RAQAMLI IQTISODIYOT VA AXBOROT TEXNOLOGIYALARI
2024
№1 (13),
yanvar-mart
http://dgeconomy.tsue.uz/
ILMIY ELEKTRON JURNAL

ANALYSIS OF THE IMPACT OF FOREIGN CAPITAL ATTRACTED TO THE COUNTRY ON THE DIGITAL ECONOMY

Saydullayev Azamat Jo‘raqul o‘g‘li
TDIU tayanch doktaranti
azamatsaydullayev0221@gmail.com

Annotatsiya

Ushbu maqola to`g`ridan-to`g`ri xorijiy investitsiyalar (TTXI)ning axborot kommunikatsiya texnologiyalariga (AKT) va raqamli iqtisodiyotga ta`sirining ekonometrik tahlilini o`rganishdan iborat. Tatqiqotning asosiy vazifasi Ekonometrik usullardan, jumladan, regressiya tahlili, panel ma`lumotlar usullari va vaqt-seriyali tahlillarni qo`llash orqali tadqiqot to`g`ridan-to`g`ri investitsiyalar turli sektorlar va hududlarda raqamli iqtisodiyot va AKTning o`sishi va tarqalishiga qanday ta`sir qilishini to`liq tushunishga qaratilgan. Milliy hisoblar, sanoat hisobotlari va xalqaro ma`lumotlar bazalari ma`lumotlarini sintez qilish orqali tadqiqot to`g`ridan-to`g`ri investitsiyalar AKTni kengaytirish, innovatsiyalar va qabul qilishga hissa qo`shish mexanizmlarini tushuntirish uchun empirik asoslarni keltiriladi. https://databank.worldbank.org/source/world-development-indicators ma’lumotlar quyidagi havoladan olingan.

Аннотация

Данная статья представляет собой эконометрический анализ влияния прямых иностранных инвестиций (ПИИ) на информационно-коммуникационные технологии (ИКТ) и цифровую экономику. Основная задача исследования эконометрические методы, включая регрессионный анализ, методы панельных данных и анализ временных рядов, в исследовании рассматривается, как ПИИ влияют на рост и распространение цифровой экономики и ИКТ в различных секторах и регионах. Оно направлено на полное понимание тайны. Путем синтеза данных национальных счетов, отраслевых отчетов и международных баз данных исследование обеспечивает эмпирическую основу для объяснения механизмов, с помощью которых ПИИ способствуют расширению, инновациям и внедрению ИКТ. https://databank.worldbank.org/source/world-development-indicators информация получена по ссылке.

Abstract

This article is an econometric analysis of the impact of foreign direct investment (FDI) on information and communication technologies (ICT) and the digital economy. The

main task of the research is from econometric methods, including regression analysis, panel data methods and time-series analysis, the study examines how FDI affects the growth and diffusion of the digital economy and ICT in different sectors and regions. It is aimed at fully understanding the secret. By synthesizing data from national accounts, industry reports and international databases, the study provides an empirical framework to explain the mechanisms by which FDI contributes to ICT expansion, innovation and adoption. https://databank.worldbank.org/source/world-development-indicators information obtained from the link.

Kalit so'zlar
To`g`ridan-to`g`ri xorijiy investitsiyalar (TTXI), Axborot-kommunikatsiya texnologiyalari (AKT), Ekonometrik modellashtirish, Regressiya tahlili, Panel ma`lumotlar usullari, Vaqt seriyalarini tahlil qilish, Raqamli iqtisodiyot.

Ключевые слова
From direct foreign investments (TTXI), information and communication technologies (ICT), Econometric Modeling, Analysis of Regression, Panel Data, Digital Analysis, and Digital Economy.

Keywords
Прямые иностранные инвестиции (ПИИ), Информационные и коммуникационные технологии (ИКТ), Эконометрическое моделирование, Регрессионный анализ, Методы панельных данных, Анализ временных рядов, Цифровая экономика.

Introduction

In the current era of development and globalization, the role of information and communication technologies (ICT) in shaping economic development and stimulating innovation is increasing. Foreign direct investments play an important role in the development and distribution of ICT and thereby affect the socio-economic landscape of countries around the world. In this article, the analysis of the econometric model evaluating the impact of direct investments in information and communication technologies (ICT) is considered. The integration of ICT into various industries, including telecommunications, Internet services, software development, and digital infrastructure, has revolutionized business operations, communication channels, and societal interactions. Thus, understanding the mechanisms by which direct investment influences ICT uptake and use is critical for investors and stakeholders involved in stimulating economic growth and technological progress. The purpose of this study is to study the relationship between direct investment and ICT using econometric modeling methods. By examining these relationships, the study sheds light on the channels through which direct investment affects ICT development, evaluates the effectiveness of direct investment in promoting digitalization, and evaluates the effectiveness of different types of direct investment. aims to provide an understanding of the factors that motivate the introduction of ICT in countries and regions. Through a comprehensive analysis of an econometric model assessing the impact of direct

investment on information and communication technologies, this study provides necessary insights into the role of foreign investment in shaping countries' digital landscape and advancing their socio-economic development agenda.

