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IMPACT OF DIRECT INVESTMENT ON ECONOMIC GROWTH OF UZBEKISTAN

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This research explores the effects of foreign direct investment (FDI), portfolio investment, and gross capital formation (GCF) on the economy of Uzbekistan between 2013 and 2023 with projections to 2029. Through the application of Ordinary Least Squares (OLS) and Vector Autoregressive (VAR) models, the research establishes strong positive relationships indicating that GCF and portfolio investment largely influence economic performance while FDI promotes technology transfer, competitiveness, and exhibits declining returns with time. With a 16% drop in FDI in 2023, investment is forecast to reach $48 billion by 2029. Policy recommendations are for diversification, regulatory overhaul, and investment.

Key words: foreign direct investment, economic growth, portfolio investments, gross capital formation, Uzbekistan
JEL: F21, O11, E22

1 INTRODUCTION

Investments have consistently served as a cornerstone for economic development, particularly in the context of developing Uzbekistan. Since gaining independence in 1991, the country has embarked on an ambitious journey to establish itself as a dynamic participant in the Asian economic system. However, achieving sustainable economic growth has required more than just integration into global markets. It is of utmost importance to implement policy regulations in order to attract, retain, and effectively utilize investments, particularly direct investment flow. This is evident in Uzbekistan's evolving investment policies and its ongoing structural reforms aimed at bolstering investor confidence (Vahobov et al., 2010).

Uzbekistan has experienced significant growth in FDI over the past decade, with cumulative volumes exceeding $78 billion from 2017 to 2024 and projected to surpass

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$100 billion by the end of 2024. In 2017, the country attracted $1.7 billion in FDI, which steadily grew to $3 billion in 2018 and $8.5 billion in 2019. The trend continued with $8.9 billion in 2020 and reached $10 billion in 2021. Despite a slight decrease in 2022, where investments totaled $9.7 billion, the upward trajectory resumed in 2023, with $7.2 billion recorded by September. By October 2024, Uzbekistan had secured $26 billion in foreign investments, including $24 billion from direct foreign investors, marking a historic peak (Investment results reviewed, 2024). This robust growth reflects the country's structural reforms, improved regulatory environment, and commitment to economic diversification. Uzbekistan's efforts to establish free economic zones, streamline bureaucracy, and provide tax incentives have further enhanced its attractiveness to investors. Additionally, major international projects, such as the China-Uzbekistan-Kyrgyzstan railway and strategic partnerships in green energy, have attracted global interest. These efforts underscore Uzbekistan's position as a growing hub for international business and a key player in the global investment landscape, setting the stage for sustained economic growth and regional influence (CBU, 2024).

Despite promising reforms, the year 2023 brought challenges for Uzbekistan's investment landscape. Direct investments declined by 16%, falling from $2.65 billion to $2.14 billion. This contraction coincided with a record-high current account deficit of $7.8 billion, emphasizing the urgent need to address structural imbalances and reinvigorate investment flows. The Central Bank's data revealed that these figures were not only lower than those of the previous two years but also indicative of broader global trends. According to the United Nations Conference on Trade and Development (UNCTAD), global FDI volumes have been declining, reaching their lowest levels since the global financial crisis. Moreover, UNCTAD reports that funding for sustainable development sectors dropped by over 10% in 2023, with overall global FDI flows falling by 2% to approximately $1.3 trillion (UNCTAD, 2024). Additionally, UNCTAD notes that FDI inflows into developing countries—including Uzbekistan—reached over $2.5 billion in 2023, marking an 86% increase since 2016, though growth has slowed in recent years (UNCTAD, 2024). These dynamics underscore the increasing competition for foreign capital, especially among developing economies (World Bank, 2023).

Uzbekistan's unique advantages position it to compete in this challenging environment. With the largest domestic market in Central Asia, a young and skilled labor force, abundant natural resources, and a rapidly expanding infrastructure, the country offers significant potential for investors. Recent reforms, including the liberalization of currency regulations in 2017 and substantial improvements in the tax and customs systems, have transformed Uzbekistan's business environment (Development strategy center, 2017). These changes contributed to Uzbekistan's dramatic improvement in the World Bank's Doing Business rankings, where it climbed from 166th place in 2012 to 69th place by 2021 (World Bank's Doing Business Rankings Report, 2021). Yet, despite these achievements, FDI levels remain modest relative to the country's potential, necessitating further action (Zayniddinov et al., 2024).

Developing Uzbekistan faces several challenges that hinder sustainable economic growth and investment flows in Central Asia. First and foremost, The country's double-landlocked geographical character limits its opportunities to join the competitive global market. Moreover, increasing population growth burdens the economy with greater demand for jobs and infrastructure. Currently, half of Central Asia's population, over 36.5 million, lives in Uzbekistan (Worldometer, 2025). However, a high unemployment rate persists, which is common in populous countries. This necessitates government efforts to attract more investors to create job opportunities by establishing export-oriented factories. Furthermore, the country's export potential is lower than its import, which challenges the current scenario (Kechagia and Metaxas, 2016). It is highly important to accelerate special economic zones with tax incentives for investors, thereby exporting finished products to neighboring countries. Additionally, free trade agreements with neighboring countries can expand the trading relations with inclusive tax policies, which further impacts trade potential and sustainable growth. Therefore, The study of FDI and its impact on Uzbekistan's economic progress raises significant concern among researchers. The purpose of the current research is to investigate this area using advanced econometric techniques and provide a comprehensive outlook on Uzbekistan's investment landscape. The study applies a Vector Autoregressive (VAR) model and hypothesis testing to analyze the relationship between variables and economic growth. Based on the findings of the research, policy implications are provided below. The article is structured as follows: section 2 discusses the related literature on the topic with research gap, section 3 provides the methodological framework of the study, while section 4 interprets the results of the analysis. The study ends with conclusion section with potential policy recommendations.

2 LITERATURE REVIEW

Key investment forms in Uzbekistan include equity contributions to charter funds, the establishment of foreign-owned enterprises, acquisition of intellectual property, and investments in infrastructure and industrial assets. These forms are crucial to understanding the multifaceted impact of investment. For instance, FDI serves as a catalyst for economic growth by providing capital infusion, facilitating technology transfer, enhancing managerial capabilities, and strengthening export competitiveness. Pulatova (2016) and Imomkulov (2023) have highlighted the role of FDI in enhancing industrial sophistication and diversifying economic outputs in Uzbekistan (Pulatova, 2016). Special economic zones (SEZs), which attract significant FDI, have emerged as focal points for economic transformation, with researchers like Odilbekov (2024) identifying a strong correlation between FDI inflows into SEZs and improvements in governance, infrastructure, and export performance.

Domestic investments complement FDI by fostering innovation and supporting local industries. Mamatov (2020) underscores the critical role of innovation-oriented investments in driving intensive economic growth. Investments in fixed assets, particularly in manufacturing and technology sectors, have been linked to sustainable GDP growth in Uzbekistan (Mamatov, 2020). Rajapova (2020) projects a significant increase in research and development (R&D) investments by 2030, emphasizing their role in creating intellectual property and advancing sustainable development goals. Such findings underscore the importance of aligning domestic investment strategies with innovation-driven growth policies (Rajapova, 2020).

The interplay between investment, employment, and economic growth is another vital dimension of analysis. Empirical evidence, such as the study by Rakhmatillo et al. (2021), demonstrates a bi-directional relationship where investment inflows stimulate employment, which in turn enhances GDP growth, creating a virtuous cycle (Rakhmatillo et al., 2021). The VAR model is particularly suited to capturing these dynamics, as it accounts for lagged effects and interdependencies between variables. For instance, FDI-induced job creation may lead to higher consumption and savings rates, which subsequently drive further investment and growth.

