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Macrostructural Analysis of the Dynamics of the Two-Sector Economy

O.S. Sukharev[a], E.N. Voronchikhina[b]
[a] Institute of Economics, Russian Academy of Sciences, Moscow, Russia;
[b] Perm State National Research University, Perm, Russia

ABSTRACT

The article is devoted to an empirical demonstration of the application of macrostructural analysis of the dynamics of the Russian economy, represented by the capital goods and consumer goods sectors, including the intangible sphere. The **purpose** of the study is the formation of an algorithm for macrostructural analysis of the two-sector Russian economy with the identification of the main patterns and relationships of their joint dynamics — contribution to the overall growth rate, price dynamics, and the definition of a model for further development. The **methodology** consists of the theory of economic growth, structural analysis, empirical and regression methods for studying the relationships of relevant parameters. The main **result** of the study is the formation of an algorithm for macrostructural analysis and its application to the Russian economy at the specified time interval with the highlighting of the main characteristics of the structural dynamics represented by the capital goods and consumer goods sectors. The relationship between these sectors, mutual determination determines not only the current model of development in Russia, but provide opportunities for future economic growth, since the creation of investment and consumer products form the foundation of a growing economy. The study found that the predominance of the consumer goods sector in the Russian GDP structure not only determined the current dynamics, but also the potential for the growth rate of the capital goods sector, as well as the level of its efficiency, which affects the dynamics of prices in the sector. The growth rates of the sectors influenced each other, but the resulting structural change, in the form of a decrease in the share of the capital goods sector, was accompanied by both a reduction and an increase in overall inflation. And any impulse of acceleration of capital goods led to greater rise in sectoral prices than equivalent accelerations in the consumer goods sector. Thus, the proposed algorithm of macrostructural analysis allowed us to reveal the specifics of the structural dynamics of the Russian economy, revealing the determinants of non-monetary inflation. The perspective of the study is to assess the contribution of sectoral dynamics to a higher price level and the selection of policy instruments that affect the structure, ensuring both its growth and qualitative transformation in accordance with development goals.

Keywords: macrostructural analysis; capital goods; consumer goods; two-sector economy; the condition of economic growth; industrialization policy; inflation; the contribution of sectors to the GDP growth rate

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INTRODUCTION

The study of structural dynamics in modern economic literature has been given a lot of space, ranging from the structure of labour markets [1, 2], structural relations and industrial policy [3], structural changes and growth [4–10], changes in finances, investments, inflation and their impact on growth [11–16], with an assessment of the integration and diversification of economic activities [17, 18] and general aspects of macroeconomic influences or demographic changes, wealth structure, inequality, income, etc.[19–21].

At the same time, some studies rightly, in our opinion, note a very low level of incorporation of structural changes in the theory of economic growth [22] and more broadly in economic theory, despite the development of methods of structural analysis, including the macroeconomic aspect of its application [23–25].

Particularly noteworthy is the low degree of validity of the goals of economic growth and its structural modernization, which can accelerate or slow down growth, up to the provocation of the crisis. The best scenario when GDP growth occurs due to qualitative improvements in the economy, transformation of its structure, which creates new sources of growth. For the Russian economy, this formulation of the problem is relevant, since high losses in past years due to deindustrialisation, accompanied by GDP growth, need to be eliminated and increased opportunities for the development of industrial sectors — high-tech industries [26].

The solution of such a problem requires the use of macrostructural analysis of sectoral dynamics with the formulation of the conditions for economic growth and its industrialization. Only should industrialization be limited exclusively to the spread of "Industry 4.0" [27], which includes the introduction of digital and related information technologies? Or is there a need for a wider technological re-equipment of the manufacturing sectors, including the creation of new activities in the field of means of production? The speed of the industrial process in relation to the rate of GDP growth of the country [28] and changes in the economic structure is of fundamental importance.

If in the Soviet period the approach from the position of two sectors — means of production and consumer goods — was popular, and there were official statistics on them, then currently such accounting is not maintained in Russia. This structural breakdown is not made, a study the dynamics and coherence of the development of these sectors, and their contribution to overall economic growth.

This allows us to formulate the purpose of this study: filling the gap in the field of application of macrostructural analysis, its algorithm ideation with the study of structural dynamics within the framework of the model of the two-sector economy of Russia (means of production and consumer goods). The methodology is made up of structural analysis — empirical and model (regression analysis) methods, as well as the theory of structural changes. To achieve this goal, two tasks must be solved. First, to expand the methodology for macrostructural analysis of the two-sector economy, showing the algorithm for studying its dynamics. Secondly, to determine the conditions for the growth of industrial development within the framework of the two-sector model of the Russian economy, giving a description of the dynamics by basic indicators and structural parameters.

Let's consider the consistent solution of these tasks.

RESEARCH METHODOLOGY. MACROSTRUCTURAL ANALYSIS OF THE TWO-SECTOR ECONOMY

Macrostructural analysis is a method of studying structural changes at the macro level of the economy, causal relationships of direct and inverse action between elements,

sectors, industries with the identification of mutual dynamics. It is the direction of structural analysis, which is a powerful way to study economic changes in order to correct economic policy measures, determine the impact of individual elements of the economic system on its overall dynamics [23, 24, 26].

The content of macrostructural analysis is expressed in the "cost-output" method of V.V. Leontiev [23], theories of multi-level economy Yu.V. Yaryomenko [24], theories of technological ways S. Yu. Glazyeva [26], theories of economic restructuring and industrial development [29], structural models of economic growth, as well as in empirical [16] and index representation [25].

The central point in the implementation of structural analysis for the study of the economy at the macro level is the allocation of large aggregates — sectors, industries, interconnected and determining each other's development. In this study, the Russian economy is represented as an object of study by two large sectors — means of production (investment goods) and consumer goods (consumer goods) plus the intangible sphere, which together give the country's gross domestic product. This structure of the economy in the form of a dichotomy allows to analyze not only the contribution of these sectors to the rate of economic growth of Russia, to see the relationship between sectors, but also to highlight the conditions for the implementation of the industrialization strategy, supporting a positive rate of economic growth. In addition, the connection between price dynamics in sectors and the possibility of increasing gross value added in them is of interest. By analyzing the dynamics of the means of production sector, it is possible to get an idea of how industrialization and investment in the development of this sector affect the economic growth of the country and the consumer goods sector. The allocation of sectors will be carried out according to Rosstat ICTEA, which is reflected in *Tables 1, 2*. The time interval from 2011 to 2022 inclusive is taken for the study. Calculations were made in 2016 prices (unless otherwise specified).

