Comprehensive Analysis of Expenses of the Population and Assessment of their Impact on the Development of the Kyrgyz Economy

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Abstract

Household consumption expenditures are one of the important factors of economic development. According to Keynes' theory, they directly affect the aggregate demand and economic development of the state. Expenditures on final consumption of the population in the GDP of the Kyrgyz Republic in different years occupied about 75-85%. This importance makes it relevant to comprehensively study consumer spending as one of the main determinants of public finances. Based on statistical data for a representative period using statistical and economic-mathematical methods, a comprehensive analysis of population expenditures was carried out, the degree of their dependence and other variables on the economic development of the Kyrgyz Republic was revealed, linear regression was determined with an adequate interpretation of the results and the possibility of using regression models in forecasting. Based on the results of the analysis, the indicators of marginal propensities to consumption and saving are calculated, the multiplier of expenses for the Kyrgyz Republic and its regions. The data obtained are extremely ambiguous, however, in conditions of unstable economic development in studies based on panel data, the main trend seems to be the identified trend, which shows the willingness of more affluent regions to potentially save more for the purpose of future investment in the economy of the Kyrgyz Republic. The validity of the assessment of the relationship and the use of models for the development of concepts of economic development of the Kyrgyz Republic is shown.

1 Introduction

The decline in the pace of economic development is currently a global problem of the world economy. This is due to the modern challenges of social development.

Long before the economic crisis, due to the pandemic and global geopolitical problems, a slowdown in the pace of economic development in both developed and developing countries was determined. Thus, Russian researchers of the problem with the use of mathematical methods Zaretskaya V.G. et al. It was stated that, despite overcoming the acute phase of the financial crisis and the current risks taken under control, the hope for a rapid recovery of the Russian economy is not justified (Zaretskaya and Osinevich, 2015). Meanwhile, researchers and economists confirm the need for economic growth for the evolution of mankind. Theories of economic growth have developed at all times depending on the period and dynamics of the economy (Boldeanu and Constantinescu, 2015).

Analysts of international financial organizations in their annual studies of recent years predict low GDP growth rates. For example, the UN report on the world economic situation and prospects already in 2019 gave a disappointing forecast of a slowdown in global growth to the lowest rate in three decades. As noted, small states that are more dependent on foreign trade, have a high level of debt, and are more susceptible to unfavorable development conditions will be particularly vulnerable (UN Report, 2019). However, according to such forecasts, there is always a discrepancy between the actual data and the forecast data due to the influence of a large number of different factors on the pace of economic development (socio-economic, epidemiological, political, natural and climatic, etc.).

The relatively high rate of economic growth in the Kyrgyz Republic at the level of 7% in 2022 is estimated in the World Bank Survey as a consequence of the development of the gold mining, agriculture and services sectors, namely trade as a result of additional demand under the influence of largely random or extraordinary factors. Therefore, GDP growth in 2023 is projected at a more moderate rate of 3.5% (World Bank Report, January 2023). Meanwhile, the GDP growth rates determined by the Government of the Kyrgyz Republic are higher: at the level of 4.9% in 2023, 4.4% in 2024 and 4.5% in 2025 (Law of the Kyrgyz Republic, January 17, 2023, No. 3).

When determining GDP and its changes compared to last year, many factors are taken into account: prices, output volumes by industry, budget revenues, government expenditures. When taking into account the influence of factors, it is necessary to proceed from the fact that, as the Russian researcher defines, "conceptual models of the impact on the factors of economic growth of the region should depend on an understanding of their complexity in implementation, knowledge of tools in each case, be not only indicators of optimization, but also ensure an improvement in the quality of life of the population and the environment (Osinevich, 2011).

In connection with the above, the topic of the study of the impact of household spending as a component of GDP on economic growth and the definition of ways of its development are relevant.

