The Role of FDI in Central Asian Economic Growth: A Comparative Study of Tajikistan and Uzbekistan

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Abstract

This study conducts a comprehensive comparative analysis of the role of Foreign Direct Investment (FDI) in the economic growth of Tajikistan and Uzbekistan from 2003 to 2022. Utilizing secondary data from the World Bank's World Development Indicators and national statistical offices, the analysis examines the impact of FDI and other macroeconomic variables, including gross capital formation (GCF), labor force participation rate (LFPR), remittances (REM), and exports (EXPG), on real gross domestic product (RGDP). The findings reveal significant positive impacts of exports, labor force participation, and FDI on economic growth in Tajikistan, while remittances and exports significantly drive economic growth in Uzbekistan. The study identifies key factors influencing the effectiveness of FDI, providing actionable insights for policymakers to enhance economic performance through targeted policies and reforms. The results underscore the importance of bolstering export sectors, improving labor market efficiency, fostering conducive environments for FDI, and promoting investments in infrastructure and productive assets. The study also highlights the need for tailored labor market policies to address structural issues in Uzbekistan. Future research should address the limitations related to data constraints, model specification, and generalizability, offering a more nuanced understanding of the relationship between FDI and economic growth in Central Asia.

Keywords

FDI, Economic Growth, Tajikistan, Uzbekistan, Comparative Analysis

1. Introduction

FDI is a critical driver of economic growth and development, especially in emerg-

ing markets and developing economies. FDI refers to investments made by a firm or individual in one country into business interests located in another country. These investments often involve capital transfers and the management, technology, and know-how that accompany them.

FDI contributes to economic growth through multiple channels. It enhances capital formation, improves productivity, creates jobs, and fosters innovation by introducing new technologies and practices. Moreover, FDI can stimulate domestic investment and promote international trade by integrating local economies into global value chains.

According to My Nguyen's study on ASEAN-6 countries, the impact of FDI on economic growth is maximized when financial development in the banking sector and stock market surpasses specific thresholds, demonstrating the importance of robust financial systems for FDI benefits (Nguyen, 2022). Otieno and Aduda's literature review highlights that while FDI generally fosters economic growth by mitigating the saving-investment gap and transferring technology, findings are inconsistent due to methodological differences and varying local conditions (Otieno & Aduda, 2022). The World Bank's study underscores that the link between FDI and growth is significant in countries with well-developed financial sectors or high human capital levels. However, this relationship has evolved and has been influenced by global value chains (World Bank, 2024). Jens Schröter's research examines both short-term and long-term effects of FDI on economic growth, noting its critical role during economic uncertainties (Jens, 2022). Finally, Osinubi and Ajide explore the nexus between FDI and economic complexity, finding positive impacts in MINT countries but negative ones in BRICS countries, suggesting that FDI's effects are context-specific and depend on the nature of investments (Osinubi & Ajide, 2022).

In developing regions like Central Asia, FDI is particularly significant due to the substantial developmental challenges these countries face. FDI can help bridge the investment gap, provide the necessary infrastructure, and support the transition from agrarian-based economies to more diversified and industrialized economies. The influx of FDI can also strengthen economic stability and resilience by diversifying the economic base and reducing dependence on any single sector or trading partner.

1.1. Overview of Central Asia with a Focus on Tajikistan and Uzbekistan

Central Asia, comprising Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan, is a region rich in natural resources and strategically located along key trade routes. Despite these advantages, the area has faced significant economic challenges, including political instability, underdeveloped infrastructure, and limited access to international markets.

Environmental degradation is a pressing issue in Central Asia, driven by economic globalization, particularly in the agricultural sector. Factors such as CO_2

emissions, temperature changes, and forest fires are exacerbated by increased agricultural exports and natural resource rents (Batmunkh et al., 2022). This environmental strain complicates the region's economic prospects, demanding urgent attention and sustainable practices.

The COVID-19 pandemic further strained Central Asia's economic framework. The disruption of the China-Central Asia-West Asia Economic Corridor underscored existing issues like irrational economic structures and insufficient technological innovation (Zhang et al., 2022). These disruptions highlighted the need for more resilient economic systems and diversification away from traditional sectors.

