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Structural Analysis of Economic Growth: The Distributed Effects of Policy Instruments

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ABSTRACT

The article examines the structure of the growth of the Russian economy in the period 2003–2023. The macroeconomic policy proceeds from linking the instrument to a specific development goal, although in practice the entire set of tools affects the target parameters and economic structure, thereby generating opportunities for its contribution to the rate of economic growth and reduction of inflation. The purpose of the research is to conduct a structural analysis of Russia's economic growth with the allocation of the distributed impact on the growth rate, inflation and economic structure (by GDP) of the following main macroeconomic policy instruments: the key interest rate, monetization level, exchange rate and budget surplus/deficit. The research methodology is represented by the theory of economic growth, structural analysis, regression models, econometric approach, and statistical data processing. The information base of the study was compiled from Rosstat and the World Bank. The result is a constructed algorithm for structural analysis of growth with an assessment of the distributed impact of policy instruments and an empirical study of the Russian economy, which confirmed the different strengths of the influence of applied policy instruments not only on growth and inflation, but also on the economic structure (raw materials, processing and transaction sectors), as well as the different effects of structural elements on price dynamics and GDP, shaped by the ongoing macroeconomic policy. Such a result in the long term leads to the need to correct the instruments used in terms of the strength and nature of their action, and also allows us to take into account the formulation of structural change tasks together with the macroeconomic policy measures being formed aimed at ensuring the growth rate at relatively low price dynamics.

Keywords: GDP structure elements; structural analysis; economic sectors; economic growth; macroeconomic policy instruments; key interest rate; monetization level; budget deficit/surplus; distributed impact

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INTRODUCTION

Structural analysis is the most developed and powerful method for studying various economic changes, used to create an architectural image of economic development and draw analytical conclusions [1]. It is implemented in the "input-output" method [2], developed within the framework of multi-level economics theory [3], but is used limitedly in the study of growth problems [4, 5] and technological changes [6, 7]. Modern growth theories have a limited and weak consideration of structural changes [5]. At the same time, the transformation of the technological structure, as well as changes in economic proportions, could become a significant growth constraint over time even for the rapidly developing Chinese economy [8], and changes in the population structure could affect human population growth [9].

Neoclassical growth theories [10] do not take these aspects into account, focusing on "goals-instruments" in the implementation of macroeconomic policy [11]. The typical orthodox approach involves considering the income and substitution effects in a two-sector economy, assessing changes in employment structure and the impact of this factor on GDP growth [12]. Structural changes are examined here between selected sectors, but the overall growth model is not determined, as technological factors in general and wage dynamics are analyzed.

Similar approaches are used in studying the impact of structural reforms on labor market deregulation [13], with the effect of increasing inequality, assessing various aspects of the impact of structural dynamics on wealth [14], population structure on life expectancy [15], changes in employment structure on labor productivity [16], or industrial structure on growth [17].

It is worth noting separately the research dedicated to assessing the cumulative impact of structural changes on certain parameters of economic dynamics [18], particularly GDP, for which the Effective Structural Change Index (ESC) is introduced and used as an indicator of structural reforms. Economic diversification and the specifically implemented macroeconomic policy for this purpose imply a reduction in development risks, which should contribute to growth. But diversification involves structural changes [19], the reallocation of resources, leading to productivity growth. Diversification as a development model is inherent to poorer countries, and the link between diversification models and growth is poorly developed in modern literature [20]. The speed of structural changes has a strong impact on economic growth [21], with the level of industrialization, the state of industry, and technology being largely a determining force of such influence.

The processes of economic integration [22], the level of inequality [23], the magnitude of risk [24], and plans for the implementation of industrial and technological development programs [25] largely determine the process of modern structural changes and growth. Structural changes, expressed in the transformation of economic proportions, have the property of saturating and slowing down economic growth, as observed on the Bazarov curve in the late 1930s in the USSR [26] during industrialization, because the simultaneous impact of many factors and their intensive application create a rapid saturation effect. The reverse effect, where rapid industrialization did not lead to high growth, is also known from the First Industrial Revolution, when the economic structure changed but did not ensure a high growth rate [27].

The financial sector and markets, by influencing the distribution of finances in the economy, are today a significant factor not only in emerging crises but also in structural changes, setting a specific model for economic growth [28, 29]. Targeting policies, including inflation control through fiscal policy that channels not only finances but also other resources towards specific uses, influence economic dynamics and structure [30].

Structural analysis of economic growth on an empirical basis involves conducting multi-component assessments (GDP by expenditure and sectors, types of activity) of structural dynamics, clarifying the contribution of individual system elements to its growth, their interconnections, searching for optimal resource allocation solutions, and changes in the profitability and risk of developing economic activities. This requires solving a structural problem — allocating resources for economic growth and maximizing potential income [31]. However, not only resources and factors or sources of development are distributed in the economy, but also the instruments of macroeconomic policy being implemented. This problem remains unresolved — how exactly the strength of each instrument changes, their interrelationship, and how the impact is distributed across the economic structure, development goals, and factors.

In summary, we will formulate the **purpose of this study**: to identify the distributed impact of the basic macroeconomic policy tools that ensured the growth of the Russian economy during the period 2003–2023. The **methodology** consists of growth theory, structural and regression econometric analysis.

To achieve the set goal, it is **necessary to solve at least two tasks**.