2 Methods and Methodology

The study of consumer spending of the population and their impact on the indicator of economic development of the country was carried out according to statistical data of the National Statistical Committee of the Kyrgyz Republic for the period from 2005 to 2021, obtained both from household survey data based on statistical probability (Standard of living of the population) and calculated according to the methodology of the System of National Accounts (National Accounts). In the course of the study, economic and statistical methods, computational and constructive methods based on the Keynes concept were used.

The definition of consumption functions for the Kyrgyz Republic and regions (based on their indicators of marginal propensities to consumption, saving and the multiplier of expenditures for the period) was done using the economic and mathematical method. Correlation and regression analysis of the relationship of indicators of the finances of the population was carried out using computer applications.

3 Results and discussion

3.1 Household expenditures of the Kyrgyz Republic as part of gross domestic product

The composition of gross domestic product, calculated by the method of using income, is characterized by final consumption expenditures (individual by institutional sectors of the economy and collective), gross accumulation and net exports of goods and services.

We will analyze individual elements of the use of GDP for two periods that differ in the rate of economic growth – from 2006 to 2012 with certain differences in economic development due to socio-political upheavals and from 2013 to 2021 with a more stable rate of GDP growth (Table. 1), except for the last two years during the pandemic.

Indicators	**Average growth rates for the period from 2006 to 2012**	**Average growth rates for the period from 2013 to 2021**
Gross domestic product	104.0	103.8
Final consumption costs	*105.3*	103.2
Individual consumption expenses	*105.7*	103.5
Households	*106.4*	103.8
Gross accumulation	*117.2*	105.6
Gross fixed capital accumulation	*115.3*	105.1
Export	103.9	100.6
Import	110.1	102.6

Table 1. *Average growth rates of elements of final demand in the KR (in constant prices, percentage).* ***Source:*** *National Statistical Committee, 2006-2021*

The table shows that in the first period of the economic development of the Kyrgyz Republic, the average GDP growth rate was achieved due to the outpacing growth of spending on individual consumption, and especially households, as well as due to the growth of investment demand in the domestic market, even greater than the growth of consumer demand. The rate of export growth was on par with GDP growth. That is, the growth of economic development was restrained by a low indicator of the growth of domestic consumer demand, mainly in the sector of public institutions due to the small proportion of non-profit organizations serving households.

Against this background, the average growth rate of consumer demand in general and for households is noticeably lagging behind the GDP growth rate in the period from 2013 to 2021. The average GDP growth over the period was higher due to the prevailing favorable conditions for economic development, including in connection with the reduction of the gap between the average growth rate of imports over exports.

Final consumption expenditures are an important factor in the development of GDP, which largely consists of individual consumption, including individual household consumption. Figure 1 shows the change in the share of the main component in the GDP of the Kyrgyz Republic in recent years.

As can be seen, over the period from 2013 to 2021, there has been a decrease in the share of expenditures on individual consumption, mostly due to expenditures on individual consumption of households. This indicates a decrease in consumer spending and, accordingly, a reduction in domestic demand, which along the chain causes a slowdown in the rate of production growth in the economy of the Kyrgyz Republic.

The standard of living of the population is to a certain extent characterized by changes in the structure of monetary expenditures of the population, as an integral element of the final consumption of households.

Let's analyze the structure of monetary expenditures of the population, calculated by the average per capita monetary expenditures of the population of the Kyrgyz Republic (Table 2).

