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The Role of Business Lending in Gdp Growth

Nilufar Ilhomovna Sultanova
PhD student Tashkent State University of Economics,

ABSTRACT: This study was conducted using regression analysis of changes in the value of GDP per capita as a result of the influence of domestic lending to the private sector (as a percentage of GDP) and the share of entrepreneurship in GDP. The study showed that the change in the volume of domestic loans to the private sector (as a percentage of GDP) has a greater impact on the change in the value of GDP per capita. However, it should also be noted that an increase in factors and an increase in time series can affect the change in this conclusion.

KEYWORDS: GDP per capita, the share of entrepreneurs in GDP, credit, entrepreneurship, domestic loans to the private sector (as a percentage of GDP), small business, microcredit.

1. INTRODUCTION

No matter which country in the world we look at, we see government support for entrepreneurship. Entrepreneurship, whether small, medium or large, affects the development of employment, GDP growth, in a sense, production or services. In particular, the microfinance system is used in the development and financial support of small and medium enterprises in foreign countries.

The development of small business will solve the problem of poverty and social inequality, said M. Yunus (Yunus, Jolis, 2007) According to his concept, the main factor in repaying a loan for small business development is not collateral for the loan, but the entrepreneur's incentive to develop his business and survive in an aggressive environment (Tskhadadze, 2016-2017).

Microcredits are one of the most effective tools in the fight against poverty. American economists Woodworth and G. Waller described microcredit as "the most innovative strategy for addressing global poverty" (Woodworth, Woller, 1999). This tool allows people to be self-employed and improve their financial situation. On the one hand, small loans can be given to open your own business or to pay for any service. In addition, microcredit is one of the most effective ways to overcome poverty, as it allows you to create jobs and provide social protection to the poor. On the other hand, microcredits can reduce the burden on social protection programs for vulnerable groups, improve people's financial situation and strengthen the country's financial base. This is not only the view of American economists, but the issue of microcredit has also been studied by scientists in Germany and a number of other developing countries.

Zabolotskaya V.V. According to research, microcredit is one of the new technologies of financing and serves the interests of small business (Zabolotskaya, Olomskaya, 2011)

It should be noted that although the importance of microfinance in the development of business and entrepreneurship has been studied by many scientists, no regression analysis of changes in GDP per capita as a result of business development in Uzbekistan has been conducted. That is why this topic is relevant.

2. METHODOLOGY

The regression analysis of changes in the value of GDP per capita in the Republic of Uzbekistan as a result of the impact of local loans to the private sector (as a percentage of GDP) and the share of private entrepreneurship in GDP. As a result of ensuring the completeness and reliability of the regression analysis, regression equation, R correlation, determination coefficient, and Fisher criterion were used.

Indicators for 2013-2020 were taken as the study period. Before performing the regression analysis, all indicators were reduced to a single ln unit. The ln unit is important for accurate and understandable analysis of the change in Y as a result of the effect of x_1 and x_2.

3. RESULTS

According to Table 1, local loans to the private sector (as a percentage of GDP) and the share of the private sector in GDP were taken as X variables. The change in the value of GDP per capita of these variables is given.

Table 1: Changes in the value of GDP per capita in 2013-2020

	GDP per capita, PPP (current international $)	Domestic credit to private sector (% of GDP) (World Bank, 2021)	the share of private enterprise in GDP (%)State Statistics Committee, 2021)
2013	5942	10	60,9
2014	6158	10,5	61,9
2015	6343	10,8	64,6
2016	6453	12,4	66,8
2017	6519	16,6	65,3
2018	6917	23,8	62,4
2019	7335	30	56
2020	7449	37	55,7

According to Figure 1, the logarithm of the variables Y, X1, X2 was obtained.