Firstly, to formulate the stages for achieving the goal, which means obtaining an algorithm for identifying the influence of the following tools: the level of monetization, the key interest rate, the ratio of budget revenues to expenditures, and the exchange rate[1] on the structure of Russia's GDP (by expenditure and three sectors — manufacturing, raw materials, and transactions[2]) and the goals of macroeconomic dynamics (GDP growth rate and the level of inflation). Secondly, to assess and analyze this impact, drawing conclusions for the policy of ensuring the growth of the Russian economy.

To accomplish these tasks, it is necessary to develop a general research methodology.

Let's move on to a sequential presentation — the search for solutions to achieve the research goal.

RESEARCH METHODOLOGY. ASSESSING THE DISTRIBUTIVE IMPACT OF POLICY INSTRUMENTS

Economic growth depends on macroeconomic policy, sources of development, and elements of the economic structure [4, 8, 29, 31]. In factor growth models, of which there are quite a few, it is possible to identify the relationship between factors and their impact on GDP and its growth [10]. You can also assess specific policy measures that need to be implemented. However, classical economic policy models and their modern versions only allow us to study how policy instruments affect goals, without considering growth factors [11].

In principle, how the structure of the economy and its growth, as well as development goals, react to the applied set (structure) of policy instruments remains not entirely clear. The sequence and intensity with which policy tools affecting growth should be applied is the most important aspect in the theory of macroeconomic policy. Modern growth macroeconomic policy faces

[1] Four basic macroeconomic policy instruments (monetary, fiscal, and exchange rate) were selected without detailing them, in order to analyze the general nature of their impact over the period of development of the Russian economy under consideration.

[2] In total, the three sectors make up Russia's gross domestic product. The sector composition is as follows. Raw materials sector — agriculture, forestry, hunting; fishing and aquaculture; mining; electricity, gas, and steam supply; air conditioning; water supply; sewerage, waste collection and disposal, remediation activities. Manufacturing sector — manufacturing industries; construction. The transaction sector includes wholesale and retail trade; repair of motor vehicles and motorcycles; transportation and storage; accommodation and food service activities; information and communication activities; financial and insurance activities; real estate activities; professional, scientific, and technical activities; administrative and support service activities; public administration and defense; social security; education; health and social work activities; arts, entertainment, and recreation activities; and other service activities. OKVED of Rosstat. URL: https://www.gks.ru/accounts (accessed on 15.09.2024).

difficulties in assessing the combined impact of monetary and fiscal instruments. The problem is exacerbated by the variability of their effectiveness and the sensitivity of economic goals and structures to these instruments.

Just as a medicine can distribute its effects between patients and other organs of the human body, government measures aimed at curbing inflation and accelerating growth are distributed in their impact between these two basic goals and between elements of the economic structure, specifically, the components of GDP (by expenditure: consumer spending, investment, government spending, net exports; by sector — manufacturing, raw materials, transactional). This distributed impact of policy instruments cannot fail to affect future economic dynamics and development goals.

This study examines four basic tools of macroeconomic growth policy: reflecting the effects of monetary policy (monetization level, key interest rate), fiscal policy (ratio of budget revenues to expenditures), and exchange rate policy (domestic currency exchange rate against the dollar). Let's consider their distributed impact on two development goals — GDP growth rate and inflation level, as well as on the components of GDP structure by expenditure and the aforementioned sectors. This approach is important to demonstrate the effect of distributed influence of tools on the structure of economic growth in Russia over the period 2003–2023, and to identify the specifics of the established growth model and the macroeconomic policy being implemented. The research information base consists of data from Rosstat and the Central Bank of the Russian Federation. Of course, it should be taken into account that the official data used already reflect the government measures being implemented, and not just those related to the instruments under consideration. Therefore, the accuracy of the study will always be determined by the completeness of the tools included in the analysis, the assessment of their distributed impact, for which empirical, model analysis, or an appropriate methodology can be applied. However, what's important here is the formulation and demonstration of solutions to the task set for the main types of policies that influence economic growth and inflation.

The general research algorithm can be reduced to the following sequential steps, which determine the solution to the two problems formulated above.

Step 1. Regarding the research object (the Russian economy), identify the policy goals to be considered (GDP growth rate and inflation), defining the structure of GDP by expenditure and sectors and the contribution of each structural element to the economic growth rate according to the structural formula from the study [31], as well as to inflation.

Step 2. Obtain regression models, statistically verify them, linking policy instruments and goals, the structure of GDP (by expenditure and sectors), each element of the structure with a set of applied instruments or individually by each of them — depending on the model outcomes, taking into account the possible collinearity of instruments, goals, and elements of the GDP structure under consideration. Select the most reliable models from those built.

We will demonstrate multiple regression selection within this step of the algorithm for development purposes — the GDP growth rate and inflation (objective functions) from factors — policy instruments (the key interest rate, the level of monetization, the average annual dollar exchange rate, the ratio of revenues to expenditures of the country's consolidated budget). For the purposes of econometric analysis, let's introduce the following notation:

y — GDP growth rate, %; p — inflation (based on CPI,%);

i — key interest rate, %; $\frac{M_2}{Y}$ — monetization level, the ratio of the M_2 money aggregate to the gross domestic product (Y), %; d — average annual dollar exchange rate, rubles, b — ratio