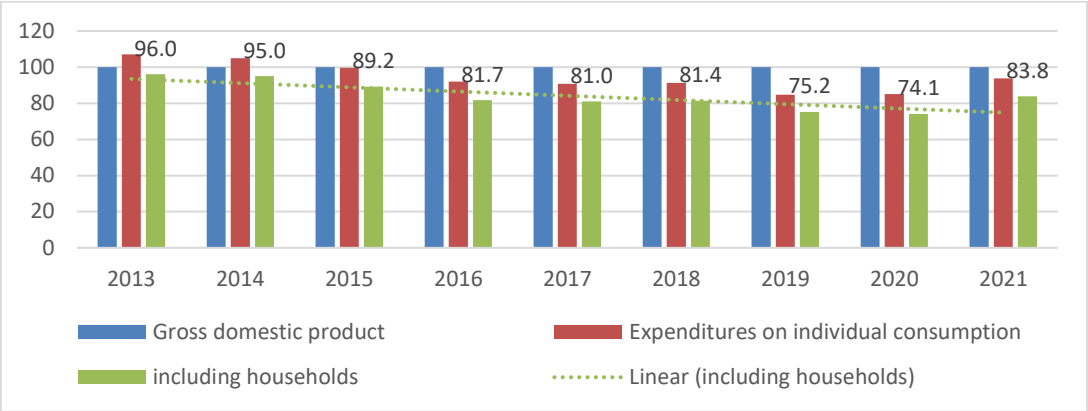

Figure 1. *Dynamics of expenditures on individual consumption as part of the GDP of the KR (in current prices, as a percentage of the total).* ***Source:*** *National Statistical Committee, 2013-2021*

Indicators	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
Monetary expenses – total	100	100	100	100	100	100	100	100	100
including consumer expenses for:	86.2	85.1	85.9	85.0	86	84.4	84.5	85.6	85.7
food products	47.0	44.9	45.8	44.5	42.7	41.3	40.8	43.9	41.9
non-food products	17.9	23.3	23.0	22.7	24.8	24.1	23.9	21.6	24.1
paid services	21.2	17.0	17.1	17.9	18.5	19.0	19.8	20.1	19.7
taxes, fees, payments	6.4	6.1	6.3	6.9	7.1	8.6	8.6	8.4	7.8
other monetary expenses	7.4	8.8	7.8	8.1	6.9	7.0	6.9	6.0	6.5

Table 2. *The structure of household monetary expenditures (as a percentage of the total).* ***Source:*** *National Statistical Committee, 2013-2021*

The characteristic dynamics of the structure of expenditures of the population of the Kyrgyz Republic has developed in the period up to 2020. The growth of per capita monetary expenditures of the population of the KR in 2019 compared to 2013 amounted to 1.4 times. The main share of monetary expenditures is consumer spending on the purchase of food, non-food products and services: 85-86%. If we analyze the structure of consumer goods, then a significant share of them falls on the purchase of food. This to some extent creates the basis for the development of the corresponding products of the agricultural and food sector of the Kyrgyz economy.

During the analyzed period, there was a decrease in the share of consumer spending in the total monetary expenditures of the population mainly due to an increase in the share of fiscal payments (from 6% to 8.6% over the observed period), which in 2000 accounted for only 3% of the monetary expenditures of the population 2004-2021 (Fynchina, 2014). For comparison, we will give the corresponding figures for the Russian Federation. If the share of expenses for the purchase of goods and payment for services for 2007-2018 is noticeably less than in the Kyrgyz Republic (more than 70%), then the share of expenses for mandatory payments and various contributions accounts for an average of about 10% (Peters I.A. et al., 2019), that is, there is a fairly rapid increase in the share of such expenditures in the Kyrgyz Republic.

The restrictions imposed in connection with the pandemic had a certain (accidental, uncharacteristic) impact on consumer behavior of the population in 2020-2021, while maintaining the general trend.

At the same time, there is a slight improvement in the structure of consumer spending, when the share of spending on food products has a downward trend due to an increase in spending on non-food products and paid services: "the increase in the share of non-food products in the total amount of spending on the purchase of goods is a progressive phenomenon and indicates an increase in living standards (Belyaevsky, 2013). However, it should still be noted that the share of household expenditures on food products in the Kyrgyz Republic at the level of 40-43% is quite large compared, for example, with the Russian Federation, where the share of food expenditures in the structure of household consumption at the level of 30% has been estimated as extremely high for many years (Shirov and Potapenko, 2020).