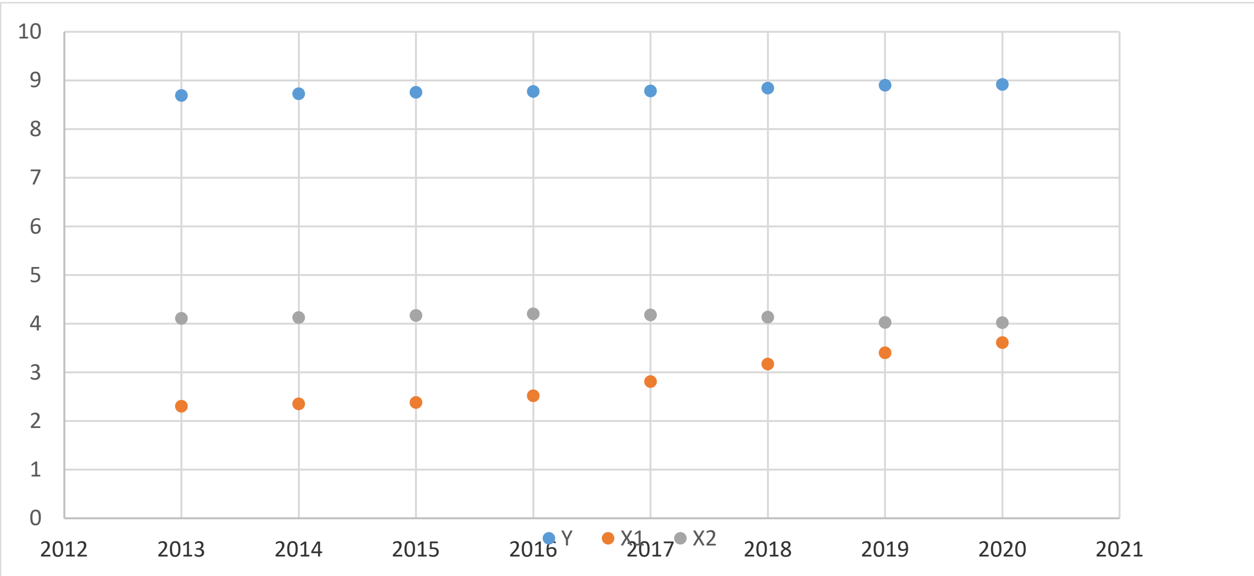

Figure 1: The logarithmic value of the variables Y, X1, X2

Let us define the vector of estimates of the regression coefficients. According to the least squares method, the vector s is obtained from the expression: s = (XTX) -1XTY

Add a single column to the matrix with variables Xj:

1	2.302585093	4.109233175
1	2.351375257	4.12552018
1	2.379546134	4.168214411
1	2.517696473	4.201703081
1	2.809402695	4.178992036
1	3.169685581	4.133565275

1	3.401197382	4.025351691
1	3.610917913	4.019980147

Matrix Y

8.689801056
8.725507328
8.755107122
8.772300418
8.782476269
8.841737429
8.900412691
8.915835074

Matrix X^T

1	1	1	1	1	1	1	1
2.302585093	2.351375257	2.379546134	2.517696473	2.809402695	3.169685581	3.401197382	3.610917913
4.109233175	4.12552018	4.168214411	4.201703081	4.178992036	4.133565275	4.025351691	4.019980147

Multiply matrices, (X^TX)

$X^T X =$

8	22,542	32,963
22,542	65,378	92,709
32,963	92,709	135,848

In the matrix, (X^TX) the number 8 lying at the intersection of the 1st row and 1st column is obtained as the sum of the products of the elements of the 1st row of the matrix X^T and the 1st column of the matrix X

Multiply matrices, (X^TY)

$X^T Y =$

70,383
198,611
289,976

Find the inverse matrix $(X^TX)^{-1}$

$(X^T X)^{-1}$ =

1229,493	-27,53	-279,54
-27,53	1,09	5,936
-279,54	5,936	63,785

The vector of estimates of the regression coefficients is:

Y(X) =

1229,493	-27,53	-279,54		70,383		8,003
-27,53	1,09	5,936	*	198,611	=	0,161
-279,54	5,936	63,785		289,976		0,0828

Regression Equation (Regression Equation Estimation)
$Y = 8.003 + 0.161X_1 + 0.08284X_2$

Interpretation of regression coefficients. The constant estimates the aggregated influence of other factors (except for the ones taken into account in the model xi) on the result Y and means that Y in the absence of xi would be 8.003. The coefficient b_1 indicates that as x1 increases by 1, Y increases by 0.161. The coefficient b_2 indicates that as x_2 increases by 1, Y increases by 0.08284.