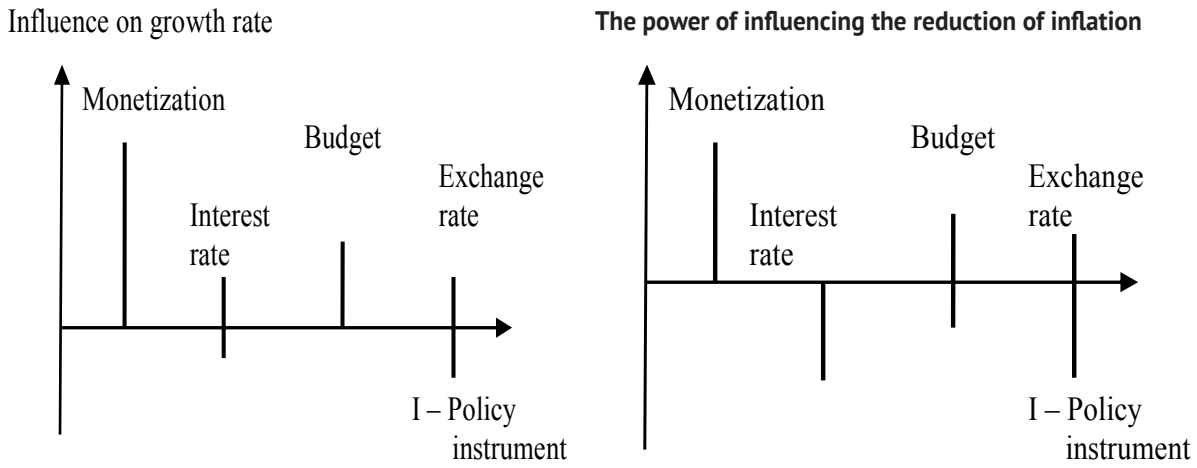

Fig. 1. **Distributed Influence of Policy Instruments**

Source: Compiled by the authors.

of revenues to expenditures of the country's consolidated budget, %.

We will look for similar regression relationships for each of the elements of the GDP structure (by expenditure and sectors).

Regression was constructed based on the original data with varying numbers of factors using the least squares method. The model for the target has the following general form:

$$y, p = ai^{\alpha} * \left(\frac{M_2}{Y}\right)^{\beta} * d^{\gamma} * b^{\delta}. \qquad (1)$$

All possible models with 2–4 factors were constructed for each of the objectives using the exhaustive search method. The total number of models considered is 11 units for each purpose.

To identify multicollinear factors, a matrix of pairwise correlations was constructed for each target variable. According to the analysis conducted, the multicollinear factors with linear pairwise correlation coefficients greater than 0.7 are: the level of monetization and the average annual dollar exchange rate. Spearman and Kendall rank correlation coefficients were also calculated, resulting in similar findings regarding the direction of the relationships between the indicators, but with varying strengths of association.

White's test was used to check for heteroskedasticity in the regression model's random errors.

The results of the test showed homoscedasticity of the random error variances in the regressions presented below. The null hypothesis H_0 of no autocorrelation of residuals was tested using the Durbin-Watson test by comparing the *DW* statistic with the theoretical values d_l and d_u. In the models presented below, the *DW* values are found within the interval $d_u < DW < 4 - d_u$, which indicates the absence of autocorrelation.

The most significant models were obtained by the method of successive elimination of multicollinear factors, and are presented in the tables below. The models are significant according to Fisher's criterion, the regression coefficients for the factors are significant according to Student's criterion, and the coefficient of determination is average or above average. Thus, a statistical model selection method was used.

Step 3. To conduct a study on the impact of economic policy instruments on the achievement of development goals and on the elements of the economy we are considering. To obtain a picture of the distributed impact (this picture is presented

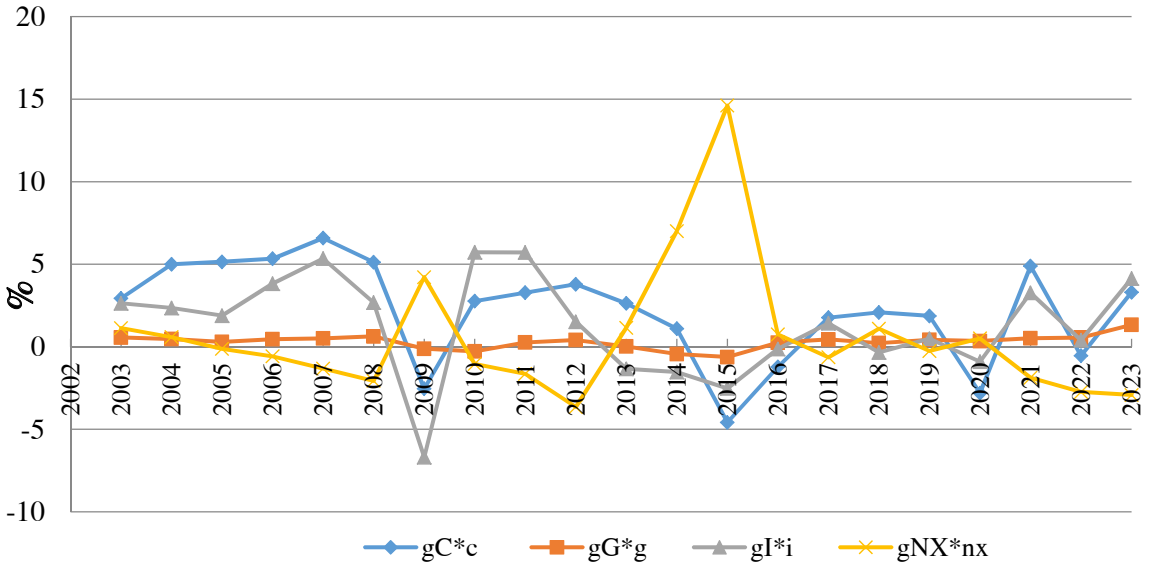

Fig. 2. **Contribution of GDP Components to the Growth Rate of the Russian Economy, 2003–2023**