After the sectors are allocated, the further algorithm of empirical and model macrostructural analysis includes the following steps.

Step 1. Calculation of the value of two sectors and share in Russia's GDP, assessment of investments in fixed assets, parameters of profitability and risk of economic activity, contribution of sectors to the economic growth rate of the country.

Step 2. Empirical assessment of economic growth conditions within the framework of two-sector dynamics according to the obtained theoretical ratios.

Step 3. Empirical assessment of the current model of economic development in the coordinates of "growth mode — industrialization model".

Step 4. Determining the mutual dynamics of sectors, as well as the dynamics of prices and gross value added in the sector of means of production and consumer goods.

Step 5. Obtaining relevant research conclusions with recommendations for the ongoing economic policy of growth and technological modernization in Russia, which requires the creation of new means of production.

To implement the given algorithm, the implementation of which is necessary to achieve the set goal and objectives of the study, we will introduce some formal relations describing the two-sector dynamics.

Let the value of gross domestic product Y consist of two product values created in sectors: means of production(Y_s) and consumer goods (Y_p), so $Y = Y_s + Y_p$. The full labour force in the economy $L = L_s + L_p$ equal to the sum of those employed in the sector of means of production and consumer goods, respectively. Let's mark the shares of each sector in the country's GDP: $n_s = Y_s / Y$, $n_p = Y_p / Y$, $z = n_s / n_p$, and the z parameter actually sets the structure of the economy that changes

Table 1

Types of Activities Included in the Capital Goods Sector

ICTEA	Designation ICTEA
Section B	Mining
C 19	Production of coke and petroleum products
C 24	Metallurgical production
C 26	Production of computers, electronic and optical products
C 27	Production of electrical equipment
C 28	Production of machinery and equipment not included in other groups
C 29	Production of motor vehicles, trailers and semi-trailers
C 30	Production of other vehicles and equipment
C 33	Repair and installation of machinery and equipment
Section D	Electricity, gas and steam supply; air conditioning
Section E	Water supply; water disposal, organisation of waste collection and disposal, pollution elimination activities
Section F	Construction

Source: Rosstat data. URL: https://rosstat.gov.ru/statistics/accounts (accessed on 12.04.2024).

over time. The growth rate of the sectors and the economy of Russia can be imagined as follows: $g_Y = (1 / Y)\, dY / dt$, $g_s = (1 / Y_s)\, dY_s / dt$, $g_p = (1 / Y_p)\, dY_p / dt$ [29].

Then it is not difficult to write down the condition of economic growth, taking into account the connection of sectors, by differentiating in time the value of the product represented by the sum of sectors $Y = Y_s + Y_p$. Taking into account the introduced designations, we will record the growth of gross product:

$$g_Y > 0 \text{ or } g_Y = g_s n_s + g_p n_p > 0 \qquad (1)$$

Hence, we get the structural condition for the economic growth of the economic system, consisting of two sectors:

$$g_s > -\frac{g_p}{z}. \qquad (2)$$

Expression (1) shows the contributions of each sector to the overall growth rate of the economy: $g_s\, n_s$ — sector of means of production, $g_p\, n_p$ — sectors of consumer goods. Thus, the contribution to the overall dynamics of economic development of each sector should be evaluated.

Since the structural dynamics is variable, both the structural parameter z and the values of growth rates are changing over time, reflecting the different contributions of sectors to the country's economic growth rate and significant structural transformations, determined, including by policy.

The dynamics of prices in each sector depends on the internal processes of development of the sector and is determined by the prices of another sector. This allows you to model such a connection and see the structural cut of inflation within the two-sector economic model. It is also not difficult to show that a situation where the wage growth rate exceeds the productivity growth rate is acceptable for economic growth. If we assume that wages in two sectors go to

Table 2

Types of Activities Included in the Consumer Goods and Intangible Sector

ICTEA	Designation ICTEA
Section A	Agriculture, forestry, hunting, fishing and fish farming
C (10–12)	Production of food, beverages, tobacco products
C (13–15)	Production of textiles, clothing, leather and leather products
C 16	Wood processing and production of wood and cork products, except furniture, production of straw products and weaving materials
C 17	Production of paper and paper products
C 18	Printing activities and copying of media
C 20	Production of chemicals and chemical products
C 21	Production of medicines and materials used for medical purposes
C 22	Production of rubber and plastic products
C 23	Production of other non-metallic mineral products
C 25	Production of finished metal products, except machinery and equipment
C (31, 32)	Production of furniture, other finished products
Section G	Wholesale and retail trade; repair of motor vehicles and motorcycles
Section H	Transportation and storage
Section I	Activities of hotels and catering establishments
Section J	Information and communication activities
Section K	Financial and insurance activities
Section L	Real estate operations activities
Section M	Professional, scientific and technical activities
Section N	Administrative activities and related additional services
O 84	State administration and military security, social security
P 85	Education
Section Q	Activities in the field of health and social services
Section R	Activities in the field of culture, sports, leisure and entertainment
Section S	Provision of other services
Section T	Activities of households as employers; undifferentiated activities of private households in the production of goods and services for their own consumption

Source: Rosstat data. URL: https://rosstat.gov.ru/statistics/accounts (accessed on 12.04.2024).

the purchase of the produced product in the consumer goods sector, then $Y_p = w_s L_s + w_p L_p$, where w_s, w_p — the average salary in the sector (per employee), so that the product per number of employees gives the total wage in the sector. By entering productivity in the sector in the form of $A_s = Y_s / L_s$, $A_p = Y_p / L_p$, we get:

$$Y = Y_s \left(1 + \frac{w_s}{A_s} + \frac{1}{z} \frac{w_p}{A_p} \right). \quad (3)$$

Adopting the growth condition for the two-sector economic system $g_Y > 0$ and differentiating the expression (3) in time, it is not difficult to obtain a condition for the rate of wage growth in the means of production sector depending on the growth rate of labour productivity (g_{As}) in the sector of means of production and, accordingly, in the sector of consumer goods (g_{Ap}) [29].

