ASSESSING MOLDOVA'S ECONOMIC DYNAMICS USING THE COBB-DOUGLAS PRODUCTION FUNCTION: ESTIMATION, VALIDATION AND FORECASTING[1]

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Abstract. The study evaluates the economic dynamics of the Republic of Moldova based on the Cobb–Douglas production function, with the aim of estimating, validating and forecasting the relationships between capital, labor and output. The econometric analysis, carried out on the basis of annual data for the period 1994–2024, included testing for stationarity, normality, autocorrelation and homoscedasticity, applying the Newey–West correction. The obtained coefficients ($\alpha \approx 0.37$, $\beta \approx 0.63$) confirm the hypothesis of constant returns to scale and are consistent with the results from the international literature. The model integrated Dummy variables to capture the structural shocks of 1996 (transition to a market economy) and 2022 (the war in Ukraine and the energy crisis), which had negative effects on productivity. The forecasts for 2025–2026 anticipate moderate GDP growth (2.5% and 3.6%), supported by capital intensity and labor dynamics, but limited by low total factor productivity. The results highlight the importance of investments in infrastructure, digitalization, and institutional reforms to strengthen resilience and long-term economic growth.

Keywords: Cobb-Douglas production function, economic model, economic shocks, factors of production

JEL Classification: A2, C5, E6

INTRODUCTION

The Cobb-Douglas function is significant in economics as a mathematical representation of the relationship between inputs (capital and labor) and output, the importance being expressed through the empirical estimation of production relations, its use in the theory of marginal productivity, by contributing to the establishment of the use of statistical techniques (Biddle, 2012). Currently, it is

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widely used both at the macroeconomic (Gamețchi & Solomon, 1998, pp. 348-355) and microeconomic levels ((Iacob & Dumitru, 2020) (Gamețchi & Solomon, 1998, pp. 191-210)). The Cobb-Douglas production function is part of complex models for analyzing the national economy at the macroeconomic level (Dobrescu, 2006). It is also used in the process of determining synthetic indicators (Havik, Karel et al., 2014), such as the potential Gross Domestic Product of the Republic of Moldova (Toacă & Tolocico, 2012).

Elements of the production function have been identified in the work of earlier economists, although widespread use of the function began with the explicit presentation by economist Paul Douglas and mathematician Charles Cobb. The first economist who formulated the production function algebraically in 1894 is considered to be Philip Wicksell. In (Velupillai , 1973) is emphasized how Wicksell formulated his production function in 1900–1901, which is identical to the Cobb–Douglas function. However, there is evidence to suggest that Johann von Thünen may have first formulated it in the 1840s (Mishra, 2007). But intensive use of these functions in economic analysis began in the 1930s, when it was first proposed by Charles Cobb and Paul Douglas in their classic work (Cobb & Douglas, 1928). They were the first to use empirical data to construct this model. It has been subjected to harsh criticism (Biddle, 2012), often unfriendly, but also to refinements, which have encouraged the academic community to continue research in this direction. Despite all the initial criticism, Cobb-Douglas regression has become a fundamental tool in economic analysis, influencing both microeconomics and macroeconomics.

The Cobb-Douglas function is significant in economics for several reasons. First of all, it is a formalized representation of economic processes (Cobb & Douglas, 1928), indicating inputs and outputs, creating possibilities for analyzing cause-effect relationships. In fact, this is a statistical tool (Biddle, 2012)that allows quantifying the contributions of inputs to production. Based on the function, the principle is determined according to which payments to production factors are determined by their marginal productivity. At the same time, the function has contributions to economic policy, because the discovery of the relationships between inputs and outputs provides quantitative tools to determine the effects of changes in labor and capital on production. A significant contribution, the Cobb-Douglas production function, had on modern econometrics, which in turn contributed to microeconomic and macroeconomic research. Thus, the Cobb-Douglas function became a cornerstone in economic modeling and empirical analysis. Cobb and Douglas were innovators in applying the LS (Least Squares) Method to economics, advancing empirical research methods.