Source: Constructed by the authors based on data Rosstat. URL: http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/accounts/# (accessed on 15.09. 2024).

in a theoretical-schematic form for two basic policy goals in *Fig. 1*).[3]

Fig. 1 shows that the impact of each instrument on a single goal can be positive, meaning it pushes towards the goal's direction — increasing the growth rate, for example, or decreasing inflation — or negative, meaning it pushes away from achieving the goal — increasing inflation, or slowing down growth. At the same time, the impact itself can be higher or lower when comparing the tools used. *Fig. 1* on the right shows a scenario of negative impact on inflation (through the instruments of "interest rate", "budget", and "exchange rate"). The left side of *Fig. 1* schematically represents only the influence of tools on the growth rate. For example, raising interest rates in Russia is slowing down economic growth [8], as is the institutional shift in the financial market [29], and the resulting devaluation triggers a mechanism of imported inflation, general price increases, and a slowdown in growth.

Step 4. To obtain a picture of the impact of the financial market on economic growth, inflation, and the structure of the economy (based on institutional bias research [29]).

Step 5. Provide recommendations on the further application of the macroeconomic policy tools under consideration to achieve economic development goals — regarding inflation and growth.

It should be particularly noted that there is currently no goal-setting in the area of building a certain economic structure or ensuring the structural dynamics of Russia's GDP. The dominance of the transactional sector is prevalent both in terms of its share of GDP and its contribution to the average rate of economic growth over the entire period under review. A separate picture of the impact of the applied instruments can be obtained for the elements of the economic structure, as well as their connection to the inflation targeting policy implemented in Russia since 2014 [30]. However, these aspects

[3] The most important aspect of the study is the examination of the influence of structural elements on economic growth and price dynamics. However, if there is a picture of the influence of instruments on these elements, and of the elements themselves on the target development parameters, then a combined analysis of the overall impact of policy on growth and inflation is possible, taking into account structural conditions and growth characteristics.

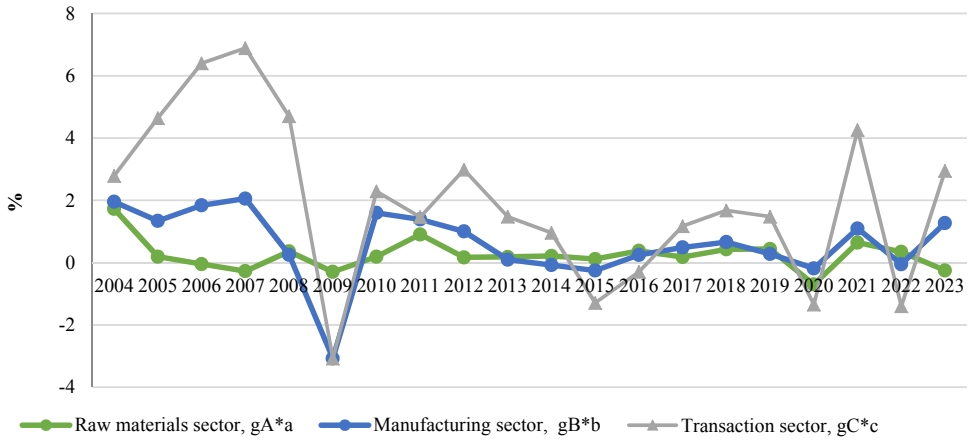

Fig 3. **Contribution of Economic Sectors to the Growth Rate of Russia's GDP, 2004–2023**

Source: Constructed by the authors based on data Rosstat: 2003–2011 in 2008 prices, 2012–2022 in 2016 prices, 2023 in 2021 prices. URL: http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/accounts/# (accessed on 15.09. 2024).

can be attributed to subsequent scientific and research work, as can the improvement of the approach to analyzing the distributed impact of macroeconomic policy on growth, inflation, and structure.

Let's move on to the implementation of the research algorithm and the methodology constructed in this paragraph.

STRUCTURAL ANALYSIS OF THE GROWTH OF THE RUSSIAN ECONOMY

Applying the structural formula for assessing the contribution of component of GDP [31], we obtain a picture of the structural dynamics of Russia's GDP for the period 2003–2023, as shown in *Fig. 2* and *3*.

Fig. 2 shows that gross consumption, as a component of GDP, dominates the contribution to the growth rate. In 2010–2011 and 2023, investment spending (gross fixed capital formation) made a decisive contribution to the pace of economic growth. This is how 2023 differed from previous years, particularly the growth of 2021, where gross consumption dominated the contribution to the economic growth rate, and the crisis year of 2022. In 2023, the contribution of government spending to the growth rate also increased significantly.

Fig. 3 shows the structure of contributions from the three basic sectors of the Russian economy — manufacturing, raw materials, and transactions. The dominance of the transactional sector is indicative; in different years, either the manufacturing or the raw materials sector comes in second place.

It should be noted that after the COVID crisis of 2020, the transactional sector regained its lead in contributing to the growth rate of Russia's GDP, but in 2022, the contribution of this sector became negative. In 2023, its dominance returned, but the manufacturing sector also increased its contribution compared to 2022 and 2021, and the entire preceding period since 2012 (*Fig. 3*).