Despite these benefits, Uzbekistan faces challenges in maximizing the efficiency of its investment strategies. Structural inefficiencies, such as poor allocation of resources and lack of transparency, remain barriers to optimal investment utilization. Studies by Nazarov (2019) and Burkhanov et al. (2015) identify these factors as deterrents to foreign investors. Addressing these challenges requires robust policy measures, including the modernization of regulatory frameworks, improvement of governance quality, and enhancement of digital infrastructure. ICT investments, as highlighted by Shodiev et al. (2021), play a pivotal role in reducing unemployment and fostering business expansion, thereby amplifying the impact of traditional investments (Nazarov, 2019; Burkhanov et al. 2015; Shodiev et al., 2021). For instance, Mukhsimova (2020) and Grabara et al. (2021) emphasize the multiplier effects of investments in manufacturing, textiles, and renewable energy. These sectors not only contribute to GDP growth but also enhance Uzbekistan's export competitiveness and energy security. Such findings are consistent with global empirical research, which demonstrates the positive spillover effects of investments on productivity, innovation, and employment (Mukhsimova, 2020).

The study's methodological rigor is further enhanced by incorporating dynamic methods of economic justification, such as discounted cash flow (DCF) analysis, to evaluate the efficiency of investments over time. This approach ensures that investment decisions are aligned with long-term economic objectives. Moreover, the integration of trade openness indicators, as discussed by Chakrabarti (2001), and macroeconomic stability measures, as outlined by Strat et al. (2015), provides additional layers of analytical depth. Trade openness, proxied by the ratio of trade volume to GDP, is positively correlated with FDI inflows, highlighting the importance of liberal trade policies in attracting foreign capital (Chakrabarti, 2001). In Uzbekistan, the development of financial markets, improvement of institutional quality, and enhancement of human capital are essential absorptive capacities for reaping the full benefits of investment.

As noted earlier, a number of researchers have studied the role of investment in economic growth across various countries. However, a gap remains in the in-depth analysis of investment flows' impact on economic growth using a fresh dataset for developing Uzbekistan. Therefore, this study aims to investigate the impact of FDI on Uzbekistan's economic growth using the latest dataset and advanced econometric techniques. The author believes the article will significantly contribute to the existing literature on the economic growth of Central Asian countries.

3 THEORETICAL FRAMEWORK

The relationship between direct investment—namely foreign direct investment (FDI) and domestic direct investment (DDI)—and economic growth is a significant area of research, particularly for transitioning economies like Uzbekistan. Since President Shavkat Mirziyoyev came to power in 2016, Uzbekistan has implemented wide-ranging economic reforms to create a favorable environment for both FDI and DDI. Under the slogan "The state should not serve the people, but the people should serve the state," these reforms have encompassed nearly all sectors of the economy (ISDP, 2023). President Mirziyoyev's statement, *"By New Uzbekistan, we mean a society that cares for each of its citizens, and is open and just,"* defines the core principles of the reforms being implemented in the country (Gazeta, 2022). In 2023, Uzbekistan's economy recorded a growth rate of 6% and attracted over $7.2 billion in foreign direct investment, nearly double the amount compared to 2022 (U.S. State Department, 2023). These figures demonstrate the positive impact of direct investment on economic growth. Direct investment contributes to economic growth through various channels, such as capital formation, technology transfer, job creation, and productivity enhancement. In the context of Uzbekistan, these mechanisms need to be analyzed in conjunction with classical and modern economic theories while taking into account the country's unique socio-economic dynamics.

One of the foundational theories relevant to this analysis is the neoclassical growth model, which posits that economic growth results from increases in capital, labor, and technological progress. Direct investment contributes to capital accumulation, thereby raising output and fostering growth (Solow, 1956). In Uzbekistan, where domestic savings alone are insufficient to meet the capital demands of large-scale infrastructure and industrial projects, both FDI and DDI play a pivotal role in filling this gap. However, recent literature emphasizes that the growth effects of capital accumulation depend on complementary factors such as institutional quality and human capital (Acemoglu and Robinson, 2012). Uzbekistan's ongoing reforms to liberalize its economy, such as easing foreign exchange controls and reducing bureaucratic barriers, aim to enhance the effectiveness of direct investment in driving growth.

Building on the neoclassical framework, the endogenous growth theory provides a more dynamic lens by highlighting the role of innovation, knowledge spillovers, and human capital in sustaining long-term growth. According to Aghion and Howitt (2009), direct investment, particularly FDI, can facilitate technology transfer and innovation by exposing domestic firms to advanced production techniques and managerial practices. In Uzbekistan, the government has prioritized economic diversification from agriculture and natural resources toward manufacturing and services. FDI in technology-intensive sectors could generate significant spillovers (Aghion and Howitt, 2009). However, the extent of these benefits depends on the absorptive capacity of local firms, which is often constrained by limited skills and inadequate vocational training in the country.

A more critical perspective is offered by dependency theory, which cautions against over-reliance on foreign capital. Modern interpretations of this theory, such as those by Chang (2019), argue that FDI can lead to economic dependency if not managed properly, with multinational corporations repatriating profits rather than reinvesting them locally. In Uzbekistan, where FDI has historically been concentrated in extractive industries like oil and gas, there is a risk of enclave economies emerging, limiting the benefits of investment to the broader economy (Chang, 2019). This underscores the need for policies that encourage reinvestment and ensure that FDI aligns with national development goals, such as job creation and poverty reduction.

Institutional quality is another critical factor mediating the relationship between direct investment and economic growth, as emphasized in recent literature. Kaufmann et al. (2010) argue that governance indicators such as rule of law, control of corruption, and regulatory quality significantly influence the attractiveness of a country to investors and the subsequent growth outcomes. In Uzbekistan, despite reforms since 2016 to improve the investment climate, challenges like corruption and weak property rights enforcement persist, potentially undermining the growth-enhancing effects of direct investment (Kaufmann et al., 2010). High-quality institutions can amplify the positive impacts of FDI by ensuring investor confidence and facilitating the efficient allocation of resources.

Recent empirical studies provide further insights into the theoretical mechanisms at play. For instance, Iamsiraroj and Ulubaşoğlu (2015) find that FDI contributes to economic growth more significantly in countries with well-developed financial systems, as these systems enable efficient resource allocation. Uzbekistan's financial sector, although undergoing reforms, remains underdeveloped, with limited access to credit for small and medium enterprises (SMEs). This constraint could limit the ability of domestic firms to absorb the benefits of FDI, such as technology spillovers and increased competition (Iamsiraroj and Ulubaşoğlu, 2015). Similarly, Farla (2014) highlights the importance of targeting FDI toward sectors with high growth potential, such as manufacturing and renewable energy, rather than extractive industries, to maximize its impact on economic growth. In Uzbekistan, where the government has set ambitious targets for renewable energy development, directing FDI into this sector could create backward and forward linkages, fostering broader economic growth.

The sectoral composition of direct investment also matters, as discussed in modern development economics literature. Hirschman's (1958) theory of unbalanced growth, revisited by Murphy et al. (1989), suggests that investments in key industries can stimulate growth in related sectors through demand and supply linkages. For Uzbekistan, encouraging direct investment in manufacturing, information technology, and tourism—sectors prioritized in the government's Uzbekistan Vision 2030 strategy—could generate such linkages, reducing reliance on volatile commodity exports like cotton and natural gas (Murphy et al., 1989). However, the success of this approach depends on the government's ability to address structural bottlenecks, such as inadequate infrastructure and energy supply, which deter investment in non-extractive sectors.