Estimating a production function for a real economy, whether at the macroeconomic or microeconomic level, remains a challenge, determined by several moments. This has generated and continues to generate discussions. One of the challenges is the quality of statistical information, but even more so what type of information should be included in the factors involved in the function. Another major challenge concerns the theoretical foundations of the function. The most radical in this regard are the Marxist and post-Keynesian schools, arguing that it oversimplifies reality, treats capital incorrectly and ignores the social and institutional relations of production. (Shaikh, 1973) demonstrated that the empirical success of the Cobb-Douglas function is due to its mathematical properties, not its economic validity. The heated discussions regarding the production function known as the "Cambridge capital controversy" had profound implications for economic theory, especially for the use of aggregate production functions and the foundations of neoclassical economics. There are several reasons underlying this controversy, one of which is related to the major difficulties in measuring capital, since capital is heterogeneous (e.g., machines, buildings) and its aggregation into

a single measure is problematic. This dispute has exposed fundamental flaws in neoclassical theory. The dispute did not lead to the abandonment of this theory, but it remains a reminder of the limits of an aggregate production function and the need for more robust theoretical foundations.

The formalization of economic processes is a tool that is useful in certain situations, but we must never forget the limits of any mathematical formulations. Socio-economic processes are too complex to be modeled even by the most sophisticated formulas. The multitude of relationships, but also the system effect, is complicated to be taken into account, even by the most complex formulas. However, mathematics (Kurakova, 2023)remains a useful tool in scientific research in the economic field. The mathematical apparatus comes, first of all, to arrange things that are obvious from an economic point of view, and their formalization allows the quantification of relationships that allow experiments to be carried out in laboratory conditions with the aim of determining the consequences of possible decisions. Although mathematics is an exact science, we cannot say the same about economics. In this context, the results of mathematical models used in modeling economic processes cannot be treated as exact, well-determined solutions. The result of a mathematical model can indicate a possible direction of evolution of events in the case of one or another decision. Often decisions, which are supported by an analysis based on formalized models, are less surprising. (Jacobs, 2023) mentions “a mathematical model should be the beginning of a dialogue, not the end”. This paper also mentions the excessive use of mathematical models in the decision-making process. The use of mathematical models requires a thorough understanding of the limitations, because a mathematical model is “a mathematical view of a phenomenon”. In conclusion, mathematical modeling (Kurakova, 2023)is an important tool in decision-making in various fields of activity, but it must be used with caution. It helps to analyze complex systems and processes, find optimal decisions and predict results. To achieve maximum efficiency, it is necessary to choose the right methods and algorithms, as well as to have a sufficient amount of data for analysis. The importance of mathematical modeling and the exchange of experience is actively discussed (Tasarib, Rosli, & Rambely, 2025). The problem is that there is increasingly a reluctance towards mathematics (Nourallah & Farzad, 2012) and one of the methods would be to learn mathematics simultaneously with mathematical modeling, which would contribute to understanding the need for its use in the real field.

The purpose of this study is both didactic and practical, aiming at the use of the Cobb-Douglas production function in the analysis of economic processes, including forecasting. In the process of estimating the function, all the stages of econometric analysis specific to trend data were covered and described. This can be useful both for students of deeper analyses in mathematical modeling disciplines, and for researchers, whose goal is economic analysis.

THE GENERAL FORM OF THE COBB-DOUGLAS PRODUCTION FUNCTION

The general form of the Cobb-Douglas production function is

$$Y = A * K^{\alpha} * L^{\beta} \quad (1)$$

To estimate this model using LS method, linearization by logarithm is required. In the specialized literature, logarithmization is done by natural logarithm. This is just a convention, in reality any other logarithm can be used, but the natural logarithm is easy to explain economically, namely the estimated coefficients are elasticity coefficients, used quite often in economic analyses. Given the uniformity in the specialized literature, after logarithmic transformation, (1) becomes:

$$\log^2(Y) = \log(A) + \alpha * \log(K) + \beta * \log(L) \quad (2)$$

In case if the hypothesis $\alpha + \beta = 1$, then the Cobb-Douglas function has the form:

$$Y = A * K^{\alpha} * L^{1-\alpha} \quad (3)$$

To estimate the parameters of this function, the following logarithmic form is used:

$$\log(Y/L) = \log(A) + \alpha * \log(K/L) \quad (4)$$

Next, regressions in the form of (2) or (4) are tested based on the annual statistical information of the Republic of Moldova for the period 1994-2024. The sample includes 29 observations, which allows validating the application of all statistical tests used in the estimation process. Statistical information is taken from the website statistica.md. Production values, i.e. Y is the Gross Domestic Product, K- gross fixed capital formation, and labor (L) was calculated as the average number of employees multiplied by the average wage in the economy. The factors are time trends, which implies the need to verify the stationarity of the series, in order to avoid spurious estimates and to ensure the validity of the obtained econometric relationships.

TESTING THE STATIONARITY OF SERIES

The stationarity of the data series was tested using the Phillips-Perron ((Phillips & Perron, 1988)) and Augmented Dickey-Fuller ((Dickey & Fuller, 1979), (Dickey & Fuller, 1981)) tests. The general form of the tests was presented in (Toaca , Staver , Stratan , Lopotenco , & Cociug , 2025). Stationarity tests applied to time series indicate that level series, including logarithmic ones, are not stationary (Table 1).

Table 1Stationarity testing of logarithmic series.

Augmented Dickey-Fuller Unit Root Test on LOGY

Null Hypothesis: LOGY has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.376406	0.5792
Test critical values:	1% level	-3.689194	
	5% level	-2.971853	
	10% level	-2.625121	

Null Hypothesis: LOGK has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.953504	0.7560
Test critical values:	1% level	-3.679322	
	5% level	-2.967767	
	10% level	-2.622989	

[2] The log notation was used instead of ln, since in the econometric software EViews the natural logarithm is notated in this way.

Null Hypothesis: LOGL has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.220510	0.2037
Test critical values:	1% level	-3.679322	
	5% level	-2.967767	
	10% level	-2.622989	

Source: *Econometric estimation results generated using EViews software.*

The differences of order 1 become stationary (Table 2), which means that the series are integrated of order 1 (I(1)).

Table 2Stationarity testing of differenced logarithmic series.

Null Hypothesis: D(LOGY) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.149772	0.0000
Test critical values:	1% level	-3.689194	
	5% level	-2.971853	
	10% level	-2.625121	

Null Hypothesis: D(LOGK) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.538352	0.0001
Test critical values:	1% level	-3.689194	
	5% level	-2.971853	
	10% level	-2.625121	

Null Hypothesis: D(LOGL) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.783374	0.0080
Test critical values:	1% level	-3.689194	
	5% level	-2.971853	
	10% level	-2.625121	

Source: *Econometric estimation results generated using EViews software.*

REGRESSION ESTIMATION

The Cobb-Douglas function was estimated by LS method using EViews software. Obtaining a plausible regression involved several attempts with repeated verification of the tests confirming the statistical quality, respectively the compliance with the basic hypotheses. As a result, the regression presented in Figure 1 was obtained. Notations used in regression:

- *DLOG(K/L)* - first-order differences of the natural logarithm of the *Capital* to *Labor ratio;*
- *DLOG(Y/L)* - first-order differences of the natural logarithm of the *Output* to *Labor ratio;*

- DUMMY96 - A binary variable that will capture the shock of the transition from the Soviet to the market economy:

$$DUMMY96 = \begin{cases} 1, for\ the\ year\ 1996 \\ 0, for\ the\ other\ years \end{cases}$$

- DUMMY22 - A binary variable that will capture the shock in 2022 (war in Ukraine, energy crisis, etc.)

$$DUMMY22 = \begin{cases} 1, for\ the\ year\ 2022 \\ 0, for\ the\ other\ years \end{cases}$$

According to the student statistic, all variables are significant.