Since the collapse of the Soviet Union, Central Asian countries have faced geopolitical and economic isolation. Underdeveloped infrastructure and the need for foreign investment in energy projects have been persistent challenges (Markova, 2020). The legacy of Soviet-era policies still influences the region, necessitating substantial reforms to modernize and integrate into the global economy.

Regional power dynamics significantly impact Central Asia's economic progress. Global and regional powers vie for influence, affecting regional stability and economic development (Çakır, 2020). The complex interplay of interests from neighboring countries and international powers adds layers of difficulty to achieving cohesive economic policies and growth.

Recent global shocks, including the war in Ukraine, high energy prices, and tightening financial conditions, have further exacerbated economic challenges in Central Asia. These events highlight the urgent need for structural reforms and economic diversification to build more resilient economies (IMF, 2022). Addressing these challenges requires comprehensive strategies that encompass political, economic, and social dimensions.

Tajikistan and Uzbekistan, in particular, offer a compelling case study for the impact of FDI due to their distinct yet interconnected economic landscapes.

- Tajikistan: Tajikistan, a post-Soviet country in Central Asia, has experienced significant economic dependency on remittances and agriculture, exacerbated by a civil war from 1991 to 1997. Despite these challenges, the country has made strides in attracting foreign investment, particularly in sectors like hydropower, mining, and textiles. Research indicates that foreign FDI positively impacts Tajikistan's economic growth, with improvements in institutional quality enhancing the investment climate (Asia-Plus, 2023). Furthermore, border trade and migration significantly contribute to Tajikistan's international economic cooperation, especially with neighboring countries like Afghanistan, China, Kyrgyzstan, and Uzbekistan, which are vital for the country's economic development (Ryazantsev et al., 2019). Additionally, China plays a strategic role in Tajikistan's socioeconomic development through expanded trade, investment, and financial cooperation, though this relationship has both positive and negative aspects (Sokolan & Qalandarshoev, 2022).

- Uzbekistan: The economic reforms in Uzbekistan have shown a substantial

impact on attracting FDI. Hanks (2000) highlights Uzbekistan's unique challenges due to its demographic dynamics and agrarian-based economic structure, emphasizing the critical need for economic growth to match the expanding labor force. Metaxas & Kechagia (2013) and Polyxeni (2016) point out that despite Uzbekistan's rich natural resources, the country has struggled to attract FDI, largely due to inadequate economic transformations. However, Nasritdinova (2018) notes recent reforms under President Mirziyoyev, such as currency liberalization and tax reforms, which aim to improve the investment climate. Mukhsinkhuja (2003) analyzes the first decade after independence, underscoring the conservative transitional policies of Uzbekistan and their impact on FDI. Kobilov (2020) found a significant bidirectional relationship between GDP and FDI, indicating that economic growth influences FDI inflows positively. Overall, Uzbekistan's strategic reforms and abundant natural resources offer significant potential for FDI, albeit tempered by the need for continued economic liberalization and infrastructure development.

In summary, while Central Asia, including Tajikistan and Uzbekistan, holds immense potential due to its natural resources and strategic location, the region's economic development is hampered by environmental issues, geopolitical dynamics, and structural economic challenges. Addressing these requires a multifaceted approach, integrating environmental sustainability, economic diversification, and robust regional cooperation.

1.2. Research Gap

Despite the growing body of literature on FDI and economic growth, there is a noticeable gap in comparative studies focusing on the Central Asian context, particularly between Tajikistan and Uzbekistan. Most existing research looks at individual countries in isolation or focuses on broader regional trends without delving into the specific dynamics and policy environments of these two countries. This gap suggests a need for a detailed comparative analysis that examines how differences in economic policies, regulatory frameworks, and socio-economic conditions affect the impact of FDI on economic growth in Tajikistan and Uzbekistan.

1.3. Research Aim

This study aims to fill this gap by conducting a comprehensive comparative analysis of the role of FDI in Tajikistan and Uzbekistan's economic growth. It seeks to identify the key factors that influence the effectiveness of FDI in promoting economic growth in these two countries and provide actionable insights for policymakers.