4. ANALYSIS

4.1. Matrix of paired correlation coefficients R.

The number of observations n = 8. The number of independent variables in the model is 2, and the number of regressors, taking into account the unit vector, is equal to the number of unknown coefficients. Taking into account the attribute Y, the dimension of the matrix becomes equal to 4. The matrix of independent variables X has the dimension (8 x 4).

Matrix A composed of Y and X

1	8.69	2.303	4.109
1	8.726	2.351	4.126
1	8.755	2.38	4.168
1	8.772	2.518	4.202
1	8.782	2.809	4.179
1	8.842	3.17	4.134
1	8.9	3.401	4.025
1	8.916	3.611	4.02

Transposed matrix.

1	1	1	1	1	1	1	1
8.69	8.726	8.755	8.772	8.782	8.842	8.9	8.916

2.303	2.351	2.38	2.518	2.809	3.17	3.401	3.611
4.109	4.126	4.168	4.202	4.179	4.134	4.025	4.02

X^TX Matrix.

8	70.383	22.542	32.963
70.383	619.27	198.611	289.976
22.542	198.611	65.378	92.709
32.963	289.976	92.709	135.848

The resulting matrix has the following correspondence:

$\sum n$	$\sum y$	$\sum x_1$	$\sum x_2$
$\sum y$	$\sum y^2$	$\sum x_1 y$	$\sum x_2 y$
$\sum x_1$	$\sum yx_1$	$\sum x_1^2$	$\sum x_2 x_1$
$\sum x_2$	$\sum yx_2$	$\sum x_1 x_2$	$\sum x_2^2$

Find the paired correlation coefficients.

$$r_{xy} = \frac{\overline{x \cdot y} - \overline{x} \cdot \overline{y}}{s(x) \cdot s(y)}$$

$$r_{yx_1} = \frac{24.826 - 2.818 \cdot 8.798}{0.482 \cdot 0.0758} = 0.974$$

The values of the pairwise correlation coefficient indicate a very strong linear relationship between x_1 and y.

$$r_{yx_2} = \frac{36.247 - 4.12 \cdot 8.798}{0.063 \cdot 0.0758} = -0.659$$

The values of the paired correlation coefficient indicate a moderate linear relationship between x_2 and y.

$$r_{x_1x_2} = \frac{11.589 - 4.12 \cdot 2.818}{0.063 \cdot 0.482} = -0.712$$

The values of the pair wise correlation coefficient indicate a strong linear relationship between x_2 and x_1.

Attributes x and y	$\sum x_i$	$\overline{x} = \frac{\sum x_i}{n}$	$\sum y_i$	$\overline{y} = \frac{\sum y_i}{n}$	$\sum x_i * y_i$	$\overline{xy} = \frac{\sum x_i y_i}{n}$
For y and x_1	22.542	2.818	70.383	8.798	198.611	24.826
For y and x_2	32.963	4.12	70.383	8.798	289.976	36.247
For x1 and x_2	32.963	4.12	22.542	2.818	92.709	11.589

Dispersions and standard deviations.

Attributes x and y	$D(x)=\frac{\sum x_i^2}{n}-\overline{x}^2$	$D(y)=\frac{\sum y_i^2}{n}-\overline{y}^2$	$s(x)=\sqrt{D(x)}$	$s(y)=\sqrt{D(y)}$
For y and x_1	0.232	0.00575	0.482	0.0758
For y and x_2	0.00397	0.00575	0.063	0.0758
For x1 and x_2	0.00397	0.232	0.063	0.482

Matrix of paired correlation coefficients R:

-	y	x_1	x_2
y	1	0.9742	-0.6594
x_1	0.9742	1	-0.7117
x_2	-0.6594	-0.7117	1

Let's calculate the observed values of the t-statistic for r_{yx1} using the formula:

$$t_{nabl}=r_{yx_1}\cdot\frac{\sqrt{n-m-1}}{\sqrt{1-r_{yx_1}^2}}$$

Where m = 1 is the number of factors in the regression equation.

$$t_{nabl}=0.97\cdot\frac{\sqrt{8-1-1}}{\sqrt{1-0.97^2}}=10.56$$

Using the Student's table, we find Ttabl

t_{crit} (n-m-1; α / 2) = (6; 0.025) = 2.969

Since $t_{obs}> t_{crit}$, we reject the hypothesis that the correlation coefficient is equal to 0. In other words, the correlation coefficient is statistically significant

Let's calculate the observed values of the t-statistic for r_{yx2} using the formula:

$$t_{nabl}=0.66\cdot\frac{\sqrt{8-1-1}}{\sqrt{1-0.66^2}}=2.15$$

Since $t_{obs} <t_{crit}$, we accept the hypothesis that the correlation coefficient is equal to 0. In other words, the correlation coefficient is statistically insignificant.

4.2. Partial correlation coefficients.

$$r_{yx_1/x_2} = \frac{0.974-(-0.659)\cdot(-0.712)}{\sqrt{(1-0.659^2)\cdot(1-0.712^2)}} = 0.956$$

The tightness of communication is very strong

Let us determine the significance of the correlation coefficient r_{yx1} / x_2.

To do this, we calculate the observed values of t-statistics using the formula:

$$t_{nabl} = r_{yx_1/x_2} \cdot \frac{\sqrt{n-k-2}}{\sqrt{1-r^2_{yx_1/x_2}}}$$

Where k = 1 is the number of fixed factors.

$$t_{nabl} = 0.96 \cdot \frac{\sqrt{8-1-2}}{\sqrt{1-0.96^2}} = 7.28$$

Using the Student's table, we find Ttabl

t_{crit} (n-k-2; α / 2) = (5; 0.025) = 3.163

Since tobl> tcrit, we reject the hypothesis that the correlation coefficient is equal to 0. In other words, the correlation coefficient is statistically significant

As you can see, the relationship between y and x_1, provided that x_2 enters the model, has decreased. Hence, we can conclude that the introduction of x1 into the regression equation remains impractical.

$$r_{yx_2/x_1} = \frac{-0.659-0.974\cdot(-0.712)}{\sqrt{(1-0.974^2)\cdot(1-0.712^2)}} = 0.214$$

Communication tightness is low.

Let us determine the significance of the correlation coefficient r_{yx2} / x_1.

To do this, we calculate the observed values of t-statistics using the formula:

$$t_{nabl} = r_{yx_2/x_1} \cdot \frac{\sqrt{n-k-2}}{\sqrt{1-r^2_{yx_2/x_1}}}$$

$$t_{nabl} = 0.21 \cdot \frac{\sqrt{8-1-2}}{\sqrt{1-0.21^2}} = 0.49$$

Since $t_{obs} < t_{crit}$, we accept the hypothesis that the correlation coefficient is equal to 0. In other words, the correlation coefficient is statistically insignificant.

As you can see, the relationship between y and x_2, provided that x_1 enters the model, has decreased. Hence, we can conclude that the introduction of x2 into the regression equation remains impractical.

$$r_{x_1x_2/y} = \frac{r_{x_1x_2} - r_{x_1y}\cdot r_{x_2y}}{\sqrt{(1-r^2_{x_1y})(1-r^2_{x_2y})}}$$

$$r_{x_1x_2/y} = \frac{-0.712-0.974\cdot(-0.659)}{\sqrt{(1-0.974^2)\cdot(1-0.659^2)}} = -0.409$$

Communication tightness is not strong

Let us determining the significance of the correlation coefficient r_{yx2}/ y.

To do this, we calculate the observed values of t-statistics using the formula:

$$t_{nabl} = r_{yx2/y} \cdot \frac{\sqrt{n-k-2}}{\sqrt{1-r^2_{yx2/y}}}$$

$$t_{nabl} = 0.41 \cdot \frac{\sqrt{8-1-2}}{\sqrt{1-0.41^2}} = 1$$

Since $t_{obs}<t_{crit}$, we accept the hypothesis that the correlation coefficient is equal to 0. In other words, the correlation coefficient is statistically insignificant.

