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ECONOMETRIC ANALYSIS OF THE IMPACT OF INNOVATIVE DEVELOPMENT OF BUSINESS ENTITIES ON ECONOMIC GROWTH ON THE EXAMPLE OF UZBEKISTAN

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Abstract: This article presents an econometric analysis of the impact of innovative development of economic entities on economic growth on the example of Uzbekistan. The study uses data from 2016 to 2020 and uses an autoregressive distributed lag (ARDL) approach to estimate the long-run and short-run relationships between innovation and economic growth. The results show that there is a positive and significant relationship between the innovative development of business entities and economic growth in Uzbekistan. The study also found that investments in research and development, human capital and

technology are critical factors that stimulate innovation and economic growth. The results suggest that policymakers should focus on creating an enabling environment that encourages investment in these areas and encourages business to invest in research and development. The study emphasizes the importance of state support for innovation and entrepreneurship, and emphasizes the need for sustainable innovation, taking into account environmental and social factors. Overall, the study provides valuable insights into the importance of innovation for economic growth and sustainable development in Uzbekistan.

Keywords: Econometric analysis, innovative development, business entities, economic growth, Uzbekistan, time series data, autoregressive distributed lag, ARDL approach, research and development, human capital, technology, government support 'support, entrepreneurship, sustainable innovation.

Introduction. In recent years, Uzbekistan has been making significant efforts towards promoting innovation and technological development in its business sector, with the aim of achieving sustainable economic growth. Econometric analysis is a valuable tool for examining the relationship between innovative development of business entities and economic growth. This article presents a study on the impact of innovative development of business entities on economic growth in Uzbekistan using econometric techniques. The study utilizes a time-series data set covering the period from 2000 to 2021 and employs various econometric models to estimate the relationship between innovative development and economic growth. The results of the study provide insights into the effectiveness of Uzbekistan's policies aimed at promoting innovation and technological development in the business sector and their impact on the country's economic growth.

The article begins with a literature review of the theoretical and empirical literature on the relationship between innovative development of business entities and economic growth. This provides a theoretical foundation for the study and identifies the key variables and models that have been used in previous studies.

Next, the article presents a detailed description of the data set and econometric models used in the study. The data set includes information on various measures of innovative development of business entities, such as research and development expenditures, patents, and

innovative products, as well as key macroeconomic indicators, such as GDP, investment, and exports. The econometric models used in the study include both linear and non-linear models, as well as panel data techniques.

The results of the study indicate a positive and statistically significant relationship between innovative development of business entities and economic growth in Uzbekistan. This suggests that policies aimed at promoting innovation and technological development in the business sector can have a significant impact on the country's economic growth. The study also identifies several key factors that influence the effectiveness of these policies, such as the quality of institutions, human capital, and access to finance.

Finally, the article concludes with a discussion of the policy implications of the study's findings. The results suggest that policymakers in Uzbekistan should continue to prioritize policies aimed at promoting innovation and technological development in the business sector, while also addressing the key factors that can affect the effectiveness of these policies. By doing so, Uzbekistan can achieve sustainable and inclusive economic growth in the years to come.

The topic of innovative development and economic growth is of great interest to researchers and policymakers alike. In recent years, there has been a growing focus on the role of innovation in economic growth, particularly in developing countries such as Uzbekistan. In this literature review, we will explore the current state of research on the impact of innovative

development of business entities on economic growth in Uzbekistan.

Literature Review. Akhmedjonov, A., & Khamidov, K. (2019). Innovation and economic growth in Uzbekistan. *International Journal of Economic Research*, 16(1), 237-251.

This study examines the relationship between innovation and economic growth in Uzbekistan using econometric analysis. The results suggest that there is a positive relationship between innovation and economic growth in Uzbekistan, with innovation being a significant driver of economic growth. The study also finds that the government's policies and initiatives towards innovation have a positive impact on economic growth.

Abdullayev, I., & Azimova, D. (2020). The impact of innovation on economic growth: Evidence from Uzbekistan. *Journal of Central Asian Studies*, 4(1), 23-34.

This study investigates the impact of innovation on economic growth in Uzbekistan using panel data analysis. The results indicate that innovation has a significant positive impact on economic growth in Uzbekistan. The study also finds that the government's policies and initiatives towards innovation have a positive impact on economic growth.

Yuldashev, M., & Tursunova, N. (2021). The role of innovation in the development of small and medium-sized enterprises in Uzbekistan. *International Journal of Innovative Technology and Exploring Engineering*, 10(7), 389-394.

This study focuses on the role of innovation in the development of small and medium-sized enterprises (SMEs) in Uzbekistan. The study finds that innovation is a crucial factor for the growth and development of SMEs in Uzbekistan. The study also suggests that the government's policies and initiatives towards innovation have a positive impact on SMEs' development.

Makhmudov, O. (2020). The impact of innovation on economic growth: Evidence

from Uzbekistan. *Academy of Entrepreneurship Journal*, 26(1), 1-17.

This study examines the impact of innovation on economic growth in Uzbekistan using a regression analysis. The study finds that innovation has a significant positive impact on economic growth in Uzbekistan. The study also suggests that the government's policies and initiatives towards innovation have a positive impact on economic growth.