Thus, the view of economic dynamics changes due to the applied macrostructural

analysis, because to varying degrees, taking into account the initial state of the sectors, they affect each other, their growth rates differ, the dynamics of prices in sectors are also differently related and affect the overall price dynamics and growth. In this regard, in the above theoretical formulation, it is even possible that the growth rate of productivity in the means of production sector is positive, but the rate of wage growth may be negative, while in the consumer sector wages will grow faster than productivity. In practice, as you know, wages are not sensitive to decrease, as there are institutional restrictions. Nevertheless, joint sectoral dynamics require macrostructural analysis, and the recommendations developed in the field of economic policy require an assessment of the conditions of structural dynamics and existing development regimes in order to be adequate to the goals set not only for quantitative growth, but also for its quality.

This allows us to move on to the consideration of the conditions of industrialization of the growing economy, that is, to assess what possible government measures and influences to change the structure in the required direction as the economy grows. The criterion for distinguishing development models is the dynamics and structure of sectors.

CONDITION OF INDUSTRIAL DEVELOPMENT IN A TWO-SECTOR ECONOMY

Fig. 1 shows the relationship between the growth rate of the sector of means of production and consumer goods. The structure of the economy is given by the parameter *z*, the growth condition by formulas (1) and (2). Depending on the existing structure, the ratio between growth rates and their impact on the overall economic dynamics will be different. The AB line of *Fig. 1* reflects the superiority in the share in the structure of GDP of the consumer goods sector, the EF line — the sector of means of production. In fact,

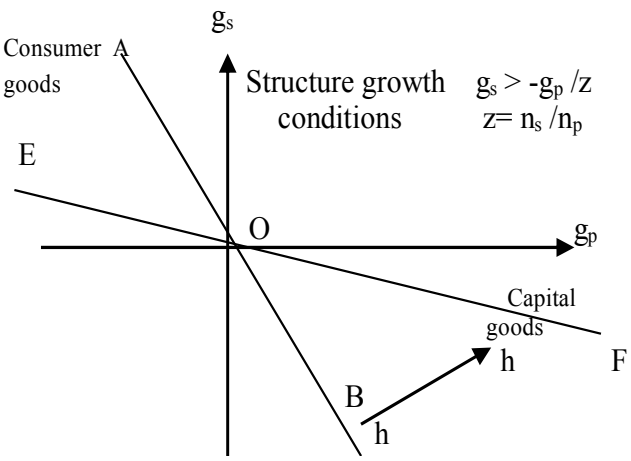

Fig. 1. **Growth Rates of the Capital Goods (g_s) and Consumer Goods (g_p) Sectors and the Economic Growth Condition**

Source: Author's calculations.

these lines embody the existing investment (EF) or consumer (AB) model of economic development. The transition from one model to another will mean a structural change and a general movement on the arrow hh (*Fig. 1*).

From the presented *Fig. 1*, linking the pace of development of economic sectors to ensure its growth within the framework of the existing and possibly changeable parameter of the *z* structure, it follows that with the growth of the consumer sector, if the industries of the means of production dominate (investment model of development) in the structure, a smaller amount of decline in this sector is allowed for the economy as a whole to grow. If the development model is consumer (the consumer goods sector is large), the decline in means of production can be large to ensure positive dynamics of the entire economy.

This theoretical result well explains the economic growth in Russia in the 2000s, when the growth rate was high with the deindustrialisation of the economy and the degradation of the sectors of the means of production. At the same time, the consumer goods sector has strengthened its position.

In the case when there is a decline in the consumer goods sector $g_p < 0$ (*Fig. 1*), then the

Table 3

Development Models and Growth Modes of Economic Sectors

Development model by structural parameter z	Growth mode by growth rate of consumer goods sector gp	
	$g_p > 0$	$g_p < 0$
Investment	Deindustrialisation is acceptable	Passive industrialization (the growth rate of the means of production is low)
Consumer	Deindustrialisation can be deep	Active industrialization (the growth rate of the means of production is high)

Source: Compiled by the authors according to *Fig. 1*.

growth rate of means of production should be higher for the consumer model than for the investment model, so that the economy as a whole grows.

Thus, it can be argued that a smaller amount of deindustrialisation is allowed in the investment model of development than in the consumer one. Therefore, the dismantling of knowledge-intensive industries and processing in the consumer development model is faster with the growth of the economy, which seems to cover this dismantling.

The best development option is the overall positive dynamics, covering both sectors of the country's economy. However, the structural task to determine which ratio of sectors is most favorable for development and prospects of the economy remains relevant and involves the assessment of the qualitative state, level of technology and connectivity of their functioning (dependence on imports, etc.).

If consumption is decreasing (the rate is negative), then to support growth in the case of the consumer model, accelerated industrialization will be needed, that is, a more intensive increase in the means of production than in the state of dominance of the means of production sector, the increase of which for the investment model with a decline in consumption may be less intensive. Models of economic development in accordance with the growth regime of the consumer goods sector are reflected in *Table 3*.

Table 1 shows that depending on the dynamics of the consumer goods sector, some de-industrialization or passive industrialization is possible so that the economy shows growth — with an investment model of development (the sector of means of production dominates the structure of GDP). If the consumer development model (the consumer goods sector dominates the structure of the gross product), then with its growth, deindustrialisation is allowed very significant, and in case of decline, active industrialization will be required. This explains, among other things, if there are other reasons, why the topic of industrialization returns to the agenda of the analytical debate during the crisis of the consumer Russian growth model.

In fact, *Fig. 1* and *Table 3* set the conditions for the industrial development of the two-sector economy — according to the allocated basic sectors (structure) and the associated dynamics. Of course, the dynamics itself cannot be the only criterion for the implementation of the industrialization process. Therefore, *Table 3* sets out a general approach useful in the field of macroeconomic policy planning, involving macrostructural analysis based on the growth rate criterion and the currently formed structure of economies.