Dependent Variable: DLOG(Y/L)
Method: Least Squares
Date: 04/09/25 Time: 15:58
Sample (adjusted): 1996 2024
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.022231	0.013071	-1.700816	0.1014
DLOG(K/L)	0.371524	0.083296	4.460258	0.0002
DUMMY22	-0.192696	0.072604	-2.654078	0.0136
DUMMY96	-0.253538	0.068969	-3.676125	0.0011

R-squared	0.663841	Mean dependent var	-0.045684
Adjusted R-squared	0.623502	S.D. dependent var	0.110283
S.E. of regression	0.067669	Akaike info criterion	-2.420937
Sum squared resid	0.114477	Schwarz criterion	-2.232345
Log likelihood	39.10359	Hannan-Quinn criter.	-2.361872
F-statistic	16.45651	Durbin-Watson stat	1.662529
Prob(F-statistic)	0.000004		

Figure 1. Estimated model.

Source: *Econometric estimation results generated using EViews software.*

Multiple linear regression looks like this:

$$DLOG\left(\frac{Y}{L}\right) = -0{,}022 + 0{,}37\ DLOG\left(\frac{K}{L}\right) - 0{,}19\ DUMMY22 - 0{,}25 DUMMY96 \qquad (2)$$

The obtained regression confirms the hypothesis α+β=1, where α=0.37, β=0.63. The obtained results are reasonable and correspond to the research carried out in this direction. If in the classical model values of approximately (Cobb & Douglas, 1928) α=0.25, β=0.75 were obtained, then in subsequent research they vary: the coefficient α between 0.20 and 0.40, and the coefficient β between 0.60 and 0.80. In the methodology of the European Commission ((Havik, Karel et al., 2014), (Streicher, 2022)) for the calculation of potential GDP, the values α=0.35, β=0.65 are proposed. For OECD countries (Organization for Economic Cooperation and Development) whose members are high-income states, (Charles, 2003) it is documented that the share of capital is in the range of 0.3-0.4. Many economic models assume that the share of labor must be constant in time and space. Time series data are consistent with this notion, while analysis of international cross-sectional data (Douglas, 2002)demonstrates that the labor share varies between 0.60 and 0.80.

If the sum of the coefficients is 1, the function is considered to have constant returns to scale, in other words, if we multiply all the factors of production, then the output multiplies by exactly the same proportion. The economic meaning of the variables included in the model: the dependent

variable is Y/L - labor productivity, which depends on K/L - capital per worker (capital intensity). The capital-labor ratio (K/L) measures capital intensity. Typically, over time, firms tend to have a higher capital-labor ratio, as they try to obtain productivity improvements from capital investments and automation of the production process.

Testing fundamental statistical hypotheses.

Normality of the residuals. The distribution of the residuals is bell-shaped, centered on zero, with no strongly deviated values.

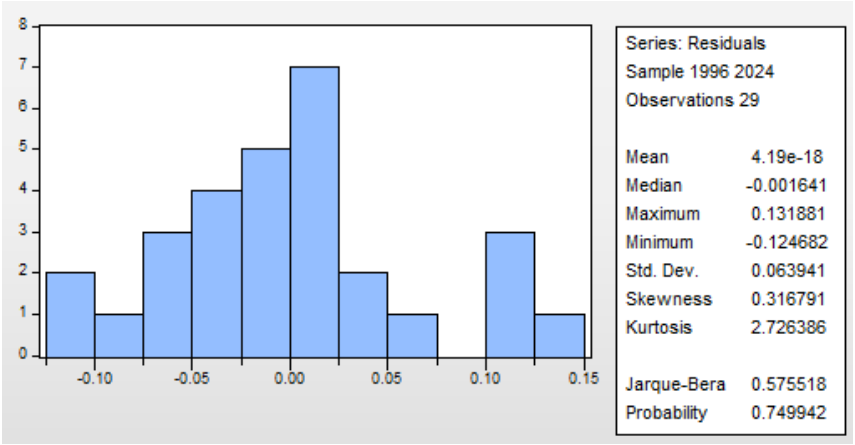


Figure 2. Testing the normality of the residuals.

Source: *Econometric estimation results generated using EViews software.*

Based on the information in Figure 2 we obtain:

- Average – $4{,}19 * 10^{-18}$, close to zero, largest residual – 0,13; smallest – $(-0{,}12)$.
- Negative skewness (slight leftward skew)
- Kurtosis – 2.72 – close to 3, demonstrates an almost normal distribution.
- The Jarque-Bera index of 0.575 and the probabilityof 0.7499 suggest that there is no significant evidence to reject the hypothesis of normality of the residuals. A probability greater than 0.05 indicates that the residuals are normally distributed, which confirms the validity of the regression model assumptions.