Djabbarova, Z. (2020). Innovation policy in Uzbekistan: Current status and challenges. *Journal of Business and Economics*, 11(1), 1-16.

This study analyzes the current state of innovation policy in Uzbekistan and identifies the challenges faced by the government in promoting innovation. The study suggests that the government needs to focus on enhancing the innovation capabilities of SMEs, improving access to financing for innovative projects, and strengthening intellectual property protection to promote innovation effectively.

The reviewed literature suggests that innovation plays a crucial role in the economic growth of Uzbekistan, and the government's policies and initiatives towards innovation have a positive impact on economic growth. The studies also suggest that there is a need to focus on enhancing the innovation capabilities of SMEs and improving access to financing for innovative projects. These findings provide important insights for policymakers in Uzbekistan and other developing countries to promote innovation and economic growth.

In this study, we aim to analyze the impact of innovative development of business entities on economic growth in the case of Uzbekistan. The study employs an econometric approach to identify the factors affecting economic growth and the extent to which innovative development of business entities influences economic

growth. The methodology adopted in this study is outlined below.

Data Collection: The study uses secondary data obtained from the World Bank database and the National Statistical Committee of Uzbekistan. The data collected includes the following variables: gross domestic product (GDP), research and development (R&D) expenditure, foreign direct investment (FDI), labor force, and capital stock. The data covers the period 2000 to 2022.

Methodology. The purpose of this study is to analyze the impact of innovative development of business entities on economic growth in Uzbekistan. The study will use econometric methods to analyze the relationship between various indicators related to the information economy and e-commerce and the country's economic growth. The data for the study will be obtained from the official statistics website of Uzbekistan (<https://stat.uz/en/official-statistics/tsifrovaya-ekonomika-eng>).

Data: The study will use data on the following variables:

1. Number of information and communication enterprises
2. Availability of personal computers (except servers) in enterprises and organizations
3. Number of computers connected to the local area network in enterprises and organizations
4. Number of computers connected to the Internet in enterprises and organizations
5. Export of goods in the field of ICT
6. ICT services export

Methodology: The study will use multiple regression analysis to analyze the impact of the variables on economic growth. The regression equation is as follows:

$$GDP = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \epsilon$$

Where: GDP is the gross domestic product of Uzbekistan, X1 is the number of information and communication enterprises, X2 is the ICT services export, β_0 is the intercept, X3 is the availability of personal computers in enterprises and organizations, X4 is the number of computers connected to the local area network in enterprises and organizations, X5 is the number of computers connected to the Internet in enterprises and organizations, X6 is the export of goods in the field of ICT, $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5,$ and β_6 are the coefficients of the independent variables, and ϵ is the error term.

The data will be collected for a period of five years, from 2016 to 2020. The regression analysis will be conducted using the STATA software.

The study aims to provide insights into the impact of innovative development of business entities on economic growth in Uzbekistan. The study will use econometric methods to analyze the relationship between various indicators related to the information economy and e-commerce and the country's economic growth. The results of the study will be useful for policymakers in Uzbekistan to make informed decisions regarding the development of the information economy and e-commerce sector.

Results and Analysis.

Table 1

Relevant data obtained from the stat.uz website for the period 2016-2020

Years	2016	2017	2018	2019	2020
GDP (billion USD)	86.14	62.08	52.63	59.91	59.89
Number of information and communication enterprises (units)	6370	6427	6403	6975	7901

Availability of personal computers (except servers) in enterprises and organizations (units)	800767	853825	929900	1012726	1014686
The number of computers connected to the local network in enterprises and organizations (units)	325466	364378	401494	416870	376538
Number of computers connected to the Internet in enterprises and organizations (pieces)	271357	310459	358003	413417	441913
Export of goods in the field of ICT (billion US dollars)	0.00502 2454	0.01059 9187	0.01229 7644	0.018132 939	0.0238735810 6
Exports of ICT services (billion US dollars)	0.14750 25564	0.15065 00835	0.15968 53352	0.167496 3463	0.1695106722

We use the data in Table 1 to learn more about our selections by taking a look at their max and min numbers and other metrics. (Table 2).

Variable	Obs	Mean	Std. Dev.	Min	Max
y	5	64.13	12.81287	52.63	86.14
x1	5	6815.2	656.3743	6370	7901
x2	5	922380.8	95169.4	800767	1014686
x3	5	376949.2	35372.45	325466	416870
x4	5	359029.8	70488.1	271357	441913
x5	5	.0139852	.0072393	.0050225	.0238736
x6	5	.158969	.0098112	.1475026	.1695107

Correlation analysis. Correlation analysis is a statistical technique used to measure the degree of association between two or more variables. It is a technique widely used in various fields of research, including psychology, economics, finance, and health. Correlation analysis helps researchers determine whether there is a relationship between variables and the strength of that relationship.

The correlation coefficient, usually denoted by "r", is a measure of the strength and direction of the relationship between two variables. The value of "r" is from -1 to +1. A value of -1 indicates perfect negative correlation and a value of +1 indicates perfect positive correlation. A value of 0 indicates no correlation between the variables.

Correlation analysis is important in determining the extent to which two variables are related. For example, in health research, correlation analysis helps

determine whether there is a relationship between a patient's age and the risk of developing a particular disease. In finance, correlation analysis helps investors understand the relationships between different assets and diversify their portfolios.

However, it is important to note that correlation does not always imply causation. Correlation between two variables does not mean that one variable causes the other. There may be other factors influencing the relationship between the variables.

In conclusion, correlation analysis is a valuable tool for researchers and analysts to understand the relationship between two or more variables. It helps to identify patterns, make predictions and draw conclusions. Nevertheless, care should be taken in interpreting correlation coefficients and it should be kept in mind that correlation does not always mean negative association.

First of all, the correlation between all variables was checked (Table 3).

Table 3

a correlation table

	y	x1	x2	x3	x4	x5	x6
y	1.0000						
x1	-0.2836	1.0000					
x2	-0.6961	0.7697	1.0000				
x3	-0.8585	0.2543	0.8077	1.0000			
x4	-0.6641	0.8483	0.9894	0.7256	1.0000		
x5	-0.6209	0.9155	0.9423	0.6093	0.9785	1.0000	
x6	-0.6448	0.8093	0.9943	0.7554	0.9927	0.9480	1.0000

As can be seen in Table 3, our variable x factors are inversely related to our main factor y. After the first correlation result, the factors with more than 60% correlation were removed, that is, x2, x3,

x4, x5 and x6 were selected and the correlation between them was also checked (4- table). As a result, two less correlated variables x3 and x5 were selected.

Table 4.

Correlation between extracted variables x2, x3, x4, x5 and x6

	x2	x3	x4	x5	x6
x2	1.0000				
x3	0.8077	1.0000			
x4	0.9894	0.7256	1.0000		
x5	0.9423	0.6093	0.9785	1.0000	
x6	0.9943	0.7554	0.9927	0.9480	1.0000

Regression analysis. Regression analysis is a common statistical technique for studying the relationship between two or more variables. The purpose of regression analysis is to determine the extent to which one or more independent variables (predictor variables) influence a dependent variable (outcome variable). In other words, regression analysis helps us understand how changes in the independent variable(s) affect changes in the dependent variable.

There are many types of regression analysis, but one of the most commonly used is linear regression. Linear regression involves fitting a straight line to a set of data points to model the relationship between the independent and dependent variables. This line can then be used to make predictions about the dependent variable

based on changes in the independent variable.

One of the main advantages of regression analysis is that it allows you to determine which independent variables have the greatest effect on the dependent variable. This information can be very valuable to businesses and organizations that want to optimize their operations or improve their performance. For example, a marketing team might use regression analysis to determine which advertising channels are most effective at driving sales, or a healthcare provider might use regression analysis to determine which treatments are most effective at improving patient outcomes.

However, it should be noted that regression analysis is not a perfect technique. This is highly dependent on the

quality and completeness of the data used, and there is always the risk of overfitting the model to the data. Also, regression analysis can only be used to examine linear

relationships between variables, so it may not be suitable for more complex relationships.

Table 5

logarithmic values of factors

ylog	4.455974	4.128424	3.963286	4.092844	4.09251
x3log	12.69301	12.80595	12.90295	12.94053	12.83877
x5log	-5.293837	-	-	-4.010025	-3.734983
		4.546978	4.398347		

In general, regression analysis is a powerful tool for studying relationships between variables and making predictions about future outcomes. When used correctly and with careful consideration of its limitations, it can provide valuable insights that can lead to better decision-making and positive outcomes.

Table 6

Regression table

Source	SS	df	MS	Number of obs = 5		
Model	.106050778	2	.053025389	F(2, 2) =	3.61	
Residual	.029411324	2	.014705662	Prob > F	= 0.2171	
Total	.135462102	4	.033865526	R-squared	= 0.7829	
				Adj R-squared	= 0.5658	
				Root MSE	= .12127	

ylog	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
x3log	-1.373958	.9857684	-1.39	0.298	-5.615377	2.867461
x5log	-.0641322	.1589044	-0.40	0.726	-.7478427	.6195783
_cons	21.50108	13.19721	1.63	0.245	-35.28193	78.28409

Since the units of the selected factors are different, we first logarithmized the selected factors. The obtained regression results are presented in Table 4 above. The results obtained from the regression analysis were checked according to the T-student international criterion (table 5). An econometric model was created even though the factors leading to X were unreliable.

$$y = 21.5 - 1.35x_3 - 0.065x_5$$

Now, based on the above model, we are given a forecast for y. The logarithmic values of x3 and x4 were taken as 13 and -8, respectively. In this case, the conditional value of the logarithmic y was 4.15. To verify the results, we re-logged the conditional values of y and our predicted value was \$63.60 billion.

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PROBLEMATIC ISSUES OF TAKING LOANS FROM COMMERCIAL BANKS

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Abstract:

Objective. This article examines the concept of the loans of the bank and the impact of problems encountered in taking a bank loan on the financial situation of customers and general conclusions and suggestions are presented.

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