As you can see, the relationship of y and x_2, provided that y enter the model decreased. Hence, we can conclude that the introduction of x2 into the regression equation remains impractical.

When comparing the coefficients of pair and partial correlation, it can be seen that due to the influence of the interfactor relationship between xi, there is an overestimation of the tightness of the relationship between the variables.

4.3. Multicollinearity analysis.

If the factor variables associated severe functional dependence, then talk about a complete multicollinearity. In this case, among the columns of the matrix of factorial variables X there are linearly dependent columns, and, by the property of the determinants of the matrix, det (X^TX = 0).

The kind of multicollinearity in which the factor variables are related by some stochastic dependence is called partial. If there is a high degree of correlation between the factor variables, then the matrix (X^TX) is close to degenerate, i.e. det ($X^TX \geqq 0$) (the closer to 0 the determinant of the interfactor correlation matrix, the stronger the multicollinearity of the factors and the more unreliable the results of multiple regression).

Determinant calculation shown in Excel solution template

1. Analysis of multicollinearity based on the matrix of correlation coefficients.

If the matrix has an interfactor correlation coefficient r_{xjxi}> 0.7, then in this multiple regression model there is multicollinearity.

In our case, r (x_1x_2) have | r |> 0.7, which indicates the multicollinearity of the factors and the need to exclude one of them from further analysis.

2. Ridge regression.

The most detailed indicator of the presence of multicollinearity problems is the coefficient of increase in variance, defined for each variable as:

$$VIF(b_j) = \frac{1}{1-R_j^2}$$

where R_j^2 is the coefficient of multiple determination in regression X_j to other X.

Multicollinearity will be indicated by a VIF of 4 and higher for at least one j.

$$VIF(b_1) = \frac{1}{1-0.7117^2} = 2.03$$

Since VIF (b) 1 ≥ 4, which indicates the multicollinearity of the factors x_1, x_2 and the need to exclude one of them from further analysis.

4.4. Regression model at standard sscale.

For our data (we take from the matrix of paired correlation coefficients):

$0.974 = \beta_1 - 0.712\beta_2$

$-0.659 = -0.712\beta_1 + \beta_2$

We solve this system of linear equations by the Gauss method: $\beta_1 = 1.023$; $\beta_2 = 0.0689$;

The sought equation on a standardized scale: $t_y = \beta_1 tx_1 + \beta 2tx_2$

The calculation of β-coefficients can be performed using the formulas:

$$\beta_1 = \frac{r_{yx1} - r_{yx2} r_{x1x2}}{1 - r_{x1x2}^2} = \frac{0.974 - (-0.659) \cdot (-0.712)}{1 - 0.712^2} = 1.023$$
$$\beta_2 = \frac{r_{yx2} - r_{yx1} r_{x1x2}}{1 - r_{x1x2}^2} = \frac{-0.659 - 0.974 \cdot (-0.712)}{1 - 0.712^2} = 0.0689$$

The standardized form of the regression equation is:

$t_y = 1.023x_1 + 0.0689x_2$

The β-coefficients found from this system make it possible to determine the values of the coefficients in the regression on a natural scale using the formulas:

$$b_j = \beta \cdot \frac{S(y)}{S(x_j)}$$
$$a = \overline{y} - \sum b_j \cdot \overline{x_j}$$

4.5. Analysis of the parameters of the regression equation.

Y	Y(x)	ε = Y - Y(x)	ε^2	$(Y-Ycp)^2$	|ε : Y|
8.69	8.714	-0.0243	0.000588	0.0117	0.00279
8.726	8.723	0.00225	5.0E-6	0.00524	0.000258
8.755	8.731	0.0238	0.000566	0.00183	0.00272
8.772	8.756	0.016	0.000255	0.000655	0.00182
8.782	8.801	-0.0189	0.000358	0.000238	0.00216
8.842	8.856	-0.0139	0.000193	0.00192	0.00157
8.9	8.884	0.0165	0.000272	0.0105	0.00185
8.916	8.917	-0.00141	2.0E-6	0.0139	0.000158
			0.00224	0.046	0.0133