Autocorrelation of Errors. The Breusch-Godfrey Serial Correlation LM test checks whether the regression residuals are autocorrelated (a key assumption for valid LS method inference). We cannot reject the null hypothesis of no serial correlation at 10%, but there is slight evidence of autocorrelation at 5%.

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	2.758948	Prob. F(2,23)	0.0843
Obs*R-squared	5.611179	Prob. Chi-Square(2)	0.0605

Figure 3. for error autocorrelation using the Breush-Godfrey test.

Source: *Econometric estimation results generated using EViews software.*

Autocorrelation correction can be performed by recalculating standard errors using the HAC (Heteroskedasticity and Autocorrelation Consistent) method. For this purpose (Figure 4), the Newey-West method was used.

Dependent Variable: DLOG(Y/L)
Method: Least Squares
Date: 04/09/25 Time: 16:36
Sample (adjusted): 1996 2024
Included observations: 29 after adjustments
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.022231	0.013258	-1.676767	0.1061
DLOG(K/L)	0.371524	0.113784	3.265166	0.0032
DUMMY22	-0.192696	0.030983	-6.219493	0.0000
DUMMY96	-0.253538	0.014209	-17.84290	0.0000

Figure 4. Re-estimation of the regression in which the standard errors were corrected by the Newey–West method.

Source: *Econometric estimation results generated using EViews software.*

The presence of autocorrelation of errors may affect the significance of exogenous factors. However, re-estimation of the regression demonstrated the significant influence of the factors included in the model on labor productivity (Figure 4).

Homoscedasticity of errors. The Breusch-Pagan-Godfrey test for heteroscedasticity shows that the hypothesis of the presence of heteroscedasticity can be rejected, having F-statistic – 0.43, p – 0.7316.

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.432390	Prob. F(3,25)	0.7316
Obs*R-squared	1.430493	Prob. Chi-Square(3)	0.6984
Scaled explained SS	0.917651	Prob. Chi-Square(3)	0.8212

Figure 5. Testing for homoscedasticity of errors using the Breush-Pagan-Godfrey test.

Source: *Econometric estimation results generated using EViews software.*

Finally:

- Capital intensity per worker significantly improves productivity;
- Structural shocks (1996, 2022) are captured and are significant;
- The model is homoscedastic;
- The residuals are well distributed (normality is maintained);
- Autocorrelation was corrected by HAC.

Interpretation of the results obtained:

1) Consistent economic theory: The obtained model is based on the logic of the Cobb-Douglas production function, for the case when α+β=1.

2) The coefficient DLOG(K/L) (~0.37) is reasonable (Figure 1) and consistent with theory and estimates from other countries.

3) The dummy variables capture the institutional and geopolitical shocks that Moldova faced in 1996 and 2022.

4) The model explains 66.38% of the production variation ($R^2 = 0.6638$), which confirms the correct specification of the model.

5) The F-statistic value is 16.45 with a probability of 0.0000, confirming that the model is significant overall.

ANALYSIS OF THE EVOLUTION OF THE NATIONAL ECONOMY BASED ON THE OBTAINED MODEL

Productivity increases mainly through capital intensity. An one percent increase in capital intensity per worker is associated with a 0.37% increase in labor productivity. This finding confirms the importance of investments in infrastructure, machinery, and technology for increasing productivity. Total factor productivity (TPF) growth (c=-0.022) is low, indicating the need for institutional and structural reforms. The estimated average TPF growth is slightly negative over the period, suggesting structural inefficiencies unrelated to capital or labor accumulation. This highlights the need for institutional reforms, technological adoption, and alignment of the education system with labor market needs.

Moldova's economy remains sensitive to shocks – energy and regional risk mitigation are essential:

1) 1996: Productivity fell by ~25%, reflecting deep disruptions during the post-Soviet economic transition.

2) 2022: There was a ~19% drop in productivity, likely caused by the war in Ukraine, the energy crisis, and supply chain disruptions.