3.2 Correlation and regression analysis of the relationship of population spending on economic growth of the KR

The correlation and regression analysis of the assessment of the relationship between the indicator of economic development of the Kyrgyz Republic and public spending is based on the fact "that consumption is one of the main components of GDP formation" (Diacona and Mahab, 2015), as well as the fact that the use of mathematical and statistical tools will have a significant impact on the formulation of new concepts (Boldeanu and Constantinescu, 2015).

First of all, we will determine the combined impact on GDP growth of the constituent elements of the population expenditures of the Kyrgyz Republic by compiling a multiple regression equation and analyzing the parameters of correlation and regression analysis (Table 3).

Indicators/Factors	Consumer spending, million soms (x_1)	Taxes and mandatory payments, million soms (x_2)	Other expenses, million soms (x_3)
Linear multiple regression equation	$y= -38096+1.043x_1+11.83x_2+3.46x_3$		
Standardized regression coefficients (β)	0.405	0.519	0.079
Equation in standardized form	$y=0.395x_1+0.512x_2+0.098x_3$		
Uncorrected multiple determination coefficient ($R^{2)}$	0.98		
Multiple correlation coefficient	0.989		
Elasticity coefficient (E)	0.5	0.46	0.14
Average approximation error (A)	6.9 < 15		
General F-criterion (Ffact/Ftable)	285.7 > 3.41		

Table 3. *Parameters of correlation and regression analysis of the relationship between GDP and expenditures of the population of the KR for the period from 2005-2021.*

The multiple regression model includes consumer spending (x_1), taxes and mandatory payments (x_2), other expenses (x_3).

Regression parameters show that with an increase in consumer spending of the population by 1 million soms, nominal GDP growth will amount to 1.043 million soms. An increase in taxes and mandatory payments by 1 million soms will contribute to GDP growth by 11.83 million soms. An increase in other expenses of the population by 1 million soms will cause a GDP growth of 3.46 million soms. Thus, the multiplier effect is affected, when an increase in the expenditure element leads to an increase in GDP by a larger amount than the initial costs.

The calculated standardized regression coefficients – β coefficients – by virtue of comparability allow us to rank the degree of influence of these factors on GDP. The expenses for taxes and mandatory payments and consumer spending have a greater impact on the indicator of economic growth in the Kyrgyz Republic, since their coefficients are modulo about the same level (0.519 and 0.405) and significantly exceed the value of the standardized coefficient for the factor of other expenditures of the population with a coefficient of less than 0.1, the impact of which on GDP is almost imperceptible.

The multiple correlation coefficient of 0.989 shows a high correlation of this set of factors with GDP.

The uncorrected multiple determination coefficient suggests that the 98% change in GDP is explained by a change in the variation of the factors included in the model and only by 2% due to other factors.

The maximum coefficient of elasticity for the studied factors shows the factor of consumer spending, a change of which by 1% of its average value entails a change in GDP by 0.54%. The coefficient of elasticity for taxes and mandatory payments is slightly lower. The coefficient of elasticity for other expenses is low: if they increase by 1% of their average value, GDP growth will be 0.14%.

All components of the expenditures of the population of the Kyrgyz Republic are closely correlated with GDP. The pair correlation coefficients show a very high dependence of each factor on GDP (ryx_1=0.98; ryx_2=0.979; ryx_3=0.923). Overestimated estimates of the closeness of the pair correlation relationship are the result of a very high interfacial relationship (rx_1x_2=0.964; rx_1x_3=0.948; rx_2x_3=0.888). This characterizes the collinearity of the factors included in the model. In order to avoid multicollinearity, the analysis of the pair correlation coefficients requires the exclusion of redundant factors x_2 и x_3 from the regression model, for which the tightness of the pair dependence is less.

The compiled regression model is statistically significant, as can be seen from the Fischer F-test indicator: the actual value of the Fischer F-test for the entire set of factors (160.73) is higher than the tabular one (3.59), that is, the coefficient of determination for population expenditures is recognized as statistically significant.