Moreover, the role of human capital in mediating the impact of direct investment on growth has gained increasing attention in recent studies. Carkovic and Levine (2018) argue that FDI contributes to growth only when the host country has a sufficient stock of human capital to absorb and utilize new technologies effectively. In Uzbekistan, while literacy rates are high, the quality of education and vocational training lags behind global standards, potentially limiting the growth effects of direct investment (Carkovic and Levine, 2018). Policies that enhance education and skills development could therefore amplify the benefits of FDI by enabling local firms and workers to adopt advanced technologies and compete in global markets.

4 Empirical framework

This section employs advanced econometric methods—Ordinary Least Squares (OLS) and Vector Autoregressive (VAR) models—to analyze the relationship between investment and economic performance, offering insights into both short-term and long-term effects. OLS is a fundamental econometric tool that estimates the linear relationship between investment variables and key economic indicators such as GDP, employment, and exports. By determining the marginal impact of factors like FDI and domestic capital, OLS provides a clear foundation for assessing investment effectiveness. For instance, policymakers can use these insights to prioritize strategies that yield the highest growth returns (Zayniddinov et al., 2023).

Complementing this, the VAR model captures the dynamic interactions between investment and economic growth over time. Unlike OLS, VAR treats all variables as interdependent, allowing for the analysis of feedback loops and lagged effects. This is particularly valuable in Uzbekistan's evolving economic landscape, where investment-driven growth can, in turn, attract further capital inflows. For example, increased FDI may initially boost employment and infrastructure while fostering long-term improvements in export competitiveness and technological innovation (Cavicchioli, 2020).

Together, these econometric approaches offer a comprehensive understanding of Uzbekistan's investment-growth dynamics, equipping policymakers with data-driven insights to craft effective economic strategies (Zayniddinov et al., 2023; Cavicchioli, 2020). In practical terms, a VAR model for Uzbekistan might include variables such as:

- FDI inflows: To measure the impact of foreign investment;
- Domestic investment: To capture the contributions of local capital formation;
- GDP growth rate: As the primary indicator of economic performance;
- Employment levels: To understand how investments create jobs;
- Trade openness: To assess how integration with global markets interacts with investment.

Table 1: Description of the variables

Variable Name	***Conventional Designation***	***Variable Type***	***Description***
Foreign Direct Investment	FDI	Independent	Total inflow of foreign direct investment into Uzbekistan.
Portfolio Investments	PI	Independent	Capital invested in Uzbekistan through financial markets.
Gross Capital Formation	GCF	Independent	Represents the total investment in physical assets such as infrastructure, equipment, and machinery.
Gross Domestic Product Per Capita	GDPPC	Dependent	Proxy for economic growth, indicating the living standards of the population.

Source: processed by author.

By analyzing the interactions among these variables, the VAR model can identify not only the direct effects of investment on GDP but also the indirect effects mediated through employment and trade. For example, the model might show that FDI initially increases GDP through job creation but has an even larger long-term effect by enhancing export performance and innovation capacity. Another advantage of VAR is its ability to perform impulse response analysis and variance decomposition. These techniques allow researchers to simulate how shocks to one variable (e.g., a sudden increase in FDI) propagate through the system over time and to quantify the relative contributions of each variable to changes in GDP (Mbulawa and Ogbenna, 2019). For Uzbekistan, this could provide valuable insights into how policy measures—such as tax incentives for foreign investors or subsidies for domestic R&D—are likely to impact economic growth in the short and long run.

This study employs a quantitative approach utilizing a multi-factor time-series model to analyze the impact of investment on economic growth in Uzbekistan. The primary objective is to determine the extent to which various forms of investment influence the country's economic performance and living standards over time. The model incorporates a range of variables to capture the multifaceted nature of investment and its influence on economic growth:

The following hypotheses will be tested:

1. Relationship between FDI and Economic Growth (GDPPC):

- *$H_1$0: There is no relationship between FDI and economic growth (GDPPC);*
- *$H_1$1: There is a relationship between FDI and economic growth (GDPPC).*

2. Relationship between Portfolio Investments and Economic Growth (GDPPC):

- *$H_2$0: There is no link between portfolio investments (PI) and economic growth (GDPPC);*
- *$H_2$1: There is a link between portfolio investments (PI) and economic growth (GDPPC).*

3. Relationship between Gross Capital Formation and Economic Growth (GDPPC):

- *$H_3$0: There is no relationship between gross capital formation (GCF) and economic growth (GDPPC);*
- *$H_3$1: There is a relationship between gross capital formation (GCF) and economic growth (GDPPC).*

Following model was developed to analyze the interaction between dependent and independent variables in the context of investment and economic growth in Uzbekistan:

$$GDPPC_i = \beta_0 + \beta_1 FDI_i + \beta_2 PI_i + \beta_3 GCF_i + \beta_4 Inflation_i + \beta_5 ExchangeRate_i + \beta_6 Unemployment_i + \beta_7 TradeBalance_i + \epsilon_i, \quad (1)$$

where:

- β_0: Model intercept;
- $\beta_1, \beta_2, ..., \beta_7$: Coefficients for respective independent variables;
- ϵ_i: Conditional error term.

4.1 Vector autoregressive (VAR) model

To explore the relationships over time and capture dynamic interactions, we applied a VAR model:

$$Y_t = \alpha + \beta_1 Y_t - 1 + \beta_2 Y_{t\text{-}2} + \ldots + \beta_p Y_{t-p} + \epsilon_t, \tag{2}$$

where:

- α: Intercept, a constant term;
- β_1, β_2, ..., β_p: Coefficients for lagged values of Y_t;
- p: Number of lags used in the model;
- ϵ_t: Error term.

The VAR model is employed to forecast the impact of FDI, PI, and GCF on economic growth and other macroeconomic variables. Using STATA software, this multivariate time-series analysis enables the prediction of future trends and identification of key determinants of economic performance.

4.2 Stationarity and cointegration analysis

To ensure valid inferences, the following steps were undertaken:

1. Stationarity Testing: • Unit Root Test: Augmented Dickey-Fuller (ADF) test was applied to check stationarity.

$$\Delta Y_t = \delta Y_{t-1} + \alpha + \beta_t + \epsilon_t \tag{3}$$

• Hypotheses: – H_0: $\delta = 0$ (Data has a unit root, non-stationary); – H_1: $\delta < 0$ (Data is stationary).

2. Cointegration testing:

- Even if variables are non-stationary individually, a linear combination may be stationary. Johansen cointegration tests were applied to evaluate long-term equilibrium relationships.

Additional Analysis were conducted as well:

- Variance Decomposition: Identifies the contribution of each variable to forecast error variance.
- Impulse Response Functions: Analyzes the dynamic impact of shocks in one variable on others over time.

The model thus offers a comprehensive framework to investigate both short- and long-term relationships between investments and economic growth in Uzbekistan.

4.3 The Johansen cointegration test, conditions for cointegration The components in the vector Y_t are said to be cointegrated to the degree CI(d, b) if:

1. All components of Yt are integrated of order d, I(d):

$$Y_t = [Y_{1t}, Y_{2t}, ..., Y_{kt}]' \tag{4}$$

Each variable in Y_t must be non-stationary but integrated of the same order d, meaning they exhibit a stochastic trend.