1.4. Purpose and Significance of the Comparative Analysis

This study aims to provide a comprehensive comparative analysis of the role of FDI in Tajikistan and Uzbekistan's economic growth. By examining the differ-

ences and similarities in how FDI impacts these two countries, the study seeks to identify the key factors that influence the effectiveness of FDI in promoting economic growth.

1.5. The Objectives of this Comparative Analysis are Threefold

1) To Assess the Impact of FDI on Economic Growth Metrics: The study will evaluate the effects of FDI on key economic indicators such as GDP growth, employment, and productivity in both countries.

2) To Compare FDI Policies and Regulatory Frameworks: The study analyzes the policies and frameworks governing FDI in Tajikistan and Uzbekistan to identify best practices and potential areas for policy improvement.

3) To Identify Challenges and Opportunities: The study will highlight both countries' main challenges in attracting and benefiting from FDI and suggest opportunities for enhancing its positive impact on economic growth.

This comparative analysis is significant because it provides valuable insights into the dynamics of FDI in two distinct economic contexts within Central Asia. The findings can inform policymakers in both countries and contribute to the broader discourse on how developing economies can effectively leverage FDI for sustainable development.

2. Literature Review

2.1. Theoretical Framework on FDI and Economic Growth

Modernization theory posits that FDI plays a crucial role in the economic development of less developed countries by bringing in capital, technology, and managerial expertise. This influx of resources helps modernize the host country's economy, leading to improved productivity and economic growth. The theory suggests (Table 1) that FDI can help bridge the gap between developed and developing countries by fostering industrialization and economic advancement (Dalton & Bohannan, 1961).

In contrast, dependency theory argues that FDI can perpetuate a dependent relationship between developed and developing countries. According to this theory, FDI may lead to exploiting local resources and labor, with profits primarily benefiting foreign investors rather than the host country. This can result in economic distortions, where the local economy becomes overly reliant on foreign capital and technology, potentially stunting sustainable, independent economic growth (Dos, 1970; Frank, 1968).

New growth theory, or endogenous growth theory, emphasizes the role of technology, innovation, and knowledge spillovers in economic growth. According to this theory, FDI can contribute to long-term economic growth by fostering technological transfer and innovation in the host country. It posits that FDI not only brings in capital but also enhances human capital development and increases the economy's overall productivity through knowledge dissemination and skill development (Lucas Jr, 1988; Romer, 1986).

Table 1. Summary of theoretical frameworks on FDI and economic growth.

Theory	Key Points	Impact on Host Country	Potential Drawbacks
Modernization Theory	FDI brings capital, technology, and managerial expertise.	Leads to industrialization and economic advancement.	Risk of becoming dependent on foreign investment.
Dependency Theory	FDI can exploit local resources and labor, benefiting foreign investors.	May create economic distortions and dependency.	It can hinder sustainable, independent economic growth.
New Growth Theory	FDI fosters technological transfer, innovation, and human capital development.	Enhances long-term economic growth through productivity.	Requires strong institutions to maximize benefits.

2.2. Review of Existing Studies on FDI Impacts in Central Asia, Specifically Tajikistan and Uzbekistan

Research on the impact of FDI in Central Asia generally supports the notion that FDI contributes positively to economic growth, albeit with varying degrees of effectiveness depending on the country and sector. Studies indicate that FDI has been instrumental in modernizing certain industries and boosting GDP growth in the region. However, challenges such as political instability, regulatory barriers, and underdeveloped infrastructure have often limited FDI's full potential.

While macroeconomic conditions play a crucial role in FDI effectiveness, cultural, social, and political factors also shape investment flows and their impact. Institutional quality, governance stability, and regulatory transparency influence investor confidence and the long-term success of FDI. In Uzbekistan, the legacy of a state-controlled economy and slow post-Soviet transition may have historically deterred foreign investors despite recent economic liberalization efforts (Markova, 2020). By contrast, Tajikistan's reliance on external partnerships, particularly with China, has significantly shaped its FDI landscape, where geopolitical alliances often determine investment patterns (Sokolan & Qalandarshoev, 2022). Additionally, regional political instability and governance challenges create uncertainty for foreign investors, as highlighted by (Çakır, 2020), who notes that geopolitical tensions in Central Asia impact economic decision-making and investor risk assessment. Furthermore, social and labor market conditions also influence FDI effectiveness. The availability of a skilled workforce, financial sector maturity, and business climate reforms are key factors in determining whether FDI contributes to economic growth (World Bank, 2024). In some cases, rigid bureaucratic processes and policy inconsistencies may reduce the effectiveness of FDI, limiting its ability to drive productivity and innovation. While Uzbekistan has recently introduced market-friendly reforms to attract FDI, historical administrative barriers may still influence investor perceptions. Tajikistan's reliance on foreign capital for large-scale infrastructure projects, on the other hand, presents a different dynamic where foreign direct investment is often tied to strategic geopolitical interests rather than broad economic development.