Literature review and methodology

Foreign direct investment is recognized as an important factor in technological development and economic growth, especially in the field of information and communication technologies (ICT). Several foreign studies have studied the relationship between the flow of direct investments and the development of ICT infrastructure, services, and innovations in different countries. Wang and Li[1] studied the impact of direct investment on ICT development in developing countries. Their research showed a positive correlation between FDI flows and the expansion of ICT capabilities, including the expansion of telecommunications networks, Internet access, and digital services. The study highlighted the importance of direct investment in bridging the digital divide and promoting inclusive growth by increasing access and affordability of ICT. Park and Lee [2] focused on the role of direct investment in stimulating the growth of the ICT sector in Asian economies. Their analysis showed a positive correlation between FDI flows and the expansion of ICT sectors, including telecommunications, software development, and digital services. The study highlighted the need for an enabling regulatory environment and investment incentives to attract FDI and encourage ICT-based economic transformation.[3] and Blonigen[4] emphasize the positive impact of direct investment on technological development and ICT diffusion, especially in developing countries. The literature consistently demonstrates the positive impact of ICT on economic growth and productivity. The introduction of ICT is related to increasing efficiency, innovation, and competitiveness in various fields. Studies by Lee et al.[6] and Qiang et al.[7] Emphasizes the role of ICT investments in accelerating economic development, reducing information costs, and facilitating knowledge creation and dissemination. Researchers have identified several factors that influence FDI flows into the ICT sector, including market size, regulatory environment, infrastructure quality, human capital, and government policies. A comprehensive review by UNCTAD [8] highlights the importance of policy coherence, investment promotion, and ICT infrastructure development in attracting direct investment in the ICT sector and harnessing its potential for sustainable development.

Methodology

The study uses secondary data from authoritative sources such as the World Bank, the United Nations, the International Telecommunication Union (ITU), and national statistical agencies. Data variables include FDI flows, ICT indicators (such as internet penetration, mobile phone subscriptions, and broadband infrastructure), and related control variables (such as GDP per capita, trade openness, and institutional quality).

Results and discussion

Table 1

Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max

FDI_GDP	25	1.784	1.022	0.543	3.843
FDI	25	8.984e+08	8.017e+08	65300000	2.498e+09
ICT	25	7.216	4.028	3.2	15.6
lnFDI_GDP	25	00.419	0.591	-0.611	1.346
lnFDI	25	20.05	1.23	17.994	21.639
lnICT	25	1.834	0.538	1.163	2.747

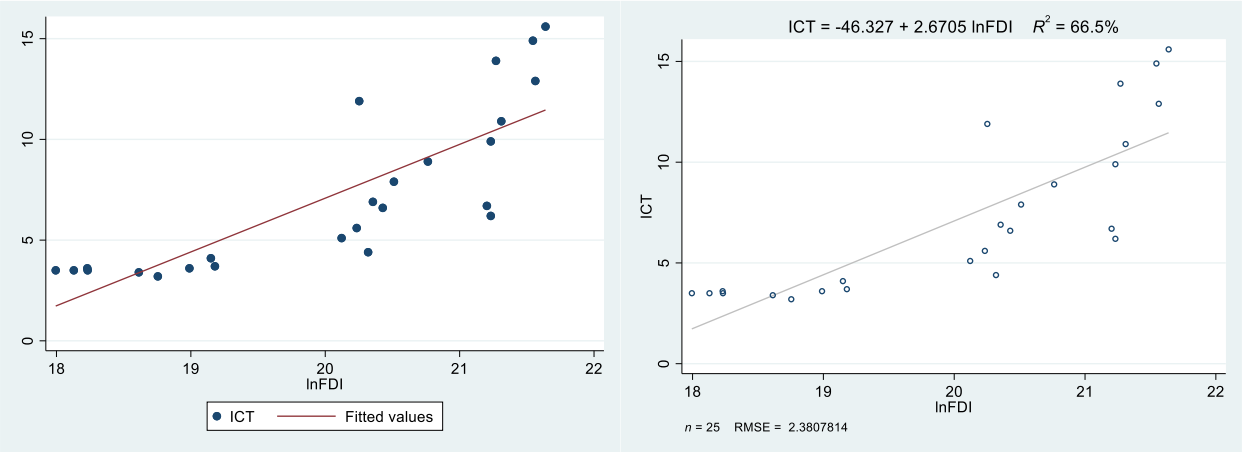

Figure 1. Regression line

Figure 1 shows whether the relationship between the factors is positive or negative, we can see that the regression results and the coefficient of determination are high.