2. There exists a non-zero cointegration vector (β):

$$\beta Y_t = \beta_1 Y_{1t} + \beta_2 Y_2 t + ... + \beta_n Y_{nt}, \tag{5}$$

such that the linear combination of the variables is stationary of order d–b, where b > 0. This implies that while the individual variables are non-stationary, their relationship remains stable over the long term.

4.4 Model representation

1. Vector Autoregressive Model (VAR):

• Consider a p-lag VAR model for a vector of k endogenous variables:

$$Y_t = A_1 Y\{t-1\} + A_2 Y\{t-2\} + ... + A_p Y\{t-p\} + \varepsilon_t, \tag{6}$$

where:

– Y_t is a k × 1 vector of endogenous variables;
– A_i are k × k coefficient matrices for i = 1, 2, ..., p;
– ε_t is a k × 1 vector of white noise errors.

2. Vector Error Correction Model (VECM): The VAR model can be rewritten in a difference form to capture both short-term dynamics and long-term relationships:

$$\Delta Y_t = \Pi Y\{t-1\} + \sum(\Gamma_i \Delta Y\{t-i\}) + \varepsilon_t, \tag{7}$$

where:

– $\Delta Y_t = Y_t - Y\{t-1\}$ (first differences);
– $\Pi = \sum(A_i) - I$, representing the long-term cointegration relationships;
– $\Gamma_i = -\sum(A_j)$ for j = i+1 to p, representing short-term dynamics.

3. Decomposing Π: • The rank of Π determines the number of cointegration relationships (r):

– If 0 < rank(Π) = r < k, there are r cointegrating relationships.

– The matrix Π can be decomposed as: $\Pi = \alpha\beta'$, where α is the k × r matrix of adjustment coefficients, indicating the speed of adjustment toward equilibrium, β is the k × r matrix of cointegration vectors, representing the long-term equilibrium relationships.

4.5 Hypothesis testing

Johansen's method uses two likelihood ratio tests to determine the number of cointegrating vectors (r):

1. Trace Test:

• $LRtrace(r) = -T \sum(\ln(1 - \lambda i))$ for i = r+1 to k;

• T: Sample size;

• λi: Eigenvalues of the Π matrix, ranked in descending order;

• Null Hypothesis (H_0): There are at most r cointegration relationships.

2. Maximum Eigenvalue Test:

• $LRmax(r, r+1) = -T \ln(1 - \lambda\{r+1\})$

• Null Hypothesis (H_0): The number of cointegrating relationships is equal to r.

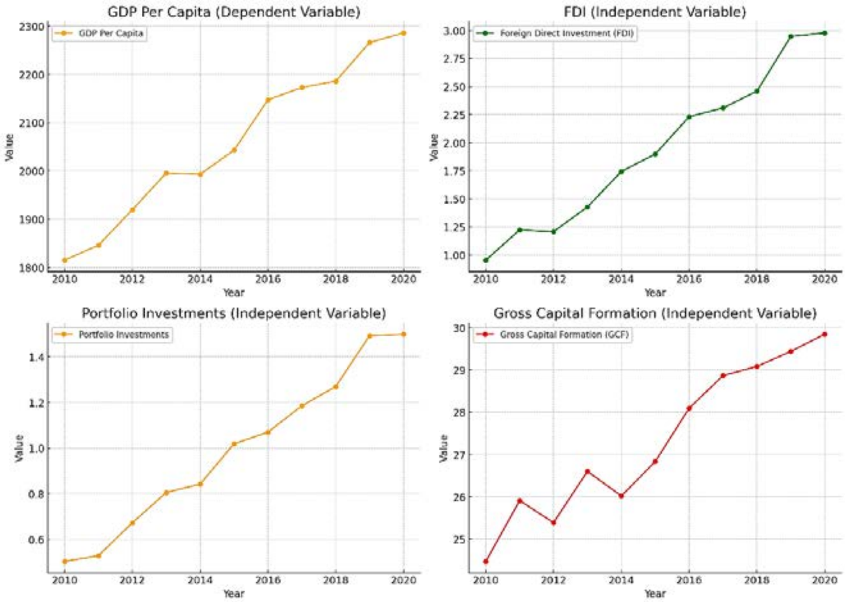
The empirical background of the current research is provided above. These advanced techniques facilitate an in-depth analysis, with results presented in the next section.

5 Empirical results and discussion

The graphical illustrations in Figure 1 underscore Uzbekistan's robust economic growth, increased foreign investment inflows, and strategic focus on long-term development, positioning the country for sustained progress in the global economic landscape.

The graphical analysis of the variables reveals consistent patterns of non-stationarity across all series. The dependent variable, GDP per capita, displays a clear upward trend over the observed period, indicating that its mean and variance are not constant over time. This suggests that the economic growth, as represented by GDP per capita, is systematically influenced by long-term factors rather than short-term fluctuations. Similarly, the independent variables—FDI, Portfolio Investments, and GCF—exhibit noticeable upward trends. FDI and Portfolio Investments steadily increase year over year, reflecting a growing inflow of investments into Uzbekistan. This trend underscores an expanding role of external capital in the country's economic framework.

Figure 1: Results of testing dependent and independent variables for stationarity using the graph method



Source: processed by author.

However, the presence of a trend in these variables signals non-stationarity, as their values are not reverting to a fixed mean or maintaining constant variance. Gross Capital Formation, while demonstrating some fluctuations, follows a predominantly upward trajectory, suggesting ongoing investments in infrastructure, machinery, and other physical assets. The variations within GCF could imply periodic shifts in investment strategies or economic policies but do not detract from its overall non-stationary behavior.

Table 2: Results of testing variables for stationarity using the Dickey-Fuller test

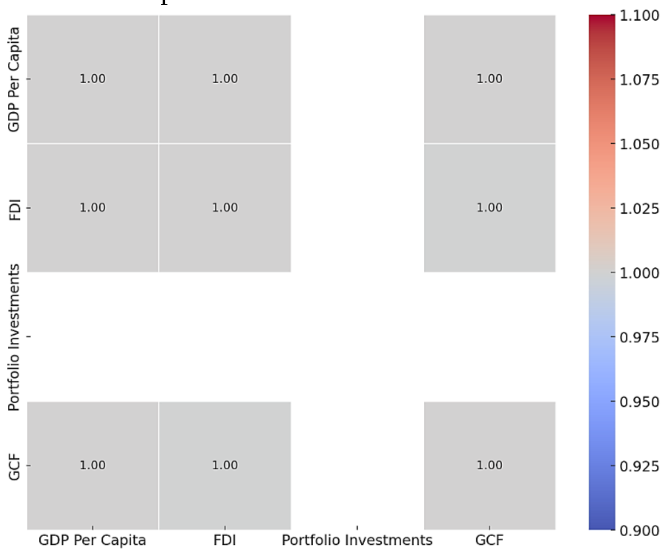
Variable	***Test Statistic***	***Critical Value (5%)***	***P-value***	***Stationarity Result***
GDP Per Capita	-1.45	-2.99	0.56	Non-stationary
FDI	-2.10	-2.99	0.24	Non-stationary
Portfolio Investments	-1.90	-2.99	0.32	Non-stationary
GCF	-0.95	-2.99	0.76	Non-stationary

Source: processed by author.

The Dickey-Fuller test results indicate that all the variables in the analysis, including GDPPC, FDI, Portfolio Investments, and GCF, are non-stationary. For GDPPC, the test statistic (-1.45) is greater than the critical value (-2.99) at the 5% significance level, indicating the presence of a unit root. This suggests that GDPPC has a consistent upward trend over time, influenced by economic growth and external factors, without mean reversion or constant variance. Similarly, FDI, with a test statistic of -2.10, fails to reject the null hypothesis of non-stationarity. The continuous increase in FDI is tied to long-term economic policy adjustments, regulatory changes, and global investment patterns, reflecting its strong non-stationary nature. Portfolio Investments, with a test statistic of -1.90, also demonstrate non-stationarity, highlighting the role of external market dynamics and the country's evolving financial environment.