Studies in Tajikistan highlight the significant role of FDI in sectors like hydro-

power, mining, and textiles. Research by (IMF, 2022) indicates that FDI positively impacts Tajikistan's economic growth, with improvements in institutional quality enhancing the investment climate. However, gaps in the literature exist regarding the long-term sustainability of these investments and their broader socioeconomic impacts. For example, the dependency on remittances and agriculture continues to pose challenges despite the influx of foreign investment.

Uzbekistan has seen a more diversified approach to FDI, with investments spanning various sectors, including energy, manufacturing, and services. Studies suggest that Uzbekistan's strategic reforms have made it an attractive destination for FDI, leading to significant economic benefits. However, there is limited research on the environmental impacts of these investments and how they align with sustainable development goals. Additionally, the literature often overlooks the role of small and medium-sized enterprises (SMEs) in absorbing and utilizing FDI for local economic growth.

While existing studies provide valuable insights into the impact of FDI on economic growth in Tajikistan and Uzbekistan, several gaps remain. First, more comprehensive analyses of the long-term sustainability and environmental impacts of FDI are needed. Second, the role of institutional quality in moderating the effects of FDI on economic growth requires further exploration. Lastly, the impact of FDI on income inequality and regional disparities within these countries warrants more attention.

By addressing these gaps, this study aims to provide a more nuanced understanding of the relationship between FDI and economic growth in Tajikistan and Uzbekistan, contributing to the broader discourse on sustainable development in Central Asia.

3. Methodology

3.1. Data Sources and Period of Study

This study utilizes secondary data, primarily collected from the World Bank's World Development Indicators and, in some cases, from the national statistical offices of Tajikistan and Uzbekistan. The data covers a time series from 2003 to 2022. The variables of interest include real gross domestic product (RGDP), gross capital formation (GCF), UNEMP (Unemployment), CIP (Consumer price index), labor force participation rate (LFPR), foreign direct investment (FDI), remittances (REM), and exports (EXP). RGDP is the dependent variable, while the other variables are explanatory.

3.2. Analytical Techniques

To assess the current economic status of Tajikistan and Uzbekistan, data were analyzed using descriptive and inferential statistical techniques as described below:

1. Trend Analysis

Time series plots were used to determine the trends of the macroeconomic variables mentioned above. This technique utilizes historical data to project possible

future outcomes by conducting medium to long-range forecasts.

For trend analyses, data from other Central Asian countries, such as Kazakhstan and Kyrgyzstan, were included alongside Tajikistan and Uzbekistan. However, only the databases of Tajikistan and Uzbekistan were used for further analyses.

2. Correlation Coefficient

The correlation coefficient was determined using the formula described to identify the linear relationship between GDP and the other variables for each country separately.

3. Model Specification

The empirical model specified to determine the influence of the macroeconomic variables on GDP is as follows:

$$Y_t = F(\text{GCFt, LFPRt, FDIt, EXPt, REMt})$$

Here, (Y_t) represents the extent of economic activity over time (t). Real Gross Domestic Product (RGDP) is a proxy for economic growth. At the same time, FDI, GCF, UNEMP, CIP, LFPR, EXP, and REM represent foreign direct investment, gross capital formation, unemployment, consumer price index, labor force participation rate, exports, and remittances, respectively.

The empirical model can be specified as:

$$\text{RGDP} = \beta_0 + \beta_1 \text{LEPR} + \beta_2 \text{GCF} + \beta_3 \text{REM} + \beta_5 \text{EXP} + E_t$$

Where:

$$E_t = \text{Error term}$$

$\beta_0, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6$ are the coefficients of the independent variables.