The contribution of investments to the growth rate was comparable to the periods 2005–2008 and 2010–2011 only in 2021 and 2023. This significantly altered the growth model in Russia, creating the preconditions and analytical expectations that an investment-driven economic growth model, similar to the one implemented in China for several decades [8], would be formed. However, expectations and hopes should not exceed the resource and factor capabilities for creating and implementing such a growth model. Thus,

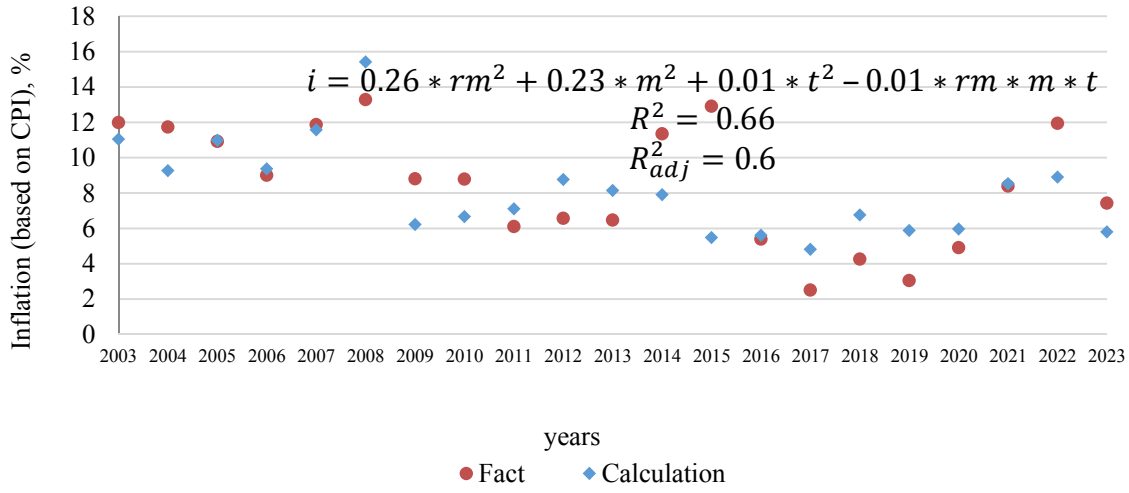

Fig. 4. **Inflation (*CPI*, *p*, %) from the Share of the Raw Materials Sector (%, *rm*), the Share of the Manufacturing Sector (*m*, %), the Share of the Transaction Sector (*t*, %) in Russia's GDP, 2003–2023**

Source: Constructed by the authors based Rosstat. URL: https://rosstat.gov.ru/ (accessed on 15.09. 2024).

Table 1

Average Contribution of the Structure of Russia's GDP to the Growth Rate for the Period 2004–2023

Components of Gross Domestic Product (structure — by sector and by expenditure)	Average contribution to the growth rate of Russia's GDP for the period 2004–2023
Raw materials sector	0.24
Manufacturing sector	0.6
Transaction sector	1.93
Household final consumption expenditure	2.15
Final consumption expenditure of general government	0.28
Gross accumulation	1.27
Net export	0.55

Source: Compiled by the authors based on *Fig. 1, 2.*

Russian economic growth was based for many years on a consumer-transaction model, which needs to be transformed into an investment-driven growth model. Macroeconomic policy and the tools used should work towards solving exactly this problem.

It is important to identify the influence of each structural element on price dynamics (inflation). To this end, we will obtain a regression reflecting the impact of sectors on inflation, from which it is evident that the raw materials sector contributes the most to inflation, followed by the manufacturing sector, while the transactional sector has the least impact, although it is this sector that determines the highest average contribution

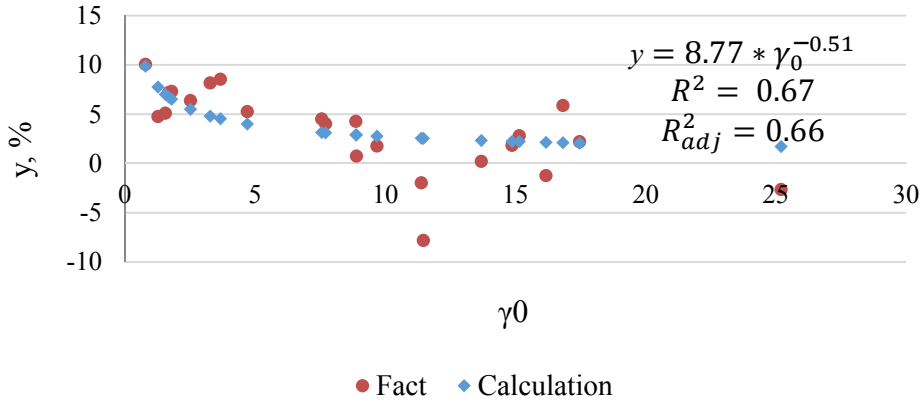

Fig. 5. **Russia's GDP Growth Rate and Institutional Bias of the Financial Sector (γ_0), 2000–2023***

Source: Authors' calculations based on data from the World Bank and Rosstat. URL: https://data.worldbank.org/indicator/NE.GDI.TOTL.ZS?view=chart; https://data.worldbank.org/indicator/NY.GNS.ICTR.ZS?view=chart; https://rosstat.gov.ru/folder/14476 (accessed on 15.09. 2024).

* The relationship between inflation and γ0 is similar. Addiction $p = 17.38 * \gamma_0^{-0.37}$ Statistics: R2 = 0.7; F-criteria = 51.3; D-W calculation. = 1.69 Є [1.45; 2.55]; White test: χ^2 calculation = 2.56; χ^2 criteria = 3.84.

to the growth rate (*Fig. 4* and *Table 1*). For the Russian economy, the creation of investment goods (means of production) makes a significant contribution to accelerating price growth [7, 8, 30].