Based on the obtained model, political implications can be proposed for improving the economic situation of the Republic of Moldova. In fact, the proposals made are known and are largely the main objectives of the current leadership. It can be noted that some of them are on the way to being realized. One of the proposals is to support and expand public and private investments to maintain the deepening of capital. This is the direction in which we need to work, but it is necessary to mention that geopolitical conditions continue to be an obstacle in this direction.

Another problem is the increase in TFP. Improving education and vocational training further is one of the factors through which TFP growth can be achieved. Dual education can be a support in this direction. The Government of the Republic of Moldova creates conditions for the opening of new SMEs (Small and Medium Enterprises). SMEs implement new technologies and digitize the production process by accessing projects. The public sector has a special importance in this direction. It is necessary to improve the efficiency of the public sector and institutional quality.

Another direction is to strengthen economic resilience to shocks, which can be achieved by diversifying trade and energy sources. These are actions successfully implemented by the Moldovan government, the benefits of which will be visible in the long term.

ECONOMIC FORECAST

The estimated model can be used for the forecast of the GDP of the Republic of Moldova. As an initial stage in this process, it is necessary to estimate the dynamics of capital and labor. The forecast was carried out based on the trends (Figure 6) of the 1st order differences of the logarithmic series, which were found to be stationary series.

Dependent Variable: D(LOG(K))
Method: Least Squares
Date: 04/18/25 Time: 10:59
Sample (adjusted): 1996 2024
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.135831	0.030410	4.466680	0.0001
@TREND	-0.003309	0.001730	-1.913056	0.0673
DUMMY09	-0.458534	0.076885	-5.963884	0.0000
DUMMY99	-0.384689	0.079354	-4.847759	0.0001

R-squared	0.695346	Mean dependent var	0.057112
Adjusted R-squared	0.658787	S.D. dependent var	0.129182
S.E. of regression	0.075460	Akaike info criterion	-2.202993
Sum squared resid	0.142354	Schwarz criterion	-2.014400
Log likelihood	35.94340	Hannan-Quinn criter.	-2.143928
F-statistic	19.02006	Durbin-Watson stat	2.025373
Prob(F-statistic)	0.000001		

Dependent Variable: D(LOG(L))
Method: Least Squares
Date: 04/18/25 Time: 11:26
Sample (adjusted): 1996 2024
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.115300	0.026213	4.398636	0.0002
@TREND	-0.002950	0.001550	-1.903597	0.0690
DUMMY22	0.239130	0.069060	3.462647	0.0020
DUMMY00	0.184010	0.068112	2.701585	0.0125
DUMMY14	-0.197910	0.066731	-2.965772	0.0067

R-squared	0.586765	Mean dependent var	0.078820
Adjusted R-squared	0.517893	S.D. dependent var	0.093855
S.E. of regression	0.065167	Akaike info criterion	-2.468141
Sum squared resid	0.101922	Schwarz criterion	-2.232400
Log likelihood	40.78804	Hannan-Quinn criter.	-2.394310
F-statistic	8.519595	Durbin-Watson stat	2.040748
Prob(F-statistic)	0.000199		

Figure 6. Trends for the time series D(LOG(K)) and D(LOG(L)).
Source: *Econometric estimation results generated using EViews software.*

The definition of the Dummy variables is analogous to the definition in regression (3). The factors included in the trend, according to *the Student statistic*, are significant. The residuals have an almost normal distribution, without visible outliers or strong asymmetries (Figure 7).