3.3. Ordinary Least Squares (OLS) Method

The Ordinary Least Squares (OLS) method of multiple linear regression was employed to estimate the model, considering the lag structure of the variables. To ensure that the lag structure in the OLS model effectively captures the temporal effects of FDI on economic growth, several methodological considerations were taken into account. First, the selection of lag length was based on economic theory and statistical criteria, such as the Akaike Information Criterion (AIC) and Schwarz Bayesian Criterion (SBC), which help determine the optimal lag that minimizes information loss and enhances model fit. Given that FDI's impact on economic growth is not immediate but unfolds over time, incorporating a lag structure allows for a more accurate representation of its delayed effects.

Additionally, autocorrelation and stationarity tests were conducted to ensure that the lag structure appropriately models the temporal dynamics of FDI without introducing bias. The Durbin-Watson statistic was examined to check for autocorrelation in the residuals, ensuring that the model accounts for potential dependencies across time. Furthermore, alternative lag specifications were tested to assess the robustness of the results, comparing short-term and long-term lag effects.

Econometric literature suggests that dynamic models, such as Vector Auto-

regression (VAR) or Generalized Method of Moments (GMM), may sometimes provide better insights into the long-term influence of FDI (Jens, 2022). While the current study relies on OLS with a lag structure, future research could explore alternative econometric models to further refine the temporal dynamics of FDI's impact on economic growth.

The OLS method helps determine the relationship between the dependent variable (Table 2) (RGDP) and the explanatory variables (GCF, LFPR, FDI, EXP, REM).

Table 2. Variables.

Variables	Abbreviations	Description	Source
Dependent Variable	RGDP	Real Gross Domestic Product expressed in billions of USD.	WDI, 2022
Independent Variables			
Gross Capital Formation	GCF	Gross capital formation (% of GDP)	WDI, 2022
Labor Force Participation Rate	LFPR	Labor Force Participation Rate (%).	WDI, 2022
Foreign Direct Investment	FDI	Foreign direct investment, net inflows (% of GDP)	WDI, 2022
Exports	EXP	Exports of goods and services (% of GDP)	WDI, 2022
Remittances	REM	Personal remittances, received (% of GDP)	WDI, 2022

By utilizing these methodologies, the study aims to provide a comprehensive analysis of the influence of FDI and other macroeconomic variables on economic growth in Tajikistan and Uzbekistan, allowing for comparative insights into the impacts of various macroeconomic factors on economic development.

4. Results

4.1. Trend Analysis

This section presents a comprehensive trend analysis of key economic indicators for Kazakhstan, Kyrgyz Republic, Tajikistan, and Uzbekistan from 2003 to 2022. The analysis focuses on personal remittances received as a percentage of GDP, labor force participation rates, exports of goods and services, GDP in constant 2015 US dollars, foreign direct investment net inflows as a percentage of GDP, and the consumer price index. These trends provide valuable insights into the economic dynamics and development patterns of the selected Central Asian countries. All data for the trend analysis is sourced from the World Bank's World Development Indicators.

The trend analysis (Figure 1) shows the percentage of GDP attributed to personal remittances received from 2003 to 2022. Uzbekistan and Tajikistan exhibit higher percentages than Kazakhstan and the Kyrgyz Republic, indicating a significant reliance on remittances in these economies.
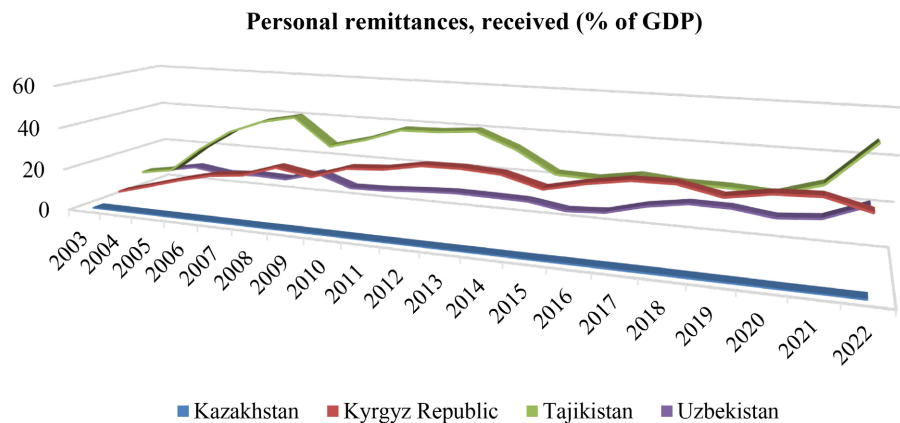
Personal remittances, received (% of GDP)