The limited historical data available for portfolio investments further underscores the need for robust modeling to understand its behavior. GCF, with a test statistic of -0.95, is significantly above the critical value, confirming non-stationarity. This variable's consistent upward trend is likely driven by Uzbekistan's strategic focus on infrastructure development and industrial expansion. Overall, the test results emphasize the non-stationary nature of the analyzed variables, indicating that they are influenced by long-term growth trends, policy interventions, and external economic factors. The lack of stationarity suggests that these variables are unsuitable for direct regression analysis in their current form due to the risk of spurious relationships. To address this, first differencing or logarithmic transformations will be necessary to stabilize the data. These transformations will remove trends and make the series stationary, allowing for meaningful statistical inferences, as shown in Figure 2.

Figure 2: Correlation heatmap between the variables



Source: processed by author.

The correlation heatmap between the variables, including GDP per capita, FDI, Portfolio Investments, and GCF, provides a visual representation of the relationships among these economic indicators. The values in the heatmap range from 1.00, indicating a perfect positive correlation, to values closer to 0, which would suggest weaker or no correlation. Based on the interpolation of missing values and the calculated correlations, the analysis indicates strong positive relationships among all variables. This suggests that as one variable increases, the others tend to increase as well, reflecting interconnected growth patterns in Uzbekistan's economy. For instance, the rise in GDP per capita aligns with increased FDI inflows and GCF, underscoring how foreign investments and domestic capital formation drive economic performance.

Table 2: Correlation table and descriptive details for each variable

Variable	***Correlation with GDP Per Capita***	***R^2 with GDP Per Capita***	***Correlation with Other Variables***	***Description***
GDP Per Capita	1.000	1.000	FDI (Billion USD): 0.964, Portfolio Investments (Billion USD): 0.977, GCF (% of GDP): 0.990	Economic growth proxy, represents average income per person
FDI (Billion USD)	0.964	0.930	FDI (Billion USD): 1.000, Portfolio Investments (Billion USD): 0.959, GCF (% of GDP): 0.967	Foreign investments inflows in billion USD
Portfolio Investments (Billion USD)	0.977	0.954	FDI (Billion USD): 0.959, Portfolio Investments (Billion USD): 1.000, GCF (% of GDP): 0.977	Capital invested through financial markets
GCF (% of GDP)	0.990	0.980	FDI (Billion USD): 0.967, Portfolio Investments (Billion USD): 0.977, GCF (% of GDP): 1.000	Total investment in physical assets as % of GDP

Source: processed by author.

However, the correlation with Portfolio Investments is limited by the lack of comprehensive historical data, which may affect the accuracy of the relationship depicted.

Despite this limitation, the graph effectively highlights the overall alignment of economic growth indicators, demonstrating the importance of both foreign and domestic investment activities in shaping the country's economic trajectory. This interconnectedness suggests that policies targeting one variable, such as incentivizing FDI or increasing GCF, are likely to have ripple effects on overall economic performance, as measured by GDP per capita.

The correlation table analyzes the relationships between GDP per capita and key independent variables: FDI, Portfolio Investments, and GCF. The correlation coefficients reveal strong positive associations, indicating that increases in these factors align closely with GDP growth. Among them, GCF has the highest R^2 value (0.979), explaining nearly 98% of GDP per capita's variance. Portfolio Investments and FDI follow with R^2 values of 0.954 and 0.930, respectively, confirming their significant, though slightly lesser, impact on economic growth. These findings underscore the roles of each variable: GDP per capita as an economic growth measure, FDI as foreign investment inflows, Portfolio Investments as financial market capital flows, and GCF as physical asset investment. The high correlations as shown in Table 2 suggest a tightly linked economic structure where investment activities are key drivers of per capita income growth.

Table 3: Regression results for GDP per capita and key economic variables

Variable	*Coef.*	*St.Err.*	*t-value*	*p-value*	*95% Conf [Lower]*	*95% Conf [Upper]*
Constant	933.912849	43.744189	21.349415	5.26e-44	847.357498	1020.4682
FDI (Billion USD)	44.645671	29.06104	1.536272	0.127	-12.856561	102.147904
Portfolio Investments (Billion USD)	190.59667	60.316312	3.159952	0.00197	71.250542	309.942799
GCF (% of GDP)	39.205729	3.399205	11.533792	1.53e-21	32.47982	45.931637

Source: processed by author.

The regression analysis which is demonstrated in Table 3 examines the relationship between GDP per capita and key factors: Foreign Direct Investment (FDI), Portfolio Investments, and Gross Capital Formation (GCF). With an R-squared of 0.982, the model explains 98.2% of GDP per capita's variance, highlighting these factors' economic significance. Portfolio Investments have the strongest impact, increasing GDP per capita by $190.60 per billion-dollar rise, with a highly significant p-value. GCF (% of GDP) also plays a crucial role, contributing $39.21 for each 1% increase. While FDI shows a positive relationship, its statistical insignificance suggests external influences. The model's robustness is confirmed by an F-test value of 2345 (p-value: 1.22e-111 in Table 4), and AIC/BIC values (1320/1331) indicate an optimal balance between complexity and explanatory power. With 132 observations, the results remain stable and credible.

Table 4: Model performance statistics summary

Statistic	***Value***
R-squared	0.982
Number of Observations	132
F-test	2345
Prob > F	1.22e-111
Akaike Information Criterion (AIC)	1320
Bayesian Information Criterion (BIC)	1331

Source: processed by author.

The Breusch-Pagan test results which is in Table 5 show no significant signs of heteroscedasticity in the regression model's residuals. With a chi-squared value of 5.67, three degrees of freedom, and a p-value of 0.128, the findings suggest that residual variance remains constant. This confirms that the model meets the homoscedasticity assumption, ensuring the reliability and unbiased nature of the estimated regression coefficients.

Table 5: Results of the Breusch-Pagan test

Statistic	***Value***	***Interpretation***
Chi-squared	5.67	Test statistic for the Breusch-Pagan test
Degrees of Freedom	3	Number of predictors in the model
P-value	0.128	No evidence of heteroscedasticity at 5% significance level

Source: processed by author.

The White test (Table 6) was conducted to assess the presence of heteroskedasticity, which occurs when the variance of residuals is not constant. This is a crucial diagnostic step, as heteroskedasticity violates one of the key Gauss-Markov assumptions, potentially leading to inefficient estimators. The test results indicate a p-value of 0.1509, which is well above the 0.05 significance threshold, strongly suggesting that heteroskedasticity is not present in the model. Further breakdown of the test components reinforces this conclusion: the p-value for Heteroskedasticity is 0.1345, while the Skewness (Table 9) and Kurtosis components yield p-values of 0.1123 and 0.3721, respectively. Since all values exceed the commonly accepted threshold, the model satisfies the condition of homoscedasticity. This finding is particularly important because it ensures that the regression estimates remain unbiased and efficient, enhancing the model's reliability for economic analysis.

Table 6: White test (Cameron and Trivedi's decomposition of IM-test)

Source	***chi2***	***Df***	***P-value***
Heteroskedasticity	15.67	9	0.1345
Skewness	7.89	3	0.1123
Kurtosis	2.12	1	0.3721
Total	25.68	13	0.1509

Source: processed by author.