The compilation and analysis of a multiple regression model with the components of public spending as factors (x_1, x_2, x_3), which are interrelated, allowed us to identify the dominant factor x_1 – consumer spending of the population. Thus, we can limit ourselves to the equation of paired regression (Padve, 2015), using the consumer spending factor of the Kyrgyz Republic as a variable.

The linear pair regression equation has the following form: y = 2,6445x_1 – 99206 and shows that with an increase in consumer spending of the population by 1 million soms, GDP increases by an average of 2.645 million soms.

The coefficient of elasticity according to the regression equation is 1.3, that is, a change in consumer spending of the population of the Kyrgyz Republic by 1% will entail a change in GDP by more than 1.3%.

The multiple correlation coefficient for this economic model is 0.98 and is estimated as a very high correlation of the result of the GDP regression model with the factor in question. Accordingly, the coefficient of determination of the R^2 model is close to 1, that is, 96% of the variation in the GDP of the Kyrgyz Republic is explained by changes in consumer spending of the population, and only 4% by the action of factors not included in the model. This indicates the acceptability of the model. The conclusion about the significance of the regression model is confirmed by the Fisher criterion, exceeding its actual value (555.9) over the tabular one at a 5% significance level (4.54).

The value of the average approximation error is 11.8% with an acceptable 15%, that is, this regression model adequately characterizes the relationship of the indicators under consideration.

3.3 Consumer spending multiplier as a tool of state regulation of socio-economic development

In their studies of the sphere of consumption and accumulation, analysts usually rely on the work of J. Keynes' "General Theory of Employment, Interest and Money", where objective and subjective factors affecting the propensity to consume are determined: "The amount that society spends on consumption obviously depends: 1) partly on the amount of income, 2) partly on other related objective circumstances, and 3) partly on the subjective needs and psychological inclinations and habits of individual members of society, as well as on the principles of, on the basis of which the total income is distributed among the participants of the economic process (and this distribution can also be modified in the event of an expansion of production)" (Keynes, 1993).

In turn, consumption forms the demand of the population, the aggregate demand. It serves as the cause of the reproductive process, creating a material base for it. And sets the pace for the dynamic development of the macroeconomic system. Household consumption is a necessary link in the reproductive process through the distribution of income for final consumption and savings used for investments, on which employment, aggregate demand and output (GDP) depend in the next reproductive cycle (Kusurgasheva and Chernovol, 2021).

Correlation and regression analysis of the relationship between household final consumption and GDP showed a direct linear dependence of two macroeconomic indicators in the study period (Fig. 2).

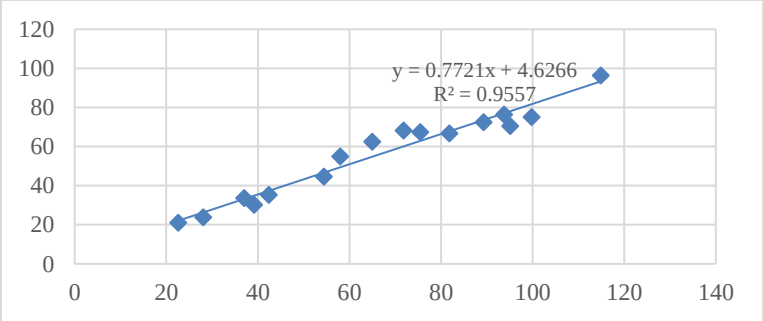

Figure 2. *Dependence of the final consumption of households on the GDP of the Kyrgyz Republic for 2005-2021, thousand soms per capita.*

With an increase in GDP per capita by 1 som, the increase in final consumption per capita will be 0.77 som. The correlation coefficient of final consumption of households and GDP is very high – 0.978.