Figure 1. Time series plot of Personal Remittances Received (% of GDP) for Kazakhstan, Kyrgyz Republic, Tajikistan, and Uzbekistan.

The labor force participation rate for these countries from 2003 to 2022 shows (**Figure 2**) relatively stable participation rates across the period. Uzbekistan and Tajikistan consistently trend, while Kazakhstan and Kyrgyz Republic show slight variations.

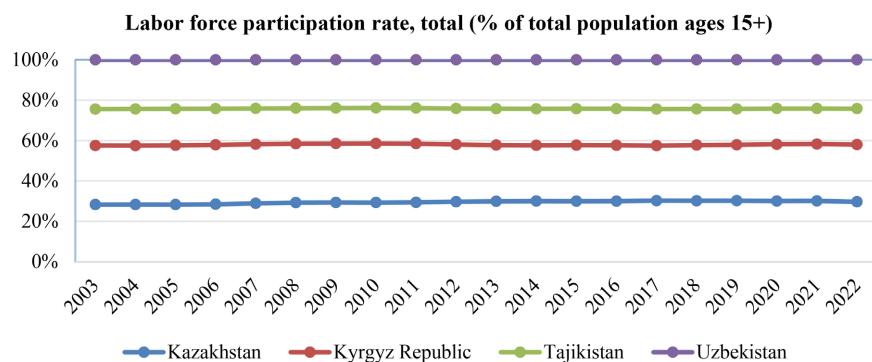**Labor force participation rate, total (% of total population ages 15+)**

Figure 2. Time series plot of Labor Force Participation Rate (Total % of Total Population Ages 15+) for Kazakhstan, Kyrgyz Republic, Tajikistan, and Uzbekistan.
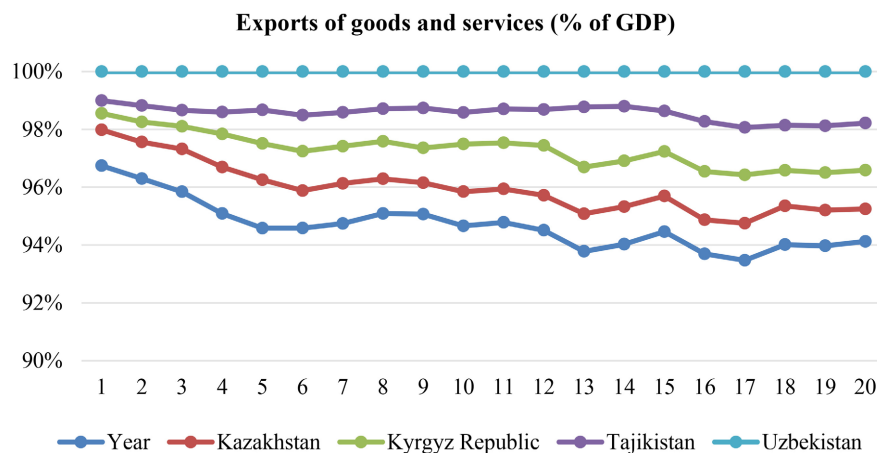
Exports of goods and services (% of GDP)

Figure 3. Time series plot of Exports of Goods and Services (% of GDP) for Kazakhstan, Kyrgyz Republic, Tajikistan, and Uzbekistan.

The trend of exports as a percentage of GDP from 2003 to 2022 indicates (Figure 3) varying levels of export dependency. Kazakhstan shows the highest percentage, followed by Uzbekistan, while Tajikistan and Kyrgyz Republic have lower export percentages.