Table 1

Pairwise correlations

Variables	**(1)**	**(2)**
(1) ICT	1.000	
(2) lnFDI	0.816*	1.000
	(0.000)	

**** p<0.01, ** p<0.05, * p<0.1*

Table 2 shows the correlation coefficients between pairs of variables. ICT: (Variable 1) - this variable is correlated with itself, so the correlation coefficient is 1.000 as expected. lnFDI: (variable 2) - The correlation coefficient of this variable with ICT is 0.816*. A positive sign indicates a positive relationship between lnFDI and ICT. The correlation coefficient of 0.816* indicates that there is a strong positive correlation between lnFDI and ICT. A p-value (in parentheses) of 0.000 indicates that the correlation is statistically significant at the 1% level. In general, based on the presented correlations, there is a statistically significant and strong positive relationship between the natural logarithm of direct investment (lnFDI) and the variable ICT in the data set. Below is an additional interpretation of the pairwise correlation between ICT and lnFDI: - A correlation coefficient of 0.816* indicates a strong positive linear relationship between ICT and INFDI. This means that as the value of ICT increases, so does the value of foreign direct investment and vice versa. A p-value of 0.000 indicates that the correlation is statistically significant at the 1% level, which strongly argues against the null hypothesis of no correlation. Thus, we can conclude that there is a strong and significant positive correlation between ICT and lnFDI in the data set, that is, countries with a high level of information and communication technologies directly attract more foreign investments.

SPEARMAN ICT lnFDI
Number of obs = 25
Spearman`s rho = 0.9155
Test of H0: ICT and lnFDI are independent
Prob > |t| = 0.0000

Spearman's rank correlation coefficient (rho) between AKT and INFDI was estimated to be approximately 0.9155. Spearman's rho value of 0.9155 indicates a very strong positive monotonic relationship between ICT and lnFDI. This shows that as ICT values increase, INFDI values tend to increase and vice versa. The p-value associated with testing the null hypothesis (H0) that ICT and lnFDI are independent is 0.0000, which is less than any conventional level of significance. Therefore, we reject the null hypothesis and conclude that there is a significant relationship between ICT and INFDI. Overall, based on Spearman's rank correlation test, there is strong evidence that ICT and lnFDI are positively related in the data set. Spearman's rank correlation coefficient provides a measure of the strength and direction of the monotonic relationship between two variables. Spearman's Rho: A coefficient of approximately 0.9155 indicates a very strong positive monotonic relationship between ICT and INFDI. This shows that as ICT values increase, INFDI values also increase and vice versa. Probability (Prob > |t|): The p-value associated with testing the null hypothesis (H0) that AKT and lnFDI are independent is very small (0.0000). This indicates that the observed correlation is statistically significant at any conventional significance level. Interpretation: The results provide evidence against the null hypothesis that ICT and INFDI are not independent and are significantly related to the data set. Overall, Spearman's rank correlation test reconfirms that there is a strong and significant positive relationship between ICT and INFDI, which indicates that countries with high levels of information and communication technology experience more foreign direct investment.

Table 1

Linear regression

ICT	**Coef.**	**St.Err.**	**t-value**	**p-value**	**[95% Conf**	**Interval]**	**Sig**
lnFDI	2.67	0.395	6.76	0.000	1.853	3.488	***
Constant	-46.327	7.934	-5.84	0.000	-62.739	-29.915	***

Mean dependent var	7.216	**SD dependent var**	4.028
R-squared	0.665	**Number of obs**	25
F-test	45.713	**Prob > F**	0.000
Akaike crit. (AIC)	116.234	**Bayesian crit. (BIC)**	118.672
*** p<.01, ** p<.05, * p<.1			

In Table 3, the result of linear regression summarizes the relationship between the ICT dependent variable and the lnFDI independent variable:

$$Y=a_0+a_1b_1+a_2b_2+a_3b_2+.....+a_nb_n+e$$

Here: a_0 is constant, a_1, a_2, a_3, and an are the coefficients we calculated, b_1, b_2, b_3, bn are independent variables, and e is an error.