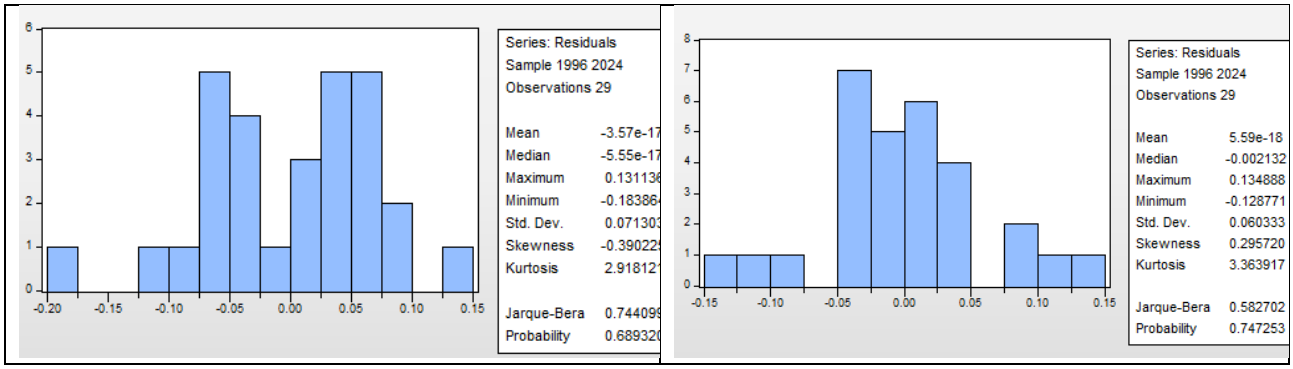


Figure 7. Checking the normality of the residuals for the trend a) D(LOG(K)) and b) D(LOG(L)) respectively.
Source: *Econometric estimation results generated using EViews software.*

Homoscedasticity of the residuals There is no evidence of heteroscedasticity in the developed models ($p > 0.05$ in all tests). The residuals have constant variance, it follows that the hypothesis of homoscedasticity cannot be rejected.

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.331357	Prob. F(3,25)	0.2865
Obs*R-squared	3.994888	Prob. Chi-Square(3)	0.2620
Scaled explained SS	2.847310	Prob. Chi-Square(3)	0.4158

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.320965	Prob. F(4,24)	0.8611
Obs*R-squared	1.472557	Prob. Chi-Square(4)	0.8315
Scaled explained SS	1.192067	Prob. Chi-Square(4)	0.8794

Figure 8. Testing the homoscedasticity of errors in the developed models using the Breush-Pagan-Godfrey test.
Source: *Econometric estimation results generated using EViews software.*

Autocorrelation of errors. There is no autocorrelation of the residuals up to lag 2 and the model without AR terms can be retained, and the estimates are statistically valid.

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.758036	Prob. F(2,23)	0.4799
Obs*R-squared	1.793357	Prob. Chi-Square(2)	0.4079

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.405730	Prob. F(2,22)	0.6714
Obs*R-squared	1.031601	Prob. Chi-Square(2)	0.5970

Figure 9. Testing the normality of residuals.

Source: *Econometric estimation results generated using EViews software.*

The macroeconomic forecast for the period 2025–2026 outlines a moderate recovery trajectory for the Republic of Moldova's economy. According to the developed scenario, gross domestic product is expected to register an annual growth of 2.5% in 2025 and 3.6% in 2026, signaling a gradual consolidation of economic activity. At the same time, the labor force is estimated to continue expanding, with rates of 2.7% and 2.4% in the same period, after a significant acceleration in previous years. The capital stock, an essential indicator for supporting investments and productivity, returns to a positive trend, with an estimated growth of 3.7% in 2025 and 3.4% in 2026. These dynamic highlights the importance of maintaining productive investments and implementing structural reforms, in order to improve the efficiency of the use of production factors and consolidate economic growth in the medium and long term.