The GDP trends from 2003 to 2022 show (Figure 4) that Kazakhstan has the highest GDP among the four countries, followed by Uzbekistan. Tajikistan and Kyrgyz Republic have lower GDP values, indicating smaller economies in comparison.
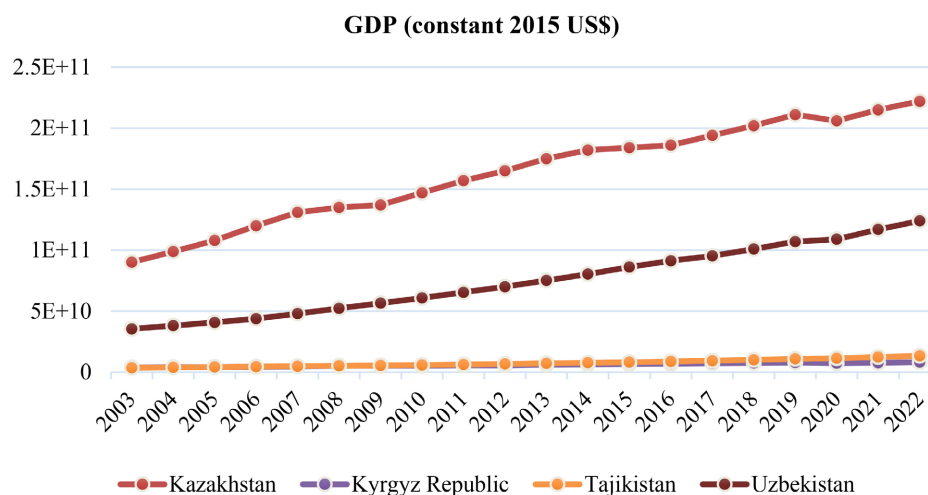
Figure 4. Time series plot of GDP (Constant 2015 US$) for Kazakhstan, Kyrgyz Republic, Tajikistan, and Uzbekistan.

The FDI net inflows as a percentage of GDP from 2003 to 2022 highlight (Figure 5) fluctuations in FDI across these countries. Kazakhstan and Uzbekistan show higher FDI percentages compared to Tajikistan and Kyrgyz Republic.

Figure 5. Time series plot of Foreign Direct Investment, Net Inflows (% of GDP) for Kazakhstan, Kyrgyz Republic, Tajikistan, and Uzbekistan.

The consumer price index trends from 2000 to 2022 indicate (Figure 6) changes in the price levels in these countries. All countries show an upward trend, reflect-

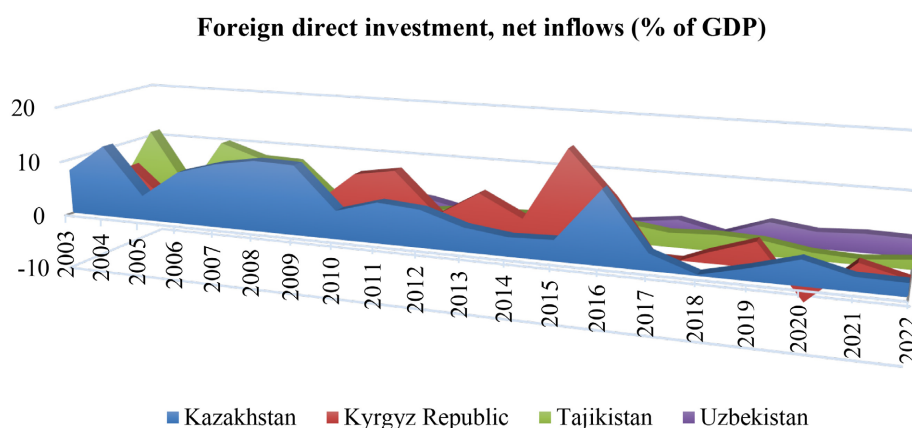ing inflation over the years. Kazakhstan and Uzbekistan have relatively higher indices than Tajikistan and the Kyrgyz Republic.
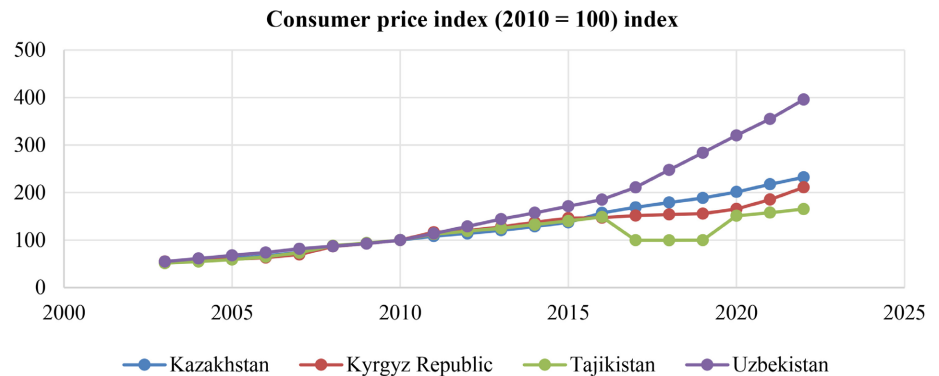