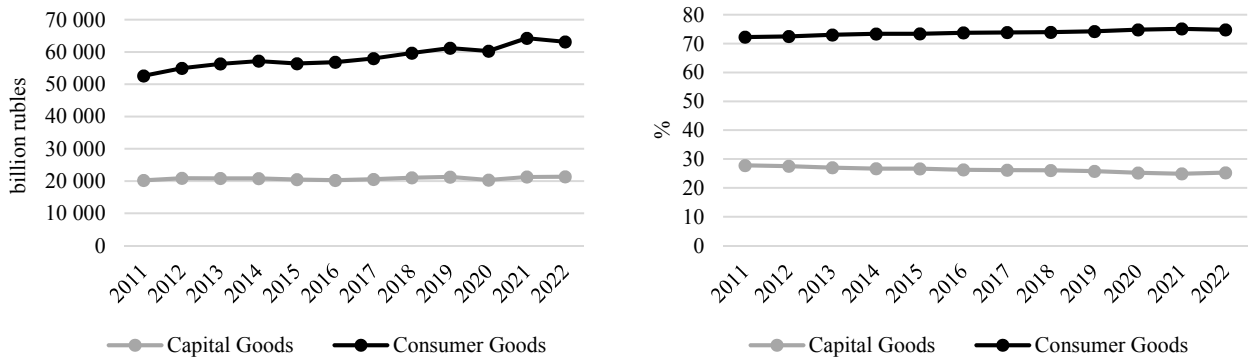

Fig 2. **Structure of Gross Value Added of the Capital Goods and Consumer Goods Sectors in Russia**

Source: Author's calculation according to Rosstat data. URL: https://rosstat.gov.ru/statistics/accounts (accessed on 10.04.2024).

Note: On the Left — in 2016 prices, billion rubles, on the Right — shares in GDP, 2011–2022.

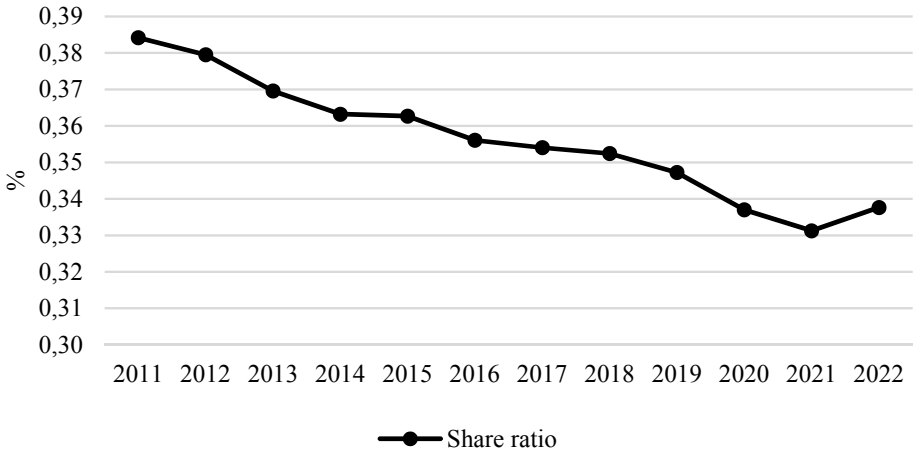

Fig. 3. **Dynamics of the Structural Parameter *z*(*t*) in the Russian Economy, 2011–2022**

Source: Rosstat. URL: https://rosstat.gov.ru/statistics/accounts (accessed on 10.04.2024).

Further, focussing on the above algorithm and the introduced condition of industrial growth, we will analyze the dynamics of the sectors of means of production and consumer goods (including the intangible sphere) of the Russian economy during the 2011–2022.

DYNAMICS OF THE SECTORS OF MEANS OF PRODUCTION AND CONSUMER GOODS IN RUSSIA

The current structure of the sectors of means of production and consumer goods in Russia in the period 2011–2022 is reflected in *Fig. 2*.

Fig. 2 gives a clear idea that the gross added value of the sector "consumption items and intangible sphere" is increasing in real 2016 prices, and the share of this sector in the structure of the Russian economy is increasing with a decrease in the share of the sector of means of production.

Investments in fixed assets of the sectors gave such a structural one, changing in 2011–2022: from about 32 to 38% for the sector of means of production, and 62–68% for the sector of consumer goods of the total investment in fixed assets. Moreover, for

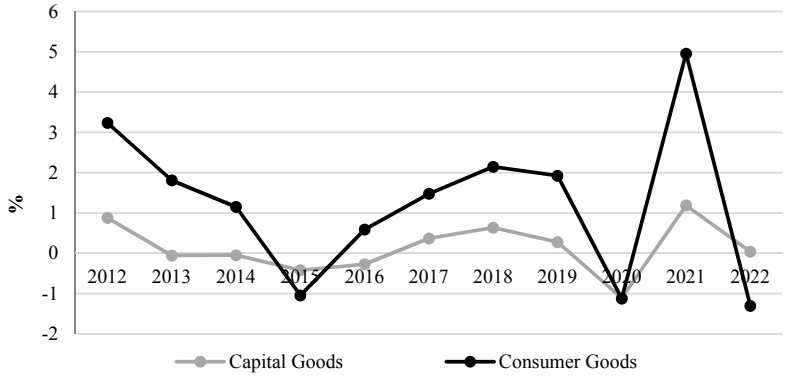

Fig. 4. **Contribution of the Capital Goods and Consumer Goods Sectors to the Growth Rate of Russia's GDP, 2012–2022**

Source: Author's calculation according to Rosstat data. URL: http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/accounts/#, в ценах 2016 г. (accessed on 10.04.2024).