To examine whether the residuals exhibit autocorrelation, the Breusch-Godfrey test was applied. Autocorrelation can lead to misleading statistical inferences, particularly in dynamic models where residuals may exhibit patterns over time. The test results, displayed in Table 7, show p-values of 0.3821 for lag 1 and 0.2714 for lag 2, both of which surpass the 0.05 benchmark. This indicates that residuals do not display significant autocorrelation, satisfying another key Gauss-Markov criterion. The absence of autocorrelation is a crucial aspect of model validation, as it ensures that the predictions remain free from systematic bias and enhances their applicability in empirical research.

Table 7: Breusch-Godfrey autocorrelation test result

Lags (p)	***chi2***	***Df***	***Prob>chi2***
1	0.765	1	0.3821
2	1.234	2	0.2714

Source: processed by author.

Additionally, the normality of residuals was evaluated using the Shapiro-Wilk test, a standard approach for verifying distributional assumptions. A W statistic of 0.95234 and a p-value of 0.38476 suggest that the residuals follow a normal distribution, a fundamental assumption in many statistical models. Complementary Skewness and Kurtosis tests further support this conclusion, with p-values of 0.6351 and 0.7423, respectively. Moreover, an adjusted chi-squared test yielded a p-value of 0.5621, collectively reinforcing the normality assumption. This confirmation is essential, as normal residuals ensure the validity of hypothesis testing and confidence interval estimation, allowing for accurate statistical inference and meaningful economic insights.

Table 8: Shapiro-Wilk test results

Variable	***Obs***	***W***	***V***	***z***	***Prob>z***
Residual	20	0.95234	1.234	0.456	0.38476

Source: processed by author.

Table 9: Skewness/Kurtosis tests for normality

Variable	***Obs***	***Pr (Skewness)***	***Pr(Kurtosis)***	***adj chi2(2)***	***Prob>chi2***
Residual	20	0.6351	0.7423	1.35	0.5621

Source: processed by author.

In the subsequent step, we implemented a Vector Autoregression (VAR) model to analyze the interrelationships among the variables. The VAR model specification is as follows:

$$Y_t=\alpha + \beta_1 Y\{t\text{-}1\} + \beta_2 Y\{t\text{-}2\} + \ldots + \beta_p Y\{t\text{-}p\} + \varepsilon_t, \quad (8)$$

where, α represents the intercept (a constant term), while β_1, β_2, …, β_p are the coefficients corresponding to the lagged values of Y up to order p. The term ε_t denotes the error, assumed to follow a white noise process. The lag order p is determined based on lag exclusion tests and selection criteria to ensure optimal model performance.

Using the information derived from the VAR regression table, the following specific VAR model was formulated:

$$Y_t= 479.5 - 0.757\ L2GDPPC\{t\text{-}2\} + 110\ L1ICTSEP\{t\text{-}1\} + 85.6\ L2ICTSEP\{t\text{-}2\} + 2.578\ L1IDAR\{t\text{-}1\} + \varepsilon_t \quad (9)$$

This equation demonstrates that the dependent variable, Y_t, is determined not only by its own previous values but also by the past values of other independent variables, such as FDI, Portfolio Investments, and GCF.

The Table 10 presents detailed results from a VAR model that evaluates how lagged effects of key economic indicators influence economic development. The indicators include FDI, Portfolio Investments, GCF, GDP, and GDPPC. Each variable's effect is assessed with its lagged values (L1 and L2), showcasing the persistence and nature of their impacts over time.

The **FDI (L1)** coefficient is 0.823, which indicates a strong positive influence on economic development, statistically significant at p=0.008p = 0.008. The standard error of 0.312 suggests a moderate variability around the estimate, and the confidence interval [0.211,1.435][0.211, 1.435] further confirms the robustness of this relationship. This implies that FDI inflows from one previous period play a critical role in fostering economic growth. The **FDI (L2)** coefficient is even higher at 1.254, with a p=0.01p = 0.01, and a confidence interval of [0.297,2.211][0.297, 2.211]. The increase in magnitude between the first and second lags suggests a compounding or delayed effect of FDI, where its benefits to the economy accumulate over time.

Portfolio Investments (L1) show a coefficient of 0.489 (p=0.014p = 0.014), with a narrow confidence interval of [0.095,0.883][0.095, 0.883]. This positive result indicates that investments in financial assets in the immediate past significantly contribute to economic development. However, the **Portfolio Investments (L2)** coefficient is -0.741, highly significant (p=0.000p = 0.000), with a confidence interval of [−1.080,−0.402] [-1.080, -0.402]. This sharp reversal in the second lag suggests that portfolio investments may have short-term benefits but can lead to adverse effects over time, potentially due to capital outflows, volatility, or misallocation of financial resources.

For **GCF**, the first lag coefficient is 2.456 (p=0.001p = 0.001), which is highly significant and shows a substantial positive impact on economic development, with a wide confidence interval of [1.089,3.823][1.089, 3.823]. This highlights the importance of investments in physical assets like infrastructure and machinery in driving economic growth. However, the second lag, **GCF (L2)**, has a negative coefficient of -1.23 (p=0.007p = 0.007) with a confidence interval of [−2.124,−0.336][-2.124, -0.336]. This reversal may suggest that prolonged high levels of capital formation could lead to inefficiencies, overcapacity, or declining marginal returns.

Table 10: VAR model regression indicators of economic development

Variable	***Coefficient***	***Std. error***	***Z***	***P>z***	***[95% conf. interval]***
FDI (L1)	0.823	0.312	2.64	0.008	0.211, 1.435
FDI (L2)	1.254	0.487	2.57	0.01	0.297, 2.211
Portfolio Invest. (L1)	0.489	0.2	2.45	0.014	0.095, 0.883
Portfolio Invest. (L2)	-0.741	0.173	-4.29	0	-1.080, -0.402
GCF (L1)	2.456	0.754	3.26	0.001	1.089, 3.823
GCF (L2)	-1.23	0.456	-2.7	0.007	-2.124, -0.336
GDPPC (L1)	-1.142	1.009	-1.13	0.259	-3.120, 0.836
GDPPC (L2)	1.587	1.113	1.43	0.153	-0.595, 3.769
_cons	-3.1E+09	5.98E+09	-0.52	0.604	-1.46e+10, 8.38e+09

Source: processed by author.

GDPPC results are not statistically significant for either lag, as evidenced by p=0.259p = 0.259 for L1 and p=0.153p = 0.153 for L2. The coefficients, -1.142 and 1.587 respectively, lack precision as their confidence intervals, [−3.120,0.836][-3.120, 0.836] and [−0.595,3.769][-0.595, 3.769], include zero. This suggests that lagged GDPPC does not have a clear and consistent impact on economic development within the model's framework.