The coefficient of determination as an indicator of the accuracy of the data description is 0.956, which suggests that more than 95% of the variations in final consumption are the influence of the GDP factor and less than 5% of the variations can be explained by the action of other factors not considered in this regression model. The significance of the model as a whole is shown by the Fisher Criterion, the actual value of which is higher than the tabular one, namely: 302 > 4.6. The elasticity coefficient of this regression model is 0.92, it shows that with an increase in GDP per capita by 1% of the average value, final consumption per capita will increase by 0.92%. The quality of the one-factor model is high and is characterized by an approximation coefficient within acceptable limits.

The calculated function of the dependence of the final consumption of households on the GDP of the Kyrgyz Republic ($y = 0.7721x + 4.6266$) allows us to determine the marginal propensity to consume (in this case, the average for the period from 2006 to 2021). It should be noted that 2020 is characterized by atypical data in the statistical sample (under the influence of restrictive measures due to COVID-19 the decrease in GDP per capita was almost 5%), however, adjusted for the prevailing high growth in 2021.

Since the increase in GDP per capita by 1 som brings an increase in consumption by an average of 0.77 som, the coefficient of the average marginal propensity to consume in the Kyrgyz Republic for the study period will be 0.77 (0.77/1). According to classical conditions, the marginal propensity to consume and the marginal propensity to accumulate are equal to 1 in total.

Consequently, the coefficient of the average marginal propensity to accumulate will be equal to 0.23 (1-0.77). Then the multiplier of expenses (consumption) will be 4.35 (1/0.23). That is, the effect on the change in the GDP

of the Kyrgyz Republic from consumption expenditures made by the population on average over the period was more than fourfold (for comparison: in the Russian Federation, the multiplier of such expenditures is slightly lower – 2.9 (Zaretskaya and Kondratieva, 2011).

In this regard, it is interesting to analyze the dependence of the final consumption of households (efficiency/x) on gross regional income (GRP) by regions of the Kyrgyz Republic. The calculation of the indicators of the multiplier of expenditures by regions was carried out according to the above scheme based on the equation of dependence of final consumption on GRP by regions of the Kyrgyz Republic. Since the National Statistical Committee of the Kyrgyz Republic does not determine the volume of final consumption by the regions of the Kyrgyz Republic, these data were obtained by the author in proportion to the share of GRP of the regions in the GDP of the Kyrgyz Republic. Based on this, the use of data with certain errors gives less accurate modeling results (Table 4).

	The equation of paired regression	**Marginal propensity to consume (MPC)**	**Marginal propensity to save (MPS)**	**Consumer spending multiplier (k)**	**GRP for 2018, thousand soms per capita**
Kyrgyz Republic	y = 0.7721x + 4.6266	0.772	0.228	4.39	93.8
Batken region	y = 0.8193x + 0.8787	0.819	0.181	5.52	38.9
Jalal-Abad region	y = 0.7657x + 3.0696	0.766	0.234	4.27	59.2
Issyk-Kul region	y = 0.7552x + 8.8487	0.755	0.245	4.08	142.1
Naryn region	y = 0.7394x + 4.3236	0.739	0.261	3.83	51.5
Osh region	y = 0.7501x + 2.4989	0.75	0.25	4.00	34.8
Talas region	y = 0.8063x + 2.0293	0.806	0.194	5.15	58.2
Chui region	y = 0.7791x + 4.1142	0.779	0.221	4.52	90.4
Bishkek	y = 0.7763x + 9.5946	0.776	0.224	4.46	220.2
Osh	y = 0.7937x + 3.319	0.794	0.206	4.85	115.9

Table 4. *The coefficients of marginal propensities to consumption and saving, the multiplier of expenditures on average for the period from 2006 to 2021 by regions of the KR.*

As can be seen from the table, the highest coefficient of marginal propensity to consume turned out to be in the Batken region, which is one of the last places in terms of GRP per capita along with the Osh region. Consumption in this area is more than produced, due to various subsidies and subsidies from the budget in view of the large number of settlements with a special status of border territories. Accordingly, the region has the highest coefficient of the expense multiplier.