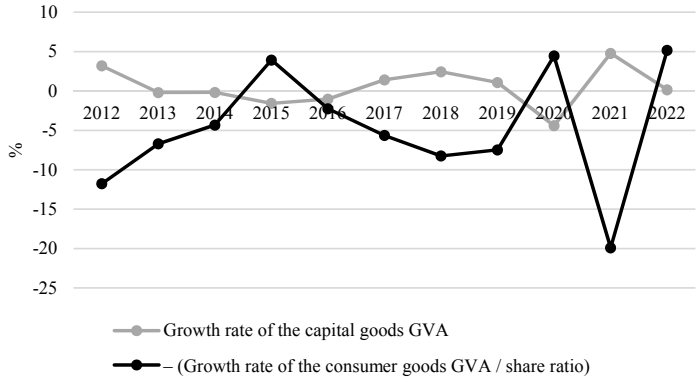

Fig. 5. **Condition of Economic Growth, % 2012–2022**

Source: Author's calculation according to Rosstat data. URL: https://rosstat.gov.ru/statistics/accounts (accessed on 10.04.2024).

the consumer goods sector, this share first decreased, then increased to the previous value. For the sector of means of production — on the contrary: first increased, then decreased to the previous value by 2022. It should be noted that in terms of investment in fixed assets in 2016 prices, their volume in the consumer goods sector exceeded the same indicator in the sector of means of production from 1.5 to 2 times.

The change in the structural parameter *z* reflects *Fig. 3*, which confirms the transformation of the structure of the Russian economy towards the sector of consumer goods and the intangible sphere when the sector of means of production is compressed. Only in 2022, the share of the sector of means of production obviously increased due to significant injections of resources and active import substitution policy in Russia.

At the 2011–2022 time interval under consideration, the profit gap in 2016 prices in favor of the consumer sector is growing, so that by 2021 it becomes twofold. Wages in 2016 prices are consistently higher in the sector of means of production, the excess is on average 15–20%. The level of profitability of sold goods, services of the means of production sector exceeds on average this indicator of the consumer goods sector by 1.5–2 times until 2017, where profitability is compared in the region of 10–12%, and further until 2022 the profitability of the consumer goods sector is higher than in the sector of means of production. In 2022, the gap is becoming the largest: the consumer goods

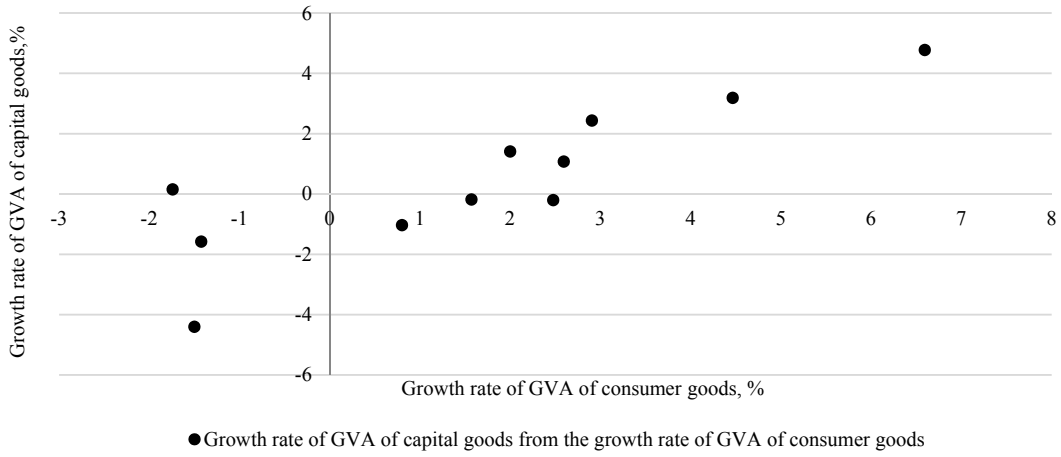

Fig. 6. **Empirical Assessment of the Growth Rates of the Sectors of the Russian Economy, 2012–2022**

Source: Author's calculation according to Rosstat data. URL: https://rosstat.gov.ru/statistics/accounts (accessed on 10.04.2024).

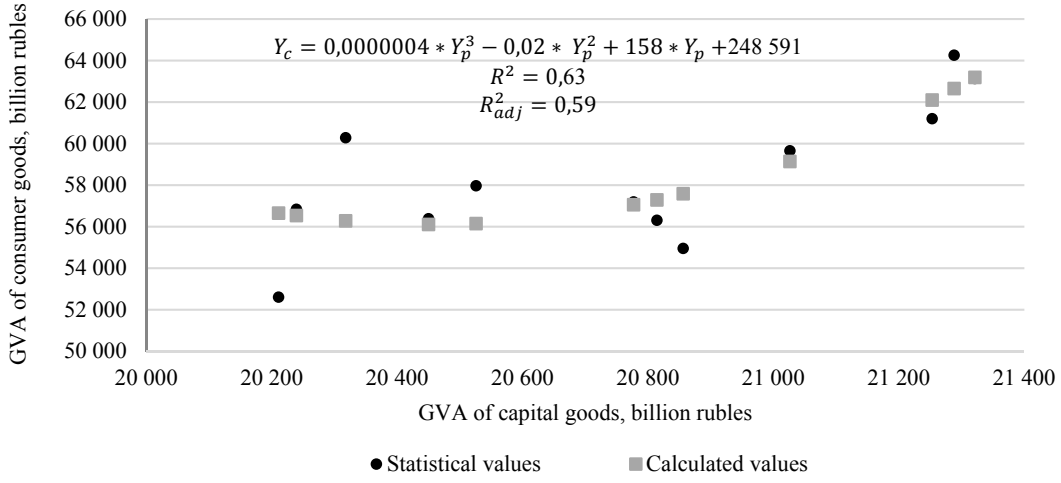

Fig. 7. **Gross Value Added Dynamics of the Capital Goods and Consumer Goods Sectors, in 2016 Prices, 2011–2022**

Source: Author's calculation according to Rosstat data. URL: https://www.gks.ru/investment_nonfinancial, https://www.gks.ru/folder/14476, https://www.gks.ru/storage/mediabank/tab1(2).htm (accessed on 10.04.2024).

Note: Regression model statistics: F-criterion = 16.9; D-Wcalc. = 1.43 ∈ [1.33; 2.67]; White's test: χ^2 calc. = 2.85; χ^2 crit. = 3.84

sector with a profitability of 18%, and 12% of the means of production. The calculation of the risk of operating in sectors shows that from approximately equal risk in 2013 in 2016 prices in two sectors of 500 billion rubles, the risk increased, reaching in the sector of means of production in 2022 to almost 5 000 billion rubles, in the consumer goods sector — up to 1600 billion rubles. The following ratio is characteristic for sectors in the 2011–2022 interval: in the sector of means of production, risk increased, profitability decreased, in the consumer goods sector — with increasing risk, profitability increased.