Average approximation error

$$A = \frac{\sum|\epsilon : Y|}{n} \cdot 100\% = \frac{0.0133}{8} \cdot 100\% = 0.17\%$$

The variance estimate is:

$s_e^2 = (Y-Y(X))^T(Y-Y(X)) = 0.00224$

The unbiased variance estimate is:

$$s^2 = \frac{1}{n-m-1} \cdot s_e^2 = \frac{1}{8-2-1} \cdot 0.00224 = 0.000448$$

Standard deviation estimate (standard error for Y estimate):

$$S = \sqrt{S^2} = \sqrt{0.000448} = 0.0212$$

Let us find an estimate for the covariance matrix of the vector k = $S^2 \bullet (X^TX)^{-1}$

k(x) = 0.000448

1229,493	-27,53	-279,54
-27,53	1,09	5,936
-279,54	5,936	63,785

=

0,55	-0,0123	-0,125
-0,0123	0,000488	0,00266
-0,125	0,00266	0,0286

The variances of the model parameters are determined by the relation $S^2_i = K_{ii}$, i.e. these are the elements lying on the main diagonal

$$S_{b0} = \sqrt{0.55} = 0.742$$
$$S_{b1} = \sqrt{0.000488} = 0.0221$$
$$S_{b2} = \sqrt{0.0286} = 0.169$$

Partial coefficients of elasticity.

The partial coefficient of elasticity shows how much percentage on average changes the attribute-result y with an increase in the attribute-factor x_j by 1% from its average level with a fixed position of other factors of the model.

$$E_1 = 0.161 \cdot \frac{2.818}{8.8} = 0.0516$$

When the factor x_1 changes by 1%, Y will change by 0.0516%. Partial coefficient of elasticity | E_1 | <1. Consequently, its influence on the effective trait Y is insignificant.

$$E_2 = 0.0828 \cdot \frac{4.12}{8.8} = 0.0388$$

When the factor x_2 changes by 1%, Y will change by 0.0388%. Partial coefficient of elasticity | E_2 | <1. Consequently, its influence on the effective trait Y is insignificant.

Standardized partial regression coefficients.

So for our example, the direct influence of the factor x_1 on the result Y in the regression equation is measured by β_j and is 1.023; the indirect (indirect) influence of this factor on the result is defined as:

$r_{x1x2}\beta_2$ = -0.712 * 0.0689 = -0.04901

4.6. Multiple Correlation Coefficient (Multiple Correlation Index).

$$R = \sqrt{1 - \frac{s^2_e}{\sum(y_i - \overline{y})^2}} = \sqrt{1 - \frac{0.00224}{0.046}} = 0.9754$$

Δ_r =

1	0,974	-0,659
0,974	1	-0,712
-0,659	-0,712	1

= 0.024

Δ_{r11} =

1	-0,712
-0,712	1

= 0.493

Multiple correlation coefficient

$$R=\sqrt{1-\frac{0.024}{0.493}}=0.9754$$

We get a similar result using other formulas:

$$R=\sqrt{1-(1-r_{yx1}^2)\cdot(1-r_{yx2|x1}^2)}$$
$$R=\sqrt{1-(1-0.974^2)\cdot(1-0.214^2)}=0.9754$$

The relationship between trait Y and factors X_i is very strong

We calculate the correlation coefficient using the known values of the linear pair correlation coefficients and β-coefficients.

$$R=\sqrt{\sum r_{yxi}\beta_{yxi}}=\sqrt{r_{yx1}\beta_{yx1}+r_{yx2}\beta_{yx2}}$$
$$R=\sqrt{0.974\cdot 1.023+(-0.659)\cdot 0.0689}=\sqrt{0.951}=0.975$$

Determination coefficient

R^2 = 0.951

Determination coefficient.