Coefficient estimation: The coefficient for lnFDI is 2.67. This shows that a one-unit increase in the natural logarithm of direct investment (lnFDI) leads to an increase in the value of ICT by approximately 2.67 units, holding other variables constant, and this is statistically significant. significant. The constant is equal to -46,327. It represents the estimated value of ICT when lnFDI is zero. Standard errors, t-values, and p-values: The standard error for the lnFDI coefficient is 0.395, the t-value associated with lnFDI is 6.76, and the corresponding p-value is 0.000. ***) indicates statistical significance. The p-value of the variable is also equal to 0.000, which indicates that it is statistically significant. The 95% confidence interval for the coefficient of lnFDI is [1.853, 3.488]. 95% confidence interval for the constant period [-62.739, -29.915]. The R-squared value is 0.665, which indicates that approximately 66.5% of the variability of the dependent variable (AKT) is explained by the linear regression model with lnFDI as the independent variable. The F-test evaluates the overall significance of the regression model. Here, the F-statistic is 45.713 and the p-value is 0.000, which indicates that the model is statistically significant. the average value of the dependent variable (AKT) is 7.216, the standard deviation is 4.028. The number of observations in the regression analysis is 25. Akaike's information criterion (AIC) and Bayesian information criterion (BIC) are measures of model fit and parsimony, with lower values indicating better fit.

Table 1

Shapiro "Wilk W" test for normal data

Variable	Obs	W	V	z	Prob>z
ehat	25	0.962	1.067	0.132	0.447

In Table 4, the Shapiro-Wilk normality test evaluates whether the given data set corresponds to a normal distribution. Interpretation of test results for the variable "ehat": Variable: ehat, Observations (observations): 25, Test statistic (W): 0.962., Critical value (V): 1.067., z-value: 0.132., Probability (Prob > z): 0.447., The test statistic (W) is 0.962., The critical value (V) is 1.067., The z-value is 0.132., The probability associated with the z-value (Prob > z) is equal to 0.447. Since the probability (Prob > z) is greater than the 0.05 significance level, we cannot reject the null hypothesis. Therefore, there is no evidence that the variable "ehat" deviates significantly from a normal distribution at the 5% significance level. Thus, the data can be considered approximately normally distributed. The test statistic (W): The Shapiro-Wilk test statistic (W) is a measure of how close the data is to a normal distribution. In this case, the test statistic is 0.962. Critical value (V): The critical value (V) is compared with the test statistic (V) and determines whether the data deviates significantly from normality. Here the critical value is 1.067. z-value: The z-value measures how many standard deviations the test statistic is from the mean under the null hypothesis of normality. In this case, the z-value is 0.132. Probability (Prob > z): This probability value indicates the probability of observing a given z-value under the null hypothesis that the data follows a normal distribution. Here the probability is 0.447. Since the probability (Prob > z) is greater than the 0.05 significance level, we cannot reject the null hypothesis. Thus, there is insufficient evidence to show that the variable "ehat" significantly deviates from the normal distribution at the 5% significance level. Therefore, the data can be considered approximately normally distributed.

Breusch "pagan/cook" weisberg test for heteroskedasticity

Assumption: Normal error terms

Variable: Fitted values of ICT

H0: Constant variance

chi2(1) = 4.40

Prob > chi2 = 0.0359

The Breusch-Pagan/Cook-Weisberg heteroskedasticity test is used to assess whether the error variance in a regression model is constant or varies across observations. The interpretation of test results is as follows: Assumption: Normal error conditions, Variable: set values of ICT, Null hypothesis (H0): errors have constant variance. Test statistic: chi^2(1) = 4.40, Probability (Prob > chi^2): 0.0359, Test statistic chi^2(1) 4.40, Probability associated with this test statistic (Prob > chi^2) equal to 0.0359. Since the probability (0.0359) is less than the 0.05 level of significance, we reject the null hypothesis. Therefore, there is evidence that the variation of the errors in the regression model for fixed values of ICT is significantly different from the constant. In other words, the model based on this test has a sign of heteroskedasticity. Test statistic: The test statistic (chi^2) is calculated to be 4.40. Degrees of freedom: The test has 1 degree of freedom. Probability (Prob > chi^2): The probability associated with the test statistic is 0.0359. Interpretation: Since the probability (0.0359) is less than the 0.05 significance level, we reject the null hypothesis (H0) that the errors have constant variance. This indicates that there is evidence of heteroskedasticity in the model based on the fixed values of ICT.