Thus, the risk of activity increased in the economy as a whole and in its allocated sectors, but at different rates, which was greater for the sector of means of production and less for the consumer goods sector. Thus, the risk of doing business in the sector of means of production was first 1.5–2 times in 2014–2015, and then 3 times higher than the risk in the consumer goods sector. Given the low margin of profitability, and even higher

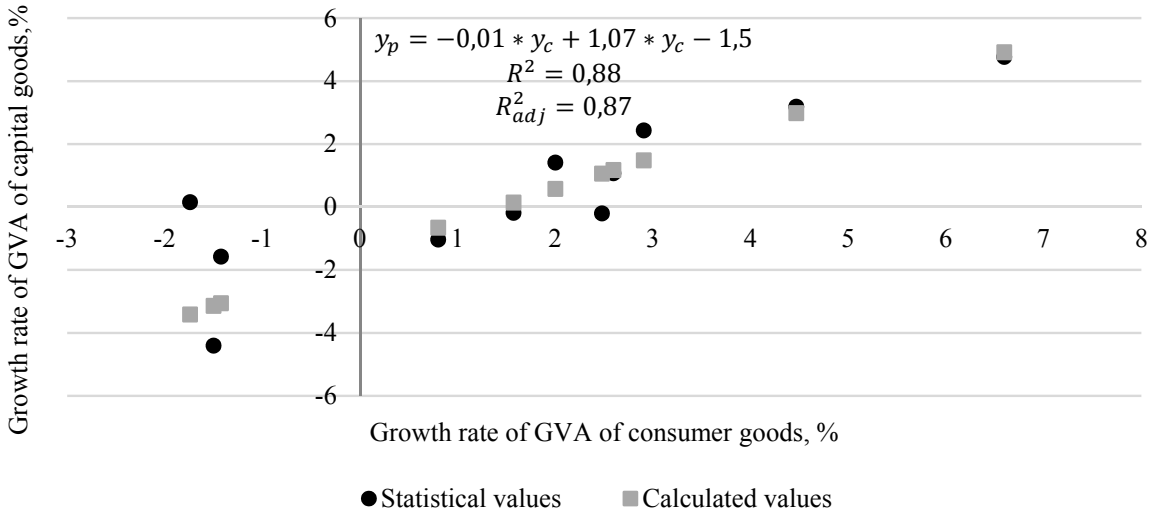

Fig. 8. **Growth Rate of the Capital Goods and Consumer Goods Sectors in Russia, 2012–2022**

Source: Author's calculation according to Rosstat data. URL: https://www.gks.ru/investment_nonfinancial, https://www.gks.ru/folder/14476, https://www.gks.ru/storage/mediabank/tab1(2).htm (accessed on 10.04.2024).

Note: Regression model statistics: F-criterion = 86.5; D-Wcalc. = 1.37 ∈ [1.32; 2.68]; White's test: χ^2 calc. = 1.43; χ^2 crit. = 3.84

profitability of the means of production sector until 2017, it is quite obvious why investment in the means of production sector was significantly less than in the consumer goods sector — due to the high instability of economic activity (risk of conducting it) in the means of production sector.

The described structural dynamics of the selected sectors of the Russian economy also predetermined their contribution to the country's economic growth rate (in accordance with the components of the formula (1)), which reflects *Fig. 4*.

Fig. 4 shows that the contribution of the sector of means of production to growth in the current assessment of dynamics was very modest and came to the first place, exceeding the contribution of the consumer goods sector, only in 2022.

Thus, we can say that a consumer model of economic growth has developed in Russia at the considered time interval. The growth condition according to formula (2) reflects *Fig. 5*, which shows crisis situations in 2015, 2020 and 2022.

Fig. 6 reflects the empirical ratio of the growth rate of the sectors of means of production and consumer goods. Within the coordinates of the "development model—growth regimes", corresponding to *Table 3* and *Fig. 1*, we can talk about the consumer growth model in Russia, for which with the growth of the consumer goods sector *($g_p > 0$)* is characterized by high deindustrialisation, which was observed in the 2000s, or active industrialization (if $g_p < 0$) in the years of crises, in particular in 2022, in connection with the tasks of ensuring the country's Defense capability.

The connection of the sectors seems to be an important condition for their joint development. *Fig. 7* shows how the change in gross value added (GVA) in one sector determines its increase in another sector.

As can be seen from *Fig. 7*, with a small increase in value added in the means of production sector, it is possible to achieve a large increase in value added in the consumer goods sector. Although there is a site where there is a very slight decrease or no significant increase in value added in the consumer goods sector. This may be due to the state of the means of production and the nature of their replacement, the creation and introduction of new means of production that do not make it possible to increase value added in the

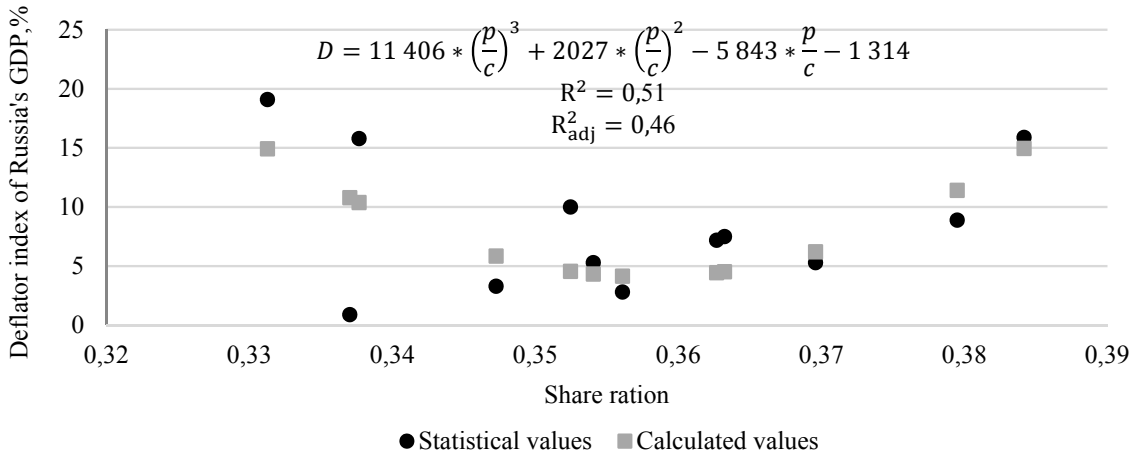

Fig. 9. **Deflator Index of Russia's GDP (*D*) and the Ratio of the Capital Goods (*s*) and Consumer Goods (*p*) Sectors, 2011–2022**

Source: Author's calculation according to Rosstat data. URL: https://rosstat.gov.ru/statistics/accounts, https://rosstat.gov.ru/statistics/price (accessed on 10.04.2024).