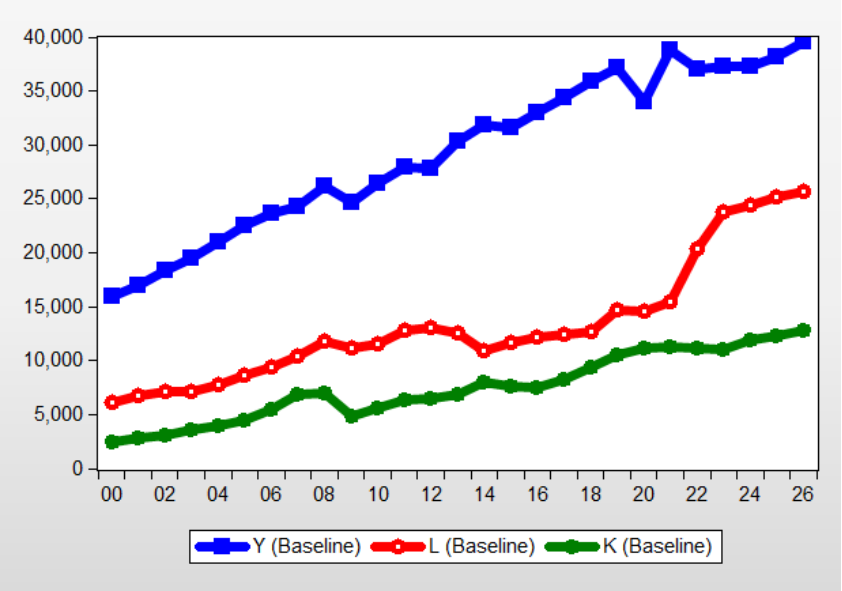


Figure 10. Evolution of Capital, Labor and Production.

Source: *Econometric estimation results generated using EViews software.*

Figure 11 showing the evolution of labor productivity (Y/L) and capital intensity (K/L) in the Republic of Moldova over the period 1996–2026 highlights fundamental economic relationships. After a sharp decline in productivity during the post-Soviet transition years, Y/L has stabilized, but at a low level and vulnerable to external shocks, such as the pandemic crisis and the war in Ukraine.

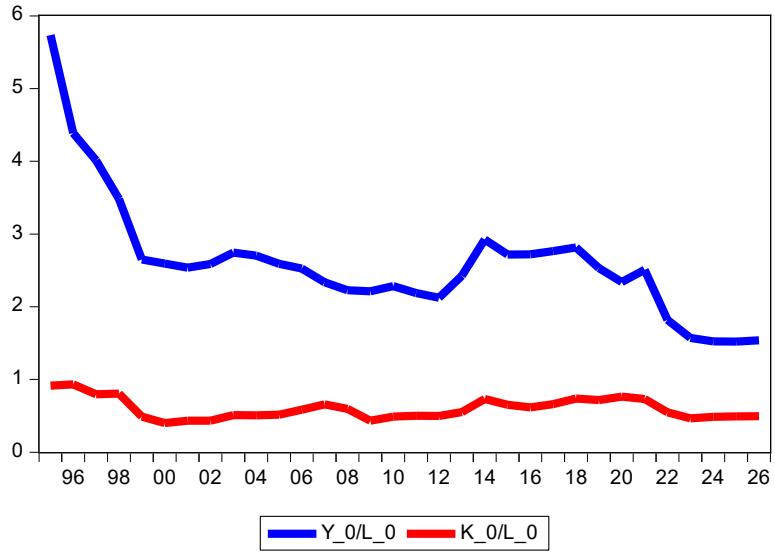


Figure 11. Evolution of labor productivity and capital intensity.
Source: *Econometric estimation results generated using EViews software.*

In parallel, K/L has recorded a relatively flat evolution, with slight increases between 2010 and 2018, followed by stagnation. This dynamic suggests an insufficient deepening of capital, which limits the potential for labor productivity growth. The relatively close correlation between the two series after 2010 confirms the significant role of capital in determining labor productivity in Moldova, and the stagnation of both indicates the need for structural reforms to stimulate investment and increase economic efficiency.

CONCLUSION

The research conducted confirms the validity of using the Cobb-Douglas production function in analyzing the evolution of the national economy. The econometric results obtained confirm the hypothesis of equality of the sum of the regression coefficients to one, which means that the economy has constant returns to scale. The estimated coefficient (0.37) is coherent with international literature and economic theory. By including Dummy variables, it was possible to capture the external shocks to which the national economy was subjected. The shocks led to a decrease in productivity, which confirms the vulnerability of the RM economy. This result once again indicates the need for policies that will strengthen the resilience of the national economy. The economic evolution of the Republic of Moldova depends particularly on capital accumulation and reforms that support productivity growth. The reforms needed in this direction are new technologies, digitalization of the national economy, development of human capital through education, vocational training and lifelong learning. This model provides a solid empirical basis for planning long-term growth policy.

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