THE INTER-BRANCH BALANCE OF LEANKAGES

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Abstract: This article analyzes the necessity of developing the Balance of Branch Linkages (BLR) model in the value expression. BLR has an increasing use in economic science and practice, providing thus advantages over other economic models of analysis and of prognosis.

Key words: modelling, ballance, systemic treatment, matrix, correlation, branch. *JEL Classification*: 011, 014, 025.

1. Introduction

The national economy represents a complex of economic branches and units, interlinked by the most diverse economic activities. The country's economy can be successful only if the rates of development between the branches and sub-branches are well established. The statistical balance of the national economy is to be characterized in material and value terms, as well as the extended reproduction of the labor force. The acknowledgement of the extended production forces is possible only through elaboration of a set of balances;

- the balance of production, consumption and accumulation;
- balance of production, distribution and utilization of Gross National Product;
- the balance of labor resources. Each of these balances is of immense importance in the economic development of the country.

In other words, the country's economic development is impossible without elaboration of these balances, which must underpin government decisions.

2. The need and advantages of developing the balance of inter-branch linkages

The proportions between branches of the economy can be determined with the help of the balance of inter-branch linkages under conditions of production diversification, of increasing specialization and cooperation in production, and through rapid changes in the structure of production. This problem can be solved exclusively by working out a balance of inter-branch linkages. The balance, being complex, covers the movement of the entire gross national product, divided on different economy branches, which provides the possibility to make a rich analysis, in particular: characterization of interdependence between economic branches and sub-branches; calculation of labor expenditures by branch; calculation of coefficients of direct and total material consumption; determination of scenarios of programs development etc.

The balance of inter-branch linkages is a way of contemplating economic problems and represents a method of analysis, based on modeling of economic processes, which allows to measure and evaluate the mutual effects of production activity, determining interdependences, apply mathematics, substantiate forecasts of economic development programs and analyze a large volume of information on the development of the economy.

An important point is that the balance of inter-branch linkages proposes methods, procedures, techniques and algorithms, thus being the methodology of economic analysis in a systemic view. Broadly speaking, systemic (cybernetic) treatment is a set consisting of: the economic process; the governing body; the information and data processing system. These elements are interconnected. The connection of the elements is realized through continuous information flows. The steering and regulating mechanism of the economic system ensures the optimal development of economic activities.

The balance model of inter-branch linkages; it is represented through a system of economic and mathematical relations as an adequate picture of the real process. As the component elements of the system are taken economic branches, where the movement of production is captured in two aspects: a production process (destination, delivery, dividing, distribution, etc.) of the product, and a process of value formation (process of supply, consumption, and resource utilization, etc.).

The inter-branch linkage balance model identifies the statistical indicators used to determine total, intermediate and final output, value added, value newly created, imports and exports, consumption and development funds. The relationships between the variables of the model are defined as the equations of the distribution by destination of the total output of the branches and as the equations of the structure of factor expenditure. In these relations, current consumption and stock flows are transformed in such a way that each flow is represented as the product of a constant value and a variable one.

The correlation of the indicators of the balance of inter-branch linkages with the system of indicators of the other balances of the national economy constitutes a method of checking the authenticity and veracity.

Due to the multiple and extremely vary possibilities of inter-branch linkage balance, the model positions further are developing into sub-models, describing the balance and development of vertical or territorial blocks of the production system (balance by branches and groups of branches, by territorial, dynamic, static balances, etc.) or different overall aspects of the system (foreign trade, production funds, labor force, price correlations, systematization of material balances in the form of the model in natural expression, the process of accumulation and formation of the development fund, etc.).

3. The balance model inter-branch linkage

In the proposed model, the output of each branch denoted by x_i (i = 1, 2, ..., n) is decomposed by destination elements: consumption for own production and other branches of material production, non-production consumption (individual, public, accumulation, reserves, export).

We denote by $_{xij}$ (j = 1, 2, ..., n) the part of the output of branch i, which is consumed productively in branch j; and Yi the part of the output of branch that is non-productively consumed. Then:

$$X_i = \sum_{i=1}^n x_{ii} + Y_i, i = 1, 2, ..., n.$$
(1)

The elements *X* denote inter-branch flows, where: y_i - final output. We analyze the inter-branch linkage balance model in the value expression (Table 1).

Consuming branches Producing branches	1	2	•••	j	•••	n	Final product	Global product
1 2 i n	X ₁₁ X ₂₁ X _{i1} X _{n1}	X ₁₂ X ₂₂ X _{i2} X _{n2}	···· ··· ···	X1j X2j Xij Xnj	···· ··· ···	X _{1n} X _{2n} X _{in} X _{nn}	$\begin{array}{c} Y_1\\ Y_2\\ \cdots\\ Y_i\\ \cdots\\ Y_n \end{array}$	$\begin{array}{c} X_1 \\ X_2 \\ \cdots \\ X_i \\ \cdots \\ X_n \end{array}$
Amortization Salary fund	a ₁ s ₁	a ₂ s ₂	 	aj Sj		an Sn		
Plusproduct Global product	p_1 X_1	p ₂ X ₂		p _j X _j		p_n X_n		

Table 1. The model of inter-branch balance linkage

If we add up the items in each row, from each column, we get: $\begin{array}{l} \sum_{j=1}^{n} \sum_{i=1}^{n} x_{ij} + \sum_{i=1}^{n} Y_i = \sum_{j=1}^{n} s_j + \sum_{j=1}^{n} p_j + \sum_{j=1}^{n} \sum_{i=1}^{n} x_{ij} \\ \sum_{i=1}^{n} Y_i = \sum_{j=1}^{n} s_j + \sum_{j=1}^{n} p_j. \end{array}$ (2) (3)

where: $\sum_{i=1}^{n} Y_i$ - non-productive consumption; $\sum_{j=1}^{n} s_j$ - the remuneration of productive sphere; $\sum_{j=1}^{b} p_j$ surplus product intended as remuneration for work in the non-productive sphere

If we note: $\frac{\mathbf{x}_{ij}}{\mathbf{x}_i} = \mathbf{a}_{ij}$; i, j = 1, 2, ..., n then: $\mathbf{x}_{ij} = \mathbf{a}_{ij} \cdot \mathbf{X}_{ij}$; i, j = 1, 2, ..., n, and the model of the balance of inter-branch linkages can be written as follows: $X_i = \sum_{j=1}^n a_{ij} \cdot X_j + Y_i$, i, j = 1, 2, j =..., *n*.

Or in matrix form as follows:

 $(I - A)X = Y \qquad (4)$

X = AX + Y

$$X = (I - A)^{-1}Y$$

The value of $(IA)^{-1}$ is the total expenditure matrix.

4. Conclusions

The static balance of inter-branch linkages describes the country's economic circuit over the entire year. In this case, the model does not reproduce the uninterrupted circuit of the extended reproduction of gross national product. The model lacks the link between two successive periods of economic time, which consists in the accumulation of assets to form the development fund in the first period and their transformation into new capacities, so this would ensure the planned growth of output. Therefore, for effective forecasting of the trajectory of output development, it is recommended to develop dynamic models.

The model of the balance of inter-branch linkages provides undeniable advantages over other models in economic calculations of analysis, forecasting, substantiation and balancing of economic development programs.

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