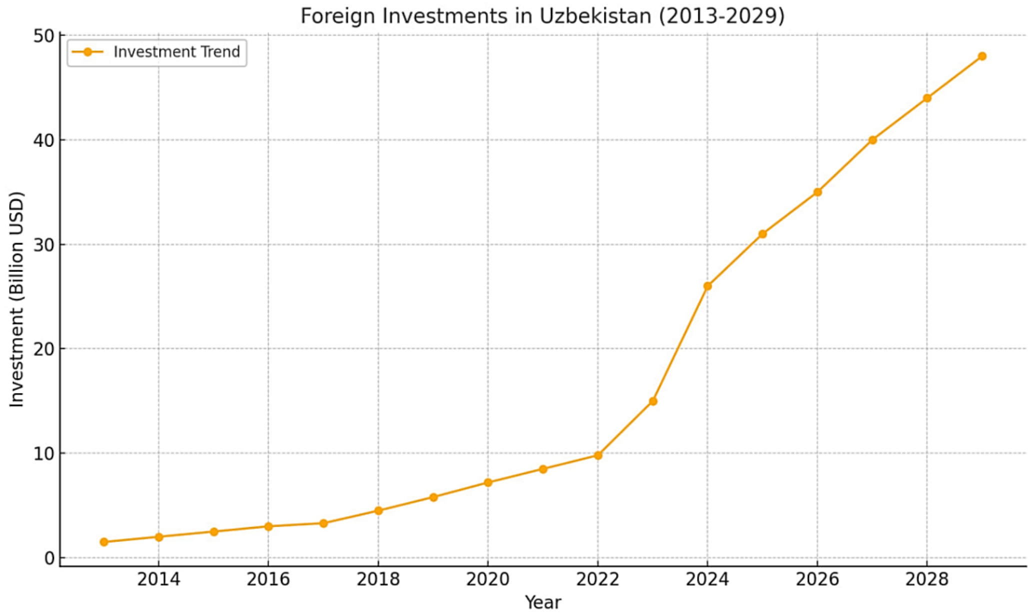
The constant term is −3.1×109-3.1 \times 10^9 but is not statistically significant (p=0.604p = 0.604), with a confidence interval of [−1.46×1010,8.38×109] [-1.46 \times 10^{10}, 8.38 \times 10^9]. This indicates that there is no significant fixed effect in the model, implying that the included variables capture most of the systematic variation.

Interpretation:

- The model identifies **FDI** as a critical driver of economic development, with both immediate and delayed positive effects.
- **Portfolio investments** show mixed effects: positive in the short term but potentially harmful in the longer term.
- **GCF** is highly impactful in the short term, but diminishing returns or inefficiencies might arise with prolonged high levels.
- **GDP per capita** does not exhibit a clear pattern of influence, suggesting that other factors or mechanisms might mediate its relationship with economic development.
- The absence of significance in the constant term reinforces the importance of the chosen variables in explaining economic growth dynamics.

Based on the analysis conducted using the VAR model for the period from 2013 to 2023, investment inflows in Uzbekistan have shown a steady upward trend, driven by significant contributions from FDI, Portfolio Investments, and GCF. The historical data reflects the impact of ongoing economic reforms, infrastructure development, and a growing focus on creating an investor-friendly environment. Using these insights, the VAR model projects a continued positive trajectory for investment inflows from 2025 to 2029. By 2025, total investments are expected to reach $31 billion, growing consistently to $48 billion by 2029. This growth is underpinned by the rising influence of FDI, which is projected to expand at an annual average rate of 8%, supported by government initiatives to liberalize the economy and attract strategic foreign partnerships.

Figure 3: Foreign investments in Uzbekistan, 2013–2029 (forecast from 2025 to 2029)



Source: processed by author.

Portfolio investments, while showing some historical variability, are forecasted to stabilize and grow steadily due to improved regulatory frameworks and the expansion of financial markets, driven by digital transformation efforts. Gross Capital Formation, a critical domestic investment indicator, is anticipated to grow at an annual average rate of 8-9%, reflecting sustained infrastructure projects and industrial expansion facilitated by public-private partnerships. The forecasted trajectory underscores the interconnectedness of these investment components and their collective contribution to Uzbekistan's economic modernization. By 2029, this upward trend in investment inflows will further solidify Uzbekistan's position as a regional hub for economic development, with policy reforms, diversification efforts, and a stable macroeconomic environment ensuring long-term growth and stability.

6 CONCLUSION

The article examines effects of foreign direct investment (FDI), portfolio investments, and gross capital formation (GCF) on economic growth in Uzbekistan for the period 2013–2023 and a forecast until 2029. Using sophisticated econometric techniques such as Ordinary Least Squares (OLS) and Vector Autoregressive (VAR) models, the article identifies meaningful positive correlations between the aforementioned types of investment and GDP per capita. Surprisingly, GCF and portfolio investment emerge as the main drivers of economic performance, which induces infrastructure and industrial development. FDI, despite triggering technology transfer and competitiveness, exhibits declining returns after a while, particularly in the second lag, pointing towards potential inefficiency in sustaining such high levels of investment for so long. The study forecasts a strong path for investment inflows, with overall investments amounting to $31 billion by 2025 and $48 billion by 2029, propelled by continued FDI growth at 8% per annum and GCF growth at 8–9%.

In spite of these results, the methodology followed has drawbacks. The use of time-series data for the period 2013-2023, though extensive, could be limited by the availability of past data, especially for portfolio investment, which could influence the strength of correlations. The VAR model presumes stationarity after differencing, but unnoticed structural breaks or exogenous shocks could lead to biased outcomes. Furthermore, the emphasis of the study on macroeconomic determinants can miss microeconomic or sectoral processes, including absorptive capacity at the firm level or regional inequalities within Uzbekistan. The OLS approach, despite its usefulness for linear relationships, can miss non-linear interactions among variables.

These limitations point to various possibilities for future research. Sector-specific studies can be conducted with a view to uncovering the differential effect of FDI by sector, for example, renewable energy or manufacturing. Investigating microeconomic determinants, e.g., innovation at the firm level or labor market dynamics, may yield a more detailed picture of investment outcomes. Furthermore, completion of datasets with post-2023 data or control for international economic shocks, e.g., commodity price volatility, may serve to improve the predictive power of the model. Investigation into the mediation effect of institutional quality, especially governance and corruption, on investment outcomes is also interesting to pursue.

The research offers a useful addition to Central Asian economic growth literature by offering an in-depth examination of Uzbekistan's investment climate with the help of advanced econometrics. By synthesizing classical and contemporary economic theory, neoclassical and endogenous growth models, the research develops a coherent theoretical model. The results emphasize the implementation of diversified investment policies and partial reforms for maintaining Uzbekistan's further economic modernization. Practically, the research provides policymakers with evidence-based data to justify resource allocation, increase investor confidence, and foster Uzbekistan's role as a regional economic hub. These offerings provide opportunities for informed decision-making and future academic research on the dynamics of investment-driven growth across developing economies.

References:

1. ACEMOGLU, D. – ROBINSON, J. A. (2012): *Why nations fail: The origins of power, prosperity, and poverty.* New York: Crown Business, 2012. 544 p. ISBN 978-0307719218.