From *Table 1*, it is clear that the transactional sector makes the largest contribution to economic growth. The processing sector follows, and the raw materials sector rounds out the top three. Gross consumption and accumulation, as well as net exports, also play an important role. Government final consumption expenditure contributes the least to the dynamics.

Inflation was determined by the raw materials sector, which contributed less on average to the GDP growth rate, and the transactional sector, which contributed the most to the dynamics of Russia's GDP (*Table 1*, *Fig. 4*), had a smaller impact. The analysis of **structural** dynamics confirms the need to adjust the macroeconomic policy task to increase the contribution of investment and government spending, as well as the manufacturing sector, which contributes little to the growth rate compared to the transactional sector.

An analysis of the impact of GDP expenditure components on price dynamics yields the following result: changes in the net export share of GDP had a stronger influence on prices compared to gross consumption and investment, although the impact of all components was positive, meaning that an increase in the share contributed to price growth. A specific feature of the development of the Russian economy during the period under review was that as the financial market expanded and financial investments increased, inflation on average decreased and economic growth slowed down. The relationship between GDP growth rate and the institutional bias of the financial sector (γ_0) [29] is illustrated in *Fig. 5*. The growth of this parameter (γ_0) is possible in the case of increased financial investments and/or a decrease in the difference between the amount of gross savings and non-financial investments (gross accumulation).

Thus, the structural analysis confirms the high importance of the transactional sector in ensuring economic growth and its lesser significance in generating inflation, as well as the higher contribution of the raw materials sector to inflation with the lowest contribution to the current GDP dynamics.

Table 2

Distributed Influence of Policy Instruments on the Structure of Sectors (Per Share in GDP) of the Russian Economy, 2003–2023

Target parameter	Model	Statistics	Impact assessment
Manufacturing sector (*m*)	$m = 43.1 * \left(\frac{M_2}{Y}\right)^{-0.2} * b^{0.26}$	R^2 = 0.74 R^2 *adj* = 0.71 *F*-criteria = 25.64 *D-W* calculation = = 1,54 ∈ [1.54; 2.46] White test: χ^2 calculation = 1.66 χ^2 criteria = 5.99	The growth in monetization was accompanied by a decrease in the sector's share, while the budget surplus contributed to the opposite dynamics
Raw materials sector (*rm*)	$rm = 10 * i^{-0.02} * d^{0.17} * b^{0.56}$	R^2 = 0.64 R^2 *adj* = 0.58 *F*- criteria = 10.38 *D-W* calculation = = 1.67 ∈ [1.67; 2.33] White test: χ^2 calculation = 7.48 χ^2 criteria = 7.81	Devaluation and a budget surplus strengthened the sector, and the interest rate hike was accompanied by a decrease in the share
Transaction sector (*t*)	$t = 58 * i^{0.006} * \left(\frac{M_2}{Y}\right)^{0.01} * b^{-0.22}$ $t = 61 * b^{-0.23}$	R^2 = 0.65 R^2 *adj* = 0.58 *F*- criteria = 10.28 *D-W* calculation = 1.72 ∈ [1.67; 2.33] White test: χ^2 calculation = 3.04 χ^2 criteria = 7.81	Increased monetization is accompanied by growth in the sector's share, while growth in the surplus acts in the opposite direction

Source: Compiled by the authors.

Gross consumption contributed the most to the GDP growth rate, but less to price dynamics, compared to net exports, which did not provide a major contribution to the growth rate but were a significant driver of inflation in Russia. The development of the financial sector with a disproportionate increase in financial investments clearly hindered economic growth in Russia during the period 2000–2023. The calculation of the risk of economic activity based on the standard deviation of income in 2000 prices shows its growth, which is accompanied by a decrease in the growth rate and an increase in the institutional bias γ_0 of the financial sector.

After obtaining the structural dynamics characteristics, it seems important to link the established changes and influences with the macroeconomic policy instruments used (monetization level, key interest rate, exchange rate, and budget surplus/deficit). This step of the implemented research algorithm will allow us to obtain a picture of the distributed impact of policy measures on the goals and structure of the economy.

DISCUSSION OF RESULTS. THE APPLICATION OF MACROECONOMIC POLICY TOOLS FOR GROWTH IN RUSSIA

To illustrate the effect of the distributed impact of policy instruments, let's consider

Table 3

Distributed Influence of Policy Instruments on the Structure of GDP (on the Share of Each Component of Expenditure in GDP) of the Russian Economy, 2002–2023

Target parameter	Model	Statistics	Impact assessment
Gross Consumption	$c = 23.5 * \left(\frac{M_2}{Y}\right)^{0.19} * b^{-0.14}$	R^2 = 0.7 R^2 *adj* = 0.66 F- criteria = 20.37 *D-W* calculation = = 1.54 ∈ [1.54; 2.46] White test: χ^2 calculation = 4.35 χ^2 criteria = 5.99	Increased monetization contributes to consumption growth, while a growing surplus or reduced spending decreases consumption
Government Expenditure	$g = 43 * \left(\frac{M_2}{Y}\right)^{-0.22} * b^{0.01}$	R^2 = 0.75 R^2 *adj* = 0.73 *F*- criteria = 28.75 *D-W* calculation = = 1.73 ∈ [1.54; 2.46] White test: χ^2 calculation = 4.61 χ^2 criteria = 5.99	Increased monetization generally reduces government spending. A larger surplus allows for greater spending
Gross Investment	$inv = 8 * i^{0.08} * d^{-0.18} * \left(\frac{M_2}{Y}\right)^{0.41}$	R^2 = 0.61 R^2 *adj* = 0.54 *F*-criteria = 7.32 *D-W* calculation = = 1.74 ∈ [1.66; 2.34] White test: χ^2 calculation = 7.7 χ^2 criteria = 7.81	Investments are heavily dependent on the level of monetization. The interest rate dependence is low, almost undetectable, which is also confirmed by the pairwise correlation analysis conducted below
Net Exports	$nx = 89 * \left(\frac{M_2}{Y}\right)^{-0.65} * b^{1.12}$	R^2 = 0.75 R^2 *adj* = 0.72 *F*- criteria = 29.3 *D-W* calculation = = 1.85 ∈ [1.54; 2.46] White test: χ^2 calculation = 4,05 χ^2 criteria = 5.99	The share of net exports decreases with increasing monetization and increases with rising budget revenues (or reduced spending). The ruble's devaluation worked to reduce the share of net exports due to import dependence. As the key interest rate increased, it reduced the share of net exports*