Note: Regression model statistics: F-criterion = 11.05; D-Wcalc. = 1.87 ∈ [1.33; 2.67]; White test: χ^2 calc. = 2.41; χ^2 crit. = 3.84.

consumer goods sector. This circumstance should be taken into account when planning economic development policies and stimulating the development of specific types of industries.

Analysis of the growth rate of the Russian economy in the studied period of time, depending on the structure of investments in fixed assets in the allocated sectors, shows that with the growth of investment in means of production relative to investments in consumer goods, the growth rate has decreased.[1]

Consequently, active industrialization was clearly not enough, both in years of decline in GDP and its growth, and the process of unstable economic activity in the means of production sector revealed insufficient regulation, as the risk increased steadily and quite high in relation to the consumer goods sector.

The mutual dynamics of the two sectors in 2012–2022 is reflected in *Fig. 8*.

In the positive area of growth rates, it can be seen that 2% of the growth rate of means of production corresponds to 3% of the growth rate of consumer goods. In the negative area of the growth rate of sectors, the decline in the sector of means of production to –4% corresponds to a decline in consumer goods of less than –2%. (*Fig. 8*). This is fully consistent with the consumer development model described above.

As for the relationship between the growth rate of sectors and the dynamics of prices in them, it is described as follows. The increase in the growth rate of the consumer goods sector from negative values to +2.5% was accompanied by a decrease in the consumer price index (CPI). A further increase in the growth rate of the sector led to an increase in the CPI to 8%. With negative and positive values of the growth rate of means of production, the producer price index fluctuated from 4 to 12%, the same fluctuations corresponded to the positive growth rate of the sector to 2.5%. With a higher growth rate, the producer price index became even higher. There were two points for a positive growth rate of means of production of 0.5 and 1%, corresponding to the negative producer price index. Therefore, the growth rate of means of production is accompanied by a very tangible increase in prices, which indicates

[1] To save space, the regression model is not given. The calculation was made by the authors according to the data: Rosstat. URL: https://rosstat.gov.ru/statistics/accounts; ЕМИСС. URL: https://www.fedstat.ru/indicator/57848 (accessed on 10.04.2024).

a high cost (and a specific structure — a high share of material costs) of the functioning of the subjects of this sector, low efficiency and manufacturability. There may be an impact and organizational weakness of functioning, gaps and regional differentiation of development, which also contribute to cost increases and price increases. Thus, the analysis shows that an increase in the growth rate per unit in the means of production leads to a greater increase in prices in this sector than in the consumer goods sector. It also creates advantages in development and fixes the existing economic structure.

Fig. 9 reflects the relationship between the deflator of Russia's GDP and the ratio of the sectors of means of production and consumer goods (economic structure).

The deflator index reflects the overall price dynamics in the country, as opposed to the producer price indices, which indicate the price dynamics of subjects in a specific set of sectors. *Fig. 9* shows that the change in the structure of the economy not in favor of the sector of means of production was accompanied by a decrease in inflation, but then this process was accompanied by an increase in inflation, which is due to the fact that the increase in the growth rate of means of production (whose share in GDP decreased) leads to greater price dynamics in this sector than the equivalent situation in the consumer goods sector (increased the share in GDP).

Thus, it can be concluded that the sector of items is more competitive and regulated in order to curb consumer inflation. The sector of means of production operates with chronic inflationary processes in it caused by the inefficient structure and low technology of this sector.

In the paper [16] it was shown that targeting contributes to the fixation of the economic structure, prolonging its inefficiency (modifying this indicator) and forcing government policy to focus not on solving basic structural problems, but on the method of incremental and local improvements and financing priorities to develop the economy along the trajectory within the framework of, in fact, an unchanging economic structure. The analysis carried out here also confirms this conclusion, demonstrating the relationship of the structure with relevant macroeconomic indicators of development — GDP growth and inflation.

CONCLUSION

Summarizing the analysis, we will formulate the main conclusions.

First, the presented results confirm the need for active industrialization and structural policies to stimulate sectors of means of production with increasing their competitiveness, technology, contribution to the growth rate and reducing the contribution to the dynamics of sectoral prices.

Secondly, the policy pursued in 2011–2022 did not contribute in any way, but only preserved the mutual dynamics of the sectors of means of production and consumer goods with the growth of the second and a decrease in the first in the country's GDP. The decrease in the structural parameter z was accompanied by a decrease in total inflation, but then its increase.

Thirdly, the profitability of the sector of means of production has become lower than the profitability of the sector of consumer goods, and the risk increased in advance, which was reflected in low investments in fixed assets of this sector compared to the consumer goods sector, which also works to fix the existing economic structure within the framework of the current economic policy.

Thus, the macrostructural analysis of economic dynamics allows to distinguish the nuances of joint development of the basic elements of the economy in the context of the policy in order to adjust not only the instruments used, but also the goals and priorities of development, to clarify the methods of influence. In the existing complexity of systemic links between economic objects, this is the foundation for effective macroeconomic management.

