps and inconsistencies which are affecting the basic data (Anghelache *et al*, 2010, p. 174).

Equality of resources and uses, for all goods and services, related to the branches of activity (according to the nomenclatures), must also be achieved globally for the national economy.

The above equality also implies equality between final demand and the cost of primary inputs (Baldwin *et al*, 2010, p.6). The final demand is obtained by subtracting intermediate inputs from the total use of goods, and (the cost of primary inputs by subtracting intermediate inputs from the total supply of goods.

Given that in the table resources - uses, resources are valued at the base price and uses at the purchase price, in order to achieve in terms of value the balance between resources and uses, one can either turn resources into purchase prices, or transform uses at basic prices.

As a result of these transformations two equalities are obtained:

- the resources at the purchase price = uses at purchase price;
- the resources at the basic price = uses at basic price.

In order to transfer resources to the market price, it is necessary to add columns in the product resource table to the product resource table for:

- adding taxes on products;
- eliminating subsidies on products;
- adding customs duties;
- reallocating commercial margins;
- reallocating transport margins;

Product taxes (PTs) are mandatory payments based on the quantity or value of goods or services produced or traded. (VAT and taxes on products excluding VAT)

Customs duties (CD), or the duties on imports, are the taxes levied by the state on the importation of goods according to the nomenclature of goods.

Subsidies on products (SP) are transfers that benefit the producers determined by the quantity or the value of the goods or services produced or imported and take the form of negative taxes deducted from other taxes.

The reallocation of trade and transport margins means their distribution on the products to which they relate. The total value of trade margins is composed of the value of the production of the trade branch and of the secondary trade margins of the other branches. This also applies to the transport margin. On the other hand, in the case of resources, the trade margin is applied to intermediate consumption, final consumption, gross capital formation and exports.

In order to avoid a double summation of the trade margin and to achieve the balance between resources and uses, in the table of resources by products, on the line corresponding to the trade branch at the intersection with the trade margin column, a value equal to the total trade margins reallocated with the algebraic sign minus. This artifice has the effect of eliminating from the table the production provided individually by the commercial services in the total resources, the commercial margins are already included by reallocation on the value of the resources of goods and services.

The table of resources by products reallocates those transport margins, which can be allocated to products and the transport costs are highlighted (explicitly invoiced) or paid separately for products purchased by the buyer (otherwise the cost of transport is included in the basic price of production), finally included in the value of the products at the purchase price. For the same reasons as for the trade margins, on the line corresponding to the transport branch next to the column of the transport margins, the amount of reallocations related to the other branches is deducted in order to avoid double summation.

In the economy as a whole, the amount of trade and transport margins is zero because they are offset by the production of trade and transport. Equality between resources and uses throughout the economy in this situation can be written:

$$\text{P (Production)} + \text{I (Imports)} + \text{IP (Taxes on products)} - \text{SP (Subsidies on products)} + \text{CD (Custom duties)} = \text{IC (Intermediate consumption)} + \text{FC (Final consumption)} + \text{GFFC (Gross formation of the fix capital)} + \text{SV (Stocks variation)} + \text{E (Exports)} \quad (6)$$

or:

$$P - IC + IP - SP + CD = FC + GFFC + SV + E - I \quad (7)$$

But: $GAV = P - CI$

Where, GAV is the gross added value on the national economy as a whole, then:

$$GAV + IP - SP + CD = FC + GFFC + SV + E - I = GDP \quad (8)$$

Where, GDP is, gross domestic product

The equation (8) shows that the input-output table is useful for determining the gross domestic product of the economy (at market price) based on the equality of resources and uses. The equation demonstrates the equivalence of the production-based method (left side of the equation) with the cost-based method (right side of the equation).

From the table of production and operating accounts of the branches, the gross domestic product can be determined by the income method at the level of the economy:

GDP (Gross domestic product) = RS (Remuneration of employees) + GOS/VMB (Gross operating surplus/Gross mixed income) + OTP (Other taxes on production) - OSP (Other subsidies on production) + IP ((Taxes on products) – SP (Subsidies on products) + CD (Custom duties) (9)

Due to the fact that the gross operating surplus/gross mixed income is estimated residually from the data obtained by the first two methods and the income-based method does not directly ensure the balance of resources with uses, the most accurate estimate of GDP at market prices is based on the production-based method and the expenditure-based method.

In the table of product resources, the evaluation of imports is done at CIF price, with higher costs for transport and insurance services, leading to an overestimation of imports compared to imports from the accounts of institutional sectors valued in FOB prices.

In order to correlate the two evaluation methods and to ensure a balanced value between resources and uses, it is necessary to create two adjustment positions, one in the table of resources by product for imports and the other in the table of end uses for exports under the CIF - FOB corrections. The corrections are determined by the costs that are found in the CIF prices and that are not found in the FOB prices. The adjustment items shall contain values equivalent to the amount of transport and insurance provided by residents related to the distance from the exporter's border to the importer's border.

A separate activity is represented by the expenses of the household resident abroad for goods and services registered as import, as well as the goods and services consumed in the country by the non-resident household registered as an export. Those activities require additional adjustments to imports and exports of goods and services, under the name of territorial corrections, in order to balance resources with the uses on products.

5. Conclusions

The presentation of the information in the overall economic picture allows us to know the situation of the national economy in relation to the rest of the world, describing in a concise way the achievement of the annual balance within the economy. The balances of the overall economic picture are aggregates or synthetic indicators for all institutional resident sectors (most important: the gross domestic product, the national income, the capacity or the need to finance the economy) being the starting points for obtaining specific rates for some institutional sectors, but also for the economy as a whole.

An important advantage offered by the picture is on the one hand, that it immediately reflects which sectors have deficits, why they have them, from which sectors the excess expenditures are financed and through which financial instruments, and on the other hand by elaborating the chart that ensures the internal coherence of the macroeconomic analysis (Ramanauskas *et al*, 2018, p.9).

The input-output picture shows a detailed picture of how industries interact to provide inputs and use each other's output to produce the nation's GDP (Lawson *et al*, 2005, p.8). The information contained in the input-output picture underlies the analysis of the interdependence of relations between the branches of activity of the economy and allows a detailed and complete characterization of the structure of the national economy.

The input-output picture has the utility of obtaining macro economic models, providing them with a detailed mesoeconomic basis in terms of production, productivity, labor, capital formation structure, costs, final consumption, exports, imports, etc.

The input-output table provides important information that allows on the one hand the measurement and the economic analysis of the efficiency of using the economic potential, by calculating synthetic indicators that express the efficiency of the use of factors of production and on the other hand of quantifying the participation of these factors in the result of the economic activity.

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