Source: Compiled by the authors.

*Note:** The following models have been selected: $nx = 66 * i^{-0,09} * \left(\frac{M_2}{Y}\right)^{-0,77} * d^{-0,25} * b^{1,58}$ (with heteroscedasticity) and a model with good statistics – $nx = 125 * i^{-0,04} * \left(\frac{M_2}{Y}\right)^{-0,71}$. The model presented in *Table 2* was retained by the method of elimination.

Table 4

The Distributed Impact of Policy Instruments on the Set Targets — GDP Growth Rate and Inflation (According to the Consumer Price Index), 2000–2023

Target parameter	Model	Statistics	Impact assessment
GDP growth rate (*y*)	$y = 4319 * i^{0.35} * d^{-2.23}$	R^2 = 0.72 R^2 *adj* = 0.69 *F*- criteria = 16.24 *D-W* calculation = 1.84 ∈ [1.55; 2.45] White test: χ^2 calculation = 0.72 χ^2 criteria = 5.99	The ruble's devaluation corresponds to a slowdown in growth (a decrease in the rate), and the key interest rate has a weak impact on the growth rate
Inflation (*p*)	$p = 3.2 * i^{0.65} * \left(\frac{M_2}{Y}\right)^{-0.14} * b^{0.4}$	R^2 = 0.71 R^2 *adj* = 0.67 *D-W* calculation = 1.66 ∈ [1.66; 2.34] White test: χ^2 calculation = 0.46 χ^2 criteria = 7.81	An increase in the monetization of the economy restrains inflation, and a growing surplus to a small extent and the key interest rate to a large extent are more responsive to a higher price level

Source: Compiled by the authors.

the GDP expenditure structure across three sectors, as well as the structure of policy objectives, represented by two goals: the growth rate and inflation. Economic policy assumes the need to ensure economic growth while adhering to established price targets (targeting). In neoclassical approaches to growth, the reaction of the structure and its influence on the target parameters are usually not taken into account [10]. The doctrine of distributed influence or macroeconomic management assumes that this influence is taken into account.

The growth rate (*y*) and inflation (*p*) represent the structure of macroeconomic policy goals. In *Tables 2–4*, in the "model" column, the left side of the equation represents the target parameter, denoted in the corresponding column. In *Table 2*, the target parameter is the share of the corresponding sector; in *Table 3*, it is the share of a GDP expenditure component (gross consumption, gross fixed capital formation, government expenditure, and net exports); and in *Table 4*, the target parameters are the GDP growth rate and the inflation rate. These tables contain the best models constructed by iterating through all the tools and filtering based on the statistics provided according to the algorithm above. *Table 2* reflects the distribution of instruments across the sectoral structure of the Russian economy.

In conclusion, we identify the following influences.

Firstly, the increase in the monetization level of the Russian economy over a twenty-year period was accompanied by the growth of the transactional sector and the decline of the manufacturing sector.

Secondly, the budget surplus (deficit reduction) acted to expand the manufacturing and raw materials sectors (*Table 2*), while restraining the transactional sector. The devaluation primarily strengthened only the raw materials sector.

Thirdly, the key interest rate, by increasing, restrained the commodity sector. There is a

Table 5

Matrix of Paired Correlations of Macroeconomic Policy Objectives and Instruments

Targets of policy	Key interest rate, %	M2/Y, %	Average annual dollar exchange rate	Income/Expenses
DP growth rate, %	0.34	–0.50	–0.38	0.78
Inflation	0.6	–0.51	–0.43	0.28

Source: Calculated by the authors.

Table 6

Matrix of Paired Correlations of GDP Structure Elements (Sector Shares) and Policy Instruments

Elements of GDP (sectors share)	Key interest rate, %	M2/Y, %	Average annual dollar exchange rate	Income/Expenses
Raw material	–0.17	0.28	0.51	0.27
Processing	0.3	–0.82	–0.79	0.73
Transactional	–0.12	0.49	0.29	–0.82

Source: Calculated by the authors.

Table 7

Matrix of Paired Correlations of Elements of the GDP Structure (by Share of Expenditures) and Policy Instruments

Elements of GDP (by share of expenditure)	Key interest rate, %	M2/Y, %	Average annual dollar exchange rate	Income/Expenses
Gross consumption	–0.34	0.73	0.34	–0.57
Government expenditure	0.47	–0.72	–0.50	0.40
Gross accumulation	–0.03	0.30	0.04	0.05
Net exports	0.20	–0.59	–0.37	0.70

Source: Calculated by the authors.

very weak correlation between the interest rate and the share of the transaction sector (*Table 2*, second column, last row). When this factor is removed and monetized, the second model with similar statistical characteristics shows an inverse relationship between the budget surplus and the share of the transactional sector over the considered time interval. The interest rate had a restraining effect on the manufacturing sector through investment limitations (it was not included in the model for the manufacturing sector — *Table 2*). According to the algorithm described above, models were selected based on the

best statistics, excluding autocorrelation and heteroskedasticity. In this regard, the best model parameters were determined by trial and error.