REFERENCES

1. Alonso-Carrera J., Raurich X. Labor mobility, structural change and economic growth. *Journal of Macroeconomics*. 2018;56:292–310. DOI: 10.1016/j.jmacro.2018.03.002
2. Brancaccio E., Garbellini N., Giammetti R. Structural labour market reforms, GDP growth and the functional distribution of income. *Structural Change and Economic Dynamics*. 2018;44:34–45. DOI: 10.1016/j.strueco.2017.09.001
3. Andreoni A., Chang H.-J. The political economy of industrial policy: Structural interdependencies, policy alignment and conflict management. *Structural Change and Economic Dynamics*. 2019;48:136–150. DOI: 10.1016/j.strueco.2018.10.007
4. Cardinale I., Galbraith J., Scazzieri R. Structural dynamics and the wealth of nations. Luigi Pasinetti's system of economic theory. *Structural Change and Economic Dynamics*. 2024;69:692–698. DOI: 10.1016/j.strueco.2023.11.019
5. Miles D. Macroeconomic impacts of changes in life expectancy and fertility. *The Journal of the Economics of Ageing*. 2023;24:100425. DOI: 10.1016/j.jeoa.2022.100425
6. Cozzi T. Pasinetti's structural economic dynamics. *Structural Change and Economic Dynamics*. 2023;61:444–449. DOI: 10.1016/j.strueco.2021.12.006
7. Erumban A.A., Das D.K., Aggarwal S., Das P.C. Structural change and economic growth in India. *Structural Change and Economic Dynamics*. 2019;51:186202. DOI: 10.1016/j.strueco.2019.07.006
8. Zhao J., Tang J. Industrial structure change and economic growth: A China-Russia comparison. *China Economic Review*. 2018;47:219–233. DOI: 10.1016/j.chieco.2017.08.008
9. Vu K.M. Structural change and economic growth: Empirical evidence and policy insights from Asian economies. *Structural Change and Economic Dynamics*. 2017;41:64–77. DOI: 10.1016/j.strueco.2017.04.002
10. Samaniego R.M., Sun J.Y. Productivity growth and structural transformation. *Review of Economic Dynamics*. 2016;21:266–285. DOI: 10.1016/j.red.2015.06.003
11. Dräger L., Lamla M.J., Pfajfar D. How to limit the spillover from an inflation surge to inflation expectations? *Journal of Monetary Economics*. 2024;144:103546. DOI: 10.1016/j.jmoneco.2023.12.004
12. Kurozumi T., Van Zandweghe W. Macroeconomic changes with declining trend inflation: Complementarity with the superstar firm hypothesis. *European Economic Review*. 2022;141:03998. DOI: 10.1016/j.euroecorev.2021.103998
13. Higgins C.R. Financial frictions and changing macroeconomic volatility. *Journal of Macroeconomics*. 2020;64:103204. DOI: 10.1016/j.jmacro.2020.103204
14. Iamsiraroj S. The foreign direct investment — economic growth nexus. *International Review of Economics & Finance*. 2016;42:116–133. DOI: 10.1016/j.iref.2015.10.044
15. Pan Zh., Bai Zh., Xing X., Wang Zh. US inflation and global commodity prices: Asymmetric interdependence. *Research in International Business and Finance*. 2024;69:102245. DOI: 10.1016/j.ribaf.2024.102245
16. Sukharev O.S., Voronchikhina E.N. Inflation targeting: Eliminating economic growth and structural deformation in Russia. *Finance: Theory and Practice*. 2024;28(1):6–19. DOI: 10.26794/2587–5671–2024–28–1–6–19
17. Cutrini E. Economic integration, structural change, and uneven development in the European Union. *Structural Change and Economic Dynamics*. 2019;50:102–113. DOI: 10.1016/j.strueco.2019.06.007
18. Freire C. Economic diversification: A model of structural economic dynamics and endogenous technological change. *Structural Change and Economic Dynamics*. 2019;49:13–28. DOI: 10.1016/j.strueco.2019.03.005
19. Taghiyeh S., Lengacher D.C., Handfield R.B. Loss rate forecasting framework based on macroeconomic changes: Application to US credit card industry. *Expert Systems with Applications*. 2021;165:113954. DOI: 10.1016/j.eswa.2020.113954
20. Pi J., Zhang P. Structural change and wage inequality. *International Review of Economics & Finance*. 2018;58:699–707. DOI: 10.1016/j.iref.2018.07.010

21. Yamada T. Income risk, macroeconomic and demographic change, and economic inequality in Japan. *Journal of Economic Dynamics and Control*. 2012;36(1):63–84. DOI: 10.1016/j.jedc.2011.07.001
22. Gabardo F.A., Pereima J.B., Einloft P. The incorporation of structural change into growth theory: A historical appraisal. *EconomiA*. 2017;18(3):392–410. DOI: 10.1016/j.econ.2017.05.003
23. Leont'ev V.V. Intersectoral economics. Moscow: Ekonomika; 1997. 477 p. (In Russ.).
24. Yaremenko Yu.V. Theory and methodology of multilevel economics research. Selected works in three books. Bk. 1. Moscow: Nauka; 2000. 398 p. (In Russ.).
25. Dedov L.A., Botkin O.I. Index macrostructural analysis of economic dynamics. Basic concepts and techniques of macrostructural analysis. Ekaterinburg: Ural Branch of RAS; 2013. 107 p. (In Russ.).
26. Glaz'ev S. Yu. Theory of long-term technical and economic development. Moscow: Vladar; 1993. 310 p. (In Russ.).
27. Lu Y. Industry 4.0: A survey on technologies, applications and open research issues. *Journal of Industrial Information Integration*. 2017:6:1–10. DOI: 10.1016/j.jii.2017.04.005
28. Romano L., Traù F. The nature of industrial development and the speed of structural change. *Structural Change and Economic Dynamics*. 2017:42:26–37. DOI: 10.1016/j.strueco.2017.05.003
29. Sukharev O.S. Elements of the theory of self-development of economic systems. Moscow: Lenand; 2018. 351 p. (In Russ.).

ABOUT THE AUTHORS

Oleg S. Sukharev — Dr. Sci. (Econ.), Prof., Chief Researcher, Institute of Economics, Russian Academy of Sciences, Moscow, Russia
https://orcid.org/0000-0002-3436-7703
Corresponding author:
o_sukharev@list.ru

Ekaterina N. Voronchikhina — Cand. Sci. (Econ.), Assoc. Prof., Department of World and Regional Economics, Economic Theory, Perm State University, Perm, Russia
https://orcid.org/0000-0001-7033-5832
envoronchikhina@gmail.com

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