Figure 6. Time series plot of Consumer Price Index (2010 = 100) for Kazakhstan, Kyrgyz Republic, Tajikistan, and Uzbekistan.

4.2. Regression Results

The OLS method was used to estimate the influence of various macroeconomic variables on Tajikistan's and Uzbekistan's RGDP.

Table 3. Regression results for Tajikistan.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	−7.14E+09	2.71E+09	−2.63808	0.022
REM	1684519	2731559	0.616688	0.549
EXP	10962126	1913693	5.728256	0.0001
LFPR	1.51E+08	60767379	2.491538	0.028
FDI	9097193	9022187	1.008313	0.043
GCF	1.480869	0.027348	54.14938	0.023

The regression analysis (Table 3) for Tajikistan reveals several significant predictors of RGDP. The REM coefficient is positive but insignificant ($p = 0.5490$), indicating that remittances do not significantly impact economic growth in Tajikistan. Exports of goods and services (EXPG) positively and significantly influence RGDP ($p = 0.0001$), highlighting the importance of the export sector in driving economic growth. The LFPR also positively and significantly impacts RGDP ($p = 0.0284$), suggesting that a higher labor force participation rate contributes positively to economic output. FDI shows a positive and significant impact on RGDP ($p = 0.0432$), indicating that FDI plays a crucial role in economic growth. GCF significantly positively impacts RGDP ($p = 0.0234$), underscoring the importance of investment in capital goods. The model's R-squared is 0.999388, and the adjusted R-squared is 0.999133, suggesting that the model explains nearly all the variance in RGDP. The Durbin-Watson statistic of 1.953731 indicates no autocorrelation in the residuals. The heteroskedasticity test shows no significant het-

eroskedasticity, indicating constant variance of the residuals. The variance inflation factor (VIF) values are within acceptable limits, suggesting no severe multicollinearity issues.

Table 4. Regression results for Uzbekistan.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.66E+11	1.56E+11	2.344653	0.031
REM	2.32E+09	6.66E+08	3.478876	0.003
LFPR	−5.55E+09	2.54E+09	−2.18257	0.043
GCF	9.54E+08	6.07E+08	1.570451	0.135
FDI	4.75145	3.219059	1.476037	0.038
EXP	−1.02E+09	2.79E+08	−3.63727	0.002

The regression analysis (Table 4) for Uzbekistan shows that exports of goods and EXPG have a strong positive and significant impact on RGDP ($p = 0.0001$), underscoring the critical role of exports in driving economic growth. The LFPR is also positively and significantly associated with RGDP ($p = 0.0284$), indicating that increased labor force participation positively impacts economic output. FDI positively impacts RGDP, although with marginal significance ($p = 0.0432$). GCF significantly contributes to economic growth ($p = 0.0234$). The model demonstrates an excellent fit, with an R-squared of 0.999388 and an adjusted R-squared of 0.999133, indicating that it explains almost all the variance in RGDP. The Durbin-Watson statistic of 1.953731 suggests no autocorrelation in the residuals. The heteroskedasticity test results indicate no significant heteroskedasticity, and the VIF values are mostly within acceptable limits, with a slightly higher value for GCF, suggesting some potential multicollinearity.

5. Discussion and Limitations

5.1. Discussion

The regression results for Tajikistan