Table 3 presents the distribution of macroeconomic policy instruments across GDP components, illustrating the varying impact of the same measures on the elements of the GDP expenditure structure. Monetization increases gross consumption and accumulation, but is inversely related to net exports and government spending (*Table 3*).

A budget surplus limits gross consumption but expands government spending and net exports. Devaluation reduces gross accumulation, the interest rate has a weak impact on investment as it increases in the event of devaluation and/or accelerating inflation, and gross accumulation depends on many other conditions affecting the investment process besides the interest rate (the availability of alternatives in the form of the financial sector, capital outflow, the state of investment objects, institutional constraints, the established economic structure, etc.). On average, of course, a higher interest rate slows down investment, although the model relationship in this part is not obvious (*Table 3*).

Table 4 shows the distribution of the impact of policy instruments on the growth rate and inflation. The best models have been selected, from which the difference in influence is evident, which determines that while achieving one goal — lowering inflation — it is not possible to achieve the second goal — a high rate of economic growth.

From *Table 4*, it follows that the regression models obtained by the screening method provide insight into the established relationships in the dynamics of relevant variables — development goals and policy instruments. Inflation was contained by the monetization of the economy, the budget surplus had little impact on it, and the increase in the key rate corresponded to a higher price level. It should be noted that the resulting model, which links the growth rate of the Russian economy to changes in the shares of GDP components, confirms the braking role of the gross consumption share (c) on the overall growth rate and the stimulating role of an increase in the net export share (nx). The regression takes the form: $y = 62297 * c^{-2.7} * nx^{0.3}$ (statistics: $R^2 = 0.53$; $R^2\ adj = 0.48$; F-criteria = = 3.62; D-W calculation = 2.05 Є [1.54; 2.46]; White test: χ^2 calculation = 0.74; χ^2 criteria = 5.99).

Table 5 shows that even paired correlation estimates confirm that the key interest rate as a policy tool is positively correlated with inflation and has a weak impact on the growth rate. Monetization was increasing, while the growth rate was decreasing on average, so the correlation is negative. The same result applies to inflation. A significant positive correlation between budget surplus and growth rate, as well as between inflation and interest rates. The surplus here should be interpreted more as an expansion of budgetary capabilities rather than a reduction in spending, meaning the acquisition of additional revenues that were directed towards priority areas of economic growth.

Table 6 reflects the pairwise correlations between the shares of sectors in GDP and the macroeconomic policy instruments used during the period 2000–2023. It is evident that the key interest rate did not significantly affect the structure of the economy, unlike the exchange rate, with the devaluation being accompanied by a decrease in the share of manufacturing and an increase in the raw materials sector. The budget worked to strengthen the manufacturing sector and was inversely related to changes in the share of transactional sectors.

Table 7 shows that the key interest rate had the strongest impact on net exports, as did the exchange rate, but in a feedback loop. The level of monetization had a positive impact on gross consumption and a negative impact on government spending. The surplus with gross

consumption exhibits an inverse correlation. Thus, the tools used had different effects on the elements of the economic structure and on achieving development goals — the growth rate and inflation.

The analysis conducted confirms the idea that the impact of instruments is distributed across the structure of the economy and across the goals of economic development, with the instruments having different effects. But structural elements also have a varying impact on the goals — growth rate and inflation. These aspects are not taken into account today when forming government policy. The analysis conducted provides a picture of the tools already implemented — the set of tools applied simultaneously, without a potential assessment of the strength of their influence on various structures (the economy, goals, factors). The last task is beyond the scope of the present study, but the results obtained provide a real insight into the effectiveness of policy instruments according to the approach in *Fig. 1*. The perspective lies in assessing the cumulative effect of using various tools and selecting them based on measuring the changing strength of influence.

CONCLUSION

In conclusion, we would like to highlight the main findings of the study that it confirms.

Firstly, an algorithm is proposed for incorporating macrostructural analysis into economic growth policy planning, with an assessment of the distributed impact of the policy instruments used. It was found that the contribution of individual sectors to the growth rate does not correspond to their influence on the overall price dynamics (contribution to inflation), particularly in the case of the commodity sector (significant contribution to inflation and a smaller one to the growth rate) and the transaction sector (smaller contribution to inflation and the main one to the growth rate). The analysis conducted showed that the closeness of the connection and the strength of the influence of the tools considered differ significantly in both the structure of GDP and the development goals. Monetization is linked to the slowdown in growth and the decline in inflation in Russia from 2003 to 2023.

Secondly, through econometric modeling, the resulting regressions show varying degrees of influence of the instruments on the components of GDP by expenditure and sectors, on the growth rate, and on inflation, which confirms the need to differentiate the instruments used in achieving the growth and inflation target. Otherwise, as experience with implemented policies shows, anti-inflationary measures in Russia hinder economic growth. The arguments presented support the need for a significant change in macroeconomic policy in terms of its content, as it has been repeated for many years, leading to a cumulative effect — negative for growth and weakly positive for inflation, without significant structural changes across sectors and GDP expenditures (as well as the contribution of these elements to the growth rate — the dynamics model).

Thus, macroeconomic analysis and approach should be applied as a basic method for justifying and developing economic policy measures that influence development goals and the economic structure that either allows or prevents these goals from being achieved.

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