R^2= 0.9754^2 = 0.9513

A more objective assessment is the adjusted coefficient of determination:

$$\overline{R}^2=1-(1-R^2)\cdot\frac{n-1}{n-m-1}$$
$$\overline{R}^2=1-(1-0.9513)\cdot\frac{8-1}{8-2-1}=0.932$$

The closer this coefficient is to one, the more the regression equation explains the behavior of Y.

The addition of new explanatory variables to the model is carried out as long as the adjusted coefficient of determination grows.

Checking the overall quality of the multiple regression equation.

According to the Fisher-Snedoskkor distribution tables, the critical value of the F-criterion (F_{cr}) is found. For this, the significance level α (usually taken equal to 0.05) and two numbers of degrees of freedom k_1 = m and k_2 = n-m-1 are set.

F statistics. Fisher's criterion.

$$R^2=1-\frac{s_e^2}{\sum(y_i-\overline{y})^2}=1-\frac{0.00224}{0.046}=0.9513$$
$$F=\frac{R^2}{1-R^2}\cdot\frac{n-m-1}{m}=\frac{0.9513}{1-0.9513}\cdot\frac{8-2-1}{2}=48.859$$

Tabular value with degrees of freedom k_1 = 2 and k_2 = n-m-1 = 8 - 2 - 1 = 5, F_{kp} (2; 5) = 5.79

Since the actual value is F> F_{kp}, the coefficient of determination is statistically significant and the regression equation is statistically reliable (i.e., the coefficients bi are jointly significant).

4.7. Assessment of the significance of additional inclusion of a factor (particular F-test).

$$F_{xj}=\frac{R^2-R^2(x_1,x_n)}{1-R^2}(n-m-1)$$

sWhere m is the number of estimated parameters.

The numerator is the increase in the proportion of variation in y due to the factor x_j additionally included in the model.

If the observed value of F_{xj} is greater than F_{kp}, then the additional introduction of the factor x_j into the model is statistically justified.

The particular F-test evaluates the significance of the coefficients of the "pure" regression (b_j). Let us estimate using the private F-criterion:

1) the expediency of including factors x_1 in the regression model after the introduction of x_j (F_{x1}).

Let us determine the observed value of the particular F-criterion:

$$F_{x1} = \frac{0.9513 - 0.435}{1 - 0.9513} \cdot (8 - 2 - 1) = 53.056$$

$R^2(x_2,x_n) = r^2(x_2) = -0.6594^2 = 0.435$

$F_{kp}(k1=1;k2=5) = 6.61$

Let us compare the observed value of the particular F-criterion with the critical one:

$F_{x1} > 6.61$, therefore, it is advisable to include the factor x_1 in the model after the introduction of the factor x_2.

2) the expediency of including the factors x_2 in the regression model after the introduction of xj (F_{x2}).

Let us determine the observed value of the particular F-criterion:

$$F_{x2} = \frac{0.9513 - 0.949}{1 - 0.9513} \cdot (8 - 2 - 1) = 0.239$$

$R^2(x_1,x_n) = r^2(x_1) = 0.9742^2 = 0.949$

Let us compare the observed value of the particular F-criterion with the critical one:

$F_{x2} < 6.61$, therefore, it is not advisable to include the factor x_2 in the model after the introduction of the factor x_1.

5. DISCUSSION

As a result of calculations, the multiple regression equation was obtained: $Y = 8.003 + 0.161X_1 + 0.08284X_2$. An economic interpretation of the model parameters is possible: an increase in X_1 by 1 unit of measure. leads to an increase in Y by an average of 0.161 units; increase in X_2 by 1 unit. leads to an increase in Y by an average of 0.0828 units. By the maximum coefficient $\beta_1 = 1.023$, we conclude that the factor X_1 has the greatest influence on the result Y. The statistical significance of the equation was tested using the coefficient of determination and Fisher's test. It was found that in the studied situation 95.13% of the total variability of Y is explained by changes in the factors X_j.

As a result of the two-factor regression, it became clear that the increase in the share of local loans to private business in GDP will also lead to an increase in GDP per capita.

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