Conclusion: if the p-value is below the level of significance, we can conclude that the variance of the errors in the regression model significantly deviates from the constant. This means that the assumption of constant variance indicating the presence of heteroskedasticity in the model is violated.

In general, the Breusch-Pagan/Cook-Weisberg test proves that the variation of the errors in the regression model is not constant, which indicates the presence of heteroskedasticity.

Conclusions and suggestions

In conclusion, the analysis presented in this study sheds light on the relationship between foreign direct investment (FDI) and information and communication technologies (ICT). Using econometric models and empirical analysis, we have identified several key insights into how FDI affects ICT development in different contexts. First, our results show that direct investment plays an important role in stimulating the adoption and diffusion of ICT in different sectors and regions. Foreign capital inflows often bring technological expertise, management practices, and access to global markets, which can catalyze ICT advances and improve productivity. Second, the impact of direct investment on ICT is not uniform and depends on various factors, such as the level of technological sophistication, the regulatory environment, and the institutional capacity of the host country. Strengthening the digital infrastructure, stimulating the development of human capital, and stimulating research and development activities are important for creating a favorable environment for ICT innovation and diffusion.

References

1. Borensztein, E., De Gregorio, J., & Lee, J. W. (1998). How does foreign direct investment affect economic growth? Journal of International Economics, 45(1), 115-135.
2. Blonigen, B. A. (2005). A review of the empirical literature on FDI determinants. Atlantic Economic Journal, 33(4), 383-403.
3. Lee, J., Park, Y., & Yoon, J. (2010). The contribution of information and communication technology to economic growth in nine developing countries. Information Development, 26(1), 47-59.
4. Qiang, C. Z., Rossotto, C. M., & Kimura, K. (2009). Economic impacts of broadband. Information and Communications for Development 2009: Extending Reach and Increasing Impact, 91-113.
5. UNCTAD. (2020). World Investment Report 2020: International Production Beyond the Pandemic. United Nations.
6. World Bank. (2021). World Development Report 2021: Data for Better Lives. World Bank Group.
7. Xu, B., & Wang, J. (1999). Capital goods trade and R&D spillovers in the OECD. European Economic Review, 43(8), 1583-1600.
8. Aitken, B. J., & Harrison, A. E. (1999). Do domestic firms benefit from direct foreign investment? Evidence from Venezuela. American Economic Review, 89(3), 605-618.
9. Bresnahan, T. F., & Trajtenberg, M. (1995). General purpose technologies Engines of growth`? Journal of Econometrics, 65(1), 83-108.
10. Keller, W. (2004). International technology diffusion. Journal of Economic Literature, 42(3), 752-782.
11. Nematovich, Raximov Abdulaxad, and Saydullayev Azamat Jo‘raqul o‘g. "IQTISODIY MASALALARNI YECHISHDA KO’P OMILLI KORRELYASION-REGRESSION TAHLIL VA GETEROSKEDATLIKNI ANIQLASH." *FAN, TA'LIM VA AMALIYOTNING INTEGRASIYASI* 3.7 (2022): 61-66.
12. Fayziyev, Rabim Aliqulovich, and Azamat Jo‘Raqul O‘G‘Li Saydullayev. "EKONOMETRIK MODELNI DARBUN-UOTSON TESTI YORDAMIDA TAHLIL QILISH." *Oriental Renaissance: Innovative, educational, natural and social sciences* 3.3 (2023): 712-717.
13. Azamat Jo‘raqul o‘g, Saydullayev. "THE ROLE OF BANKS IN THE DEVELOPMENT OF THE DIGITAL ECONOMY." *Current Issues of Bio Economics and Digitalization in the Sustainable Development of Regions (Germany)* (2022): 348-357.
14. Adilov Axror Ablaqul o’g’li, Saydullayev Azamat Jo‘raqul o‘g‘li, and Adilov Alisher Ablaqul o’g’li. "POLYAR KOORDINATALAR SISTEMASIDA PUASSON TENGLAMASI UCHUN QO’YILGAN DIRIXLE MASALASINI YECHISH." *Current Issues of Bio Economics and Digitalization in the Sustainable Development of Regions (Germany)* (2022): 414-420.
15. Nematovich, Raximov Abdulaxad, Saydullayev Azamat Jo‘raqul o‘g, and Adilov Alisher Abloqul o’g’li. "BLOCKCHAIN TEXNALOGIYASIDAN FOYDALANISH ISTIQBOLLARI." *Current Issues of Bio Economics and Digitalization in the Sustainable Development of Regions (Germany)* (2022): 171-176.