For the rest of the regions, the indicators of the average marginal propensity to accumulate over the period under review to some extent correspond to the growth of GRP per capita.

In the conditions of unstable economic development in studies based on panel data, the main trend seems to be the identified trend, which shows the willingness of more affluent regions to potentially save more for the purpose of future investment in the economy of the Kyrgyz Republic. This conclusion also follows from the psychological law, "according to which, with an increase or decrease in the real income of society, the size of total consumption will change in the same direction, but not with such rapidity" (Keynes, 1993).

It should be noted that the indicators of the multiplier determined in this way by region for a certain period fully correspond to the position of the theory of J. Keynes on more intensive economic growth with a greater marginal propensity to consume. The development of the economy, the growth of the gross disposable income of the population will contribute to an increase in the marginal propensity to consume and the growth of the consumer spending multiplier.

At the same time, the author calculated according to the accepted scheme and analyzed the multipliers of population expenditures in the Kyrgyz Republic according to data for each year of the period under review. As a result, deviations were revealed for several periods when the values of the marginal propensity to consume exceeded 1 and, accordingly, the value of the multiplier lost its meaning (based on the condition provided by Keynes on equating the amount of income growth and savings growth to 1).

4 Conclusions

In the difficult conditions of the development of modern society, the study of issues of socio-economic development, consideration of problems of micro and macroeconomics based on the provisions of classical theory should be carried out taking into account the influence of new factors or deviations from the usual models and provisions. At the same time, the finances of the population are the least predictable sphere in the conditions of existing uncertainties, which makes it impossible to take into account all aspects of economic psychology that affect the main determinants of the finances of the population.

Thus, in conditions of unstable socio-economic development, taking into account the realities of a geopolitical nature, it is possible to draw conclusions:

- Over the period from 2013 to 2021, there has been a decrease in consumer spending and, accordingly, a reduction in domestic demand, which causes a slowdown in the growth rate of the Kyrgyz economy.
- The reduction in the share of consumer spending is mainly due to the rapid growth of fiscal payments.
- In the structure of consumer goods, a significant share falls on the purchase of food. This creates the basis for the development of mainly relevant products of the agricultural and food sector of the Kyrgyz economy.
- During the analyzed period, there has been some improvement in the structure of consumer spending due to an increase in spending on non-food products and paid services.
- As a result of the correlation and regression analysis, a greater influence on the indicator of economic growth in the Kyrgyz Republic was revealed by the costs of paying taxes and mandatory payments and consumer spending.
- The pair regression model is constructed using the consumer spending factor as the dominant variable to assess the relationship between this indicator and GDP. The parameters of linear regression allow us to talk about the significance of the regression model and an adequate characterization of the relationship of the selected indicators.
- During the analysis of the multiplier of population expenditures in the Kyrgyz Republic and its regions on average for the period, a trend corresponding to the position of the theory of J. Keynes on more intensive economic growth with a greater marginal propensity to consume.
- A low or atypical relationship between the marginal propensity to accumulate and income may be a consequence of the fiscal stimulus carried out in the Kyrgyz Republic to increase the income of the population both in individual regions and in the republic as a whole in a developing market economy and the often unstable socio-economic and political situation.

Correlation and regression analysis of the compiled regression models made it possible to assess the relationship between the indicators of household spending and GDP, as well as to determine the possibilities of their application to assess the impact of consumer spending of the population of the Kyrgyz Republic, the use of their constituent elements for regulatory purposes to give accelerated development of the economy of the Kyrgyz Republic and the compilation of GDP forecasts.

The results of the study of the relationship of household expenditures (final consumption of households), savings of the population of the Kyrgyz Republic with the determination of the expenditure multiplier for the KR and regions will be useful in developing directions of socio-economic policy in the country in order to give impetus to the developing economy of the KR and may also be of interest in further research on the topic.

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