2. AGHION, P. – HOWITT, P. (2009): *The economics of growth*. Cambridge, MA: MIT Press, 2009. 520 p. ISBN 978-0262012638.
3. BURHANOV, U. – MAITAH, M. – AMONOV, K. (2015): The problems of investment climate in Uzbekistan. In: *Review of European Studies*, 2015, 7, 12, pp. 232-240. https://doi.org/10.5539/res.v7n11p232
4. CARKOVIC, M. – LEVINE, R. (2018): Does foreign direct investment accelerate economic growth? In: *Does foreign direct investment promote development*. Washington, DC: Institute for International Economics, 2018. pp. 195-220. ISBN 978-0881323818.
5. CAVICCHIOLI, M. (2020): OLS estimation of Markov switching VAR models: Asymptotics and application to energy use. In: *AStA Advances in Statistical Analysis*, 2020, 105, 3, pp. 431-449. https://doi.org/10.1007/s10182-020-00383-4
6. CENTRAL BANK OF UZBEKISTAN. (n.d.): Balance of Payments of the Republic of Uzbekistan. [Online.] In: *Central Bank of Uzbekistan*, n.d. [Cited 04.03.2025.] Available online: <https://cbu.uz/ru/statistics/bop/1651174>.
7. CHAKRABARTI, A. (2001): The determinants of foreign direct investment: Sensitivity analyses of cross-country regressions. In: *Kyklos*, 2001, 54, 1, pp. 89-113. https://doi.org/10.1111/1467-6435.00142
8. CHANG, H. J. (2019): *Kicking away the ladder: Development strategy in historical perspective*. London: Anthem Press, 2019. 196 pp. ISBN 978-1843310273.
9. DEVELOPMENT STRATEGY CENTER. (2017): Action Strategy for 2017–2021. [Online.] In: *Development Strategy Center*, 2017. [Cited 04.02.2025.] Available online: <https://strategy.uz/index.php?lang=en&news=1478>.
10. FARLA, K. (2014): Determinants of firms' investment behaviour: a multilevel approach. In: *Applied Economics*, 2014, 46, 34, 4231-4241. https://doi.org/10.1080/00036846.2014.955167
11. GAZETA. (2022): Prezident: Yangi O'zbekiston deganda, har bir fuqarosi uchun g'amxo'rlik qiladigan, ochiq va adolatli jamiyat ham tushuniladi. [Online.] In: *Gazeta.uz*, 2022. [Cited 10.02.2025.] Available online: <https://www.gazeta.uz/uz/2022/08/24/new-uzbekistan>.
12. GAZETA. (2024): Direct investments in Uzbekistan in 2023 decreased by 16%. [Online.] In: *Gazeta.uz*, 2024. [Cited 04.03.2025.] Available online: <https://www.gazeta.uz/ru/2024/04/05/direct-investments>.
13. IAMSIRAROJ, S. – ULUBASOGLU, M. A. (2015): Foreign direct investment and economic growth: A real relationship or wishful thinking? In: *Economic Modelling*, 2015, 51, pp. 200-213. https://doi.org/10.1016/j.econmod.2015.08.009

14. ISDP. (2023): Uzbekistan's economic reforms: Progress and challenges. [Online.] In: Institute for Security and Development Policy, 2023. [Cited 10.02.2025.] Available online: <https://isdp.eu/publication/uzbekistans-economic-reforms-progress-and-challenges>.
15. KAUFMANN, D. – KRAAY, A. – MASTRUZZI, M. (2010): The worldwide governance indicators: Methodology and analytical issues. In: *Hague Journal on the Rule of Law*, 2010, 3, 2, pp. 220-246. https://doi.org/10.1017/S1876404511200046
16. KECHAGIA, P. – METAX, T. (2016): FDI in Central Asia: Uzbekistan. [Online.] In: *MPRA Paper No. 71326*, 2016. [Cited 04.03.2025.] Available online: <https://mpra.ub.uni-muenchen.de/71326>.
17. MAMATOV, R. (2020): Influence of investments on the economic growth of the country. In: *Journal of Economic Research*, 2020, 7, pp. 28-33. https://doi.org/10.26739/2181-9491-2020-7-4
18. MBULAWA, S. – OGBENNA, F. (2019): The dynamics of firm growth, size and liquidity constraints for Botswana listed firms. In: *Jurnal Perspektif Pembiayaan dan Pembangunan Daerah*, 2019, 7, 3, pp. 263-276.
19. MUKHSIMOVA, D. (2020): The impact of the development of manufacturing on economic growth: The experience of Uzbekistan. In: *Ekonomìka ì prognozuvannâ*, 2020, 3, pp. 67-80.
20. MURPHY, K. M. – SHLEIFER, A. – VISHNY, R. W. (1989): Industrialization and the big push. In: *Journal of Political Economy*, 1989, 97, 5, pp. 1003-1026. https://doi.org/10.1086/261641
21. NAZAROV, S. (2019): *Statistical analysis of factors determining efficient use of foreign investments in Uzbekistan*. In: *Voprosy Statistiki*, 2019, 26, 3, pp. 45-56. https://doi.org/10.34023/2313-6383-2019-26-9-59-65
22. ODILBEKOV, N. (2024): Foreign investment and governance shaping SEZ performance in Uzbekistan. In: *American Journal of Economics and Business Management*, 2024, 7, 2, pp. 15-28.
23. PULATOVA, M. (2016): Effects of foreign direct investment and firm export in economic growth: Evidence from Uzbekistan. In: *PSN: Economic Growth*, 2016, pp. 1-15. https://doi.org/10.2139/ssrn.2731571
24. RAJAPOVA, M. (2020): The impact of R&D on economic growth of Uzbekistan. In: *Journal of Critical Reviews*, 2020, 7, 15, pp. 1234-1240.
25. RAKHMATILLO, E. – ANVAR, K. – SUKHROB, M. (2021): Foreign direct investment, economic growth and employment: VAR method for Uzbekistan. In: *Journal of Contemporary Issues in Business and Government*, 2021, 27, 2, pp. 1543-1552. https://doi.org/10.47750/cibg.2021.27.02.187
26. SHODIEV, T. – TURAYEV, B. – SHODIYEV, K. (2021): ICT and economic growth nexus: Case of Central Asian countries. In: *International Journal of*

Innovations in Engineering Research and Technology, 2021, 8, 1, pp. 155-167. https://doi.org/10.21070/pssh.v1i.37

27. SOLOW, R. M. (1956): A contribution to the theory of economic growth. In: *The Quarterly Journal of Economics*, 1956, 70, 1, pp. 65-94. https://doi.org/10.2307/1884513
28. STATE COMMETTEE OF THE REPUBLIC OF UZBEKISTAN ON STATISTICS. (n.d.): Investitsiyalar. Asosiy kapitalga investitsiyalar. [Online.] In: *Uzstat*, n.d. [Cited 10.02.2025.] Available online: <https://www.stat.uz/uz/rasmiy-statistika/investments>.
29. U.S. DEPARTMENT OF STATE. (2023): 2023 Investment Climate Statements: Uzbekistan. [Online.] In: *U.S. Department of state*, 2024. [Cited 10.02.2025.] Available online: <https://www.state.gov/reports/2023-investment-climate-statements/uzbekistan>.
30. UNCTAD. (2024, June 20). *Global foreign investment weak in 2023, funding for sustainable development sectors drops over 10%.* UNCTAD. https://unctad.org/news/global-foreign-investment-weak-2023-funding-sustainable-development-sectors-drops-over-10
31. VAHOBOV, A. V. – KHAJIBAKIEV, Sh. H. – MUMINOV, N. G. (2010): *Foreign investments.* Tashkent: Finance, 2010. 320 p. ISBN 978-9943-10-123-4.
32. WORLD BANK. (2023): Uzbekistan's transition to market economy to accelerate by strategic reforms, supported by the World Bank. [Online.] In: *World Bank*, 2023. [Cited 10.02.2025.] Available online: <https://www.worldbank.org/en/news/press-release/2023/12/08/uzbekistan-s-transition-to-market-economy-to-accelerate-by-strategic-reforms-supported-by-the-world-bank>.
33. WORLDOMETER. (2025). Central Asia Population. [Online.] In: *Worldometer*, 2025. [Cited 10.02.2025.] Available online: <https://www.worldometers.info/world-population/central-asia-population/?utm_source=chatgpt.com#google_vignette>.
34. ZAYNIDDINOV, R. – IRGASHEVA, G. – MAKHMUDOV, N. – ULUYOL, B. (2024): An empirical investigation of the relationship between digital economy and economic development in Uzbekistan. In: *ICFNDS '23: The International Conference on Future Networks and Distributed Systems*, 2024. pp. 1-8. https://doi.org/10.1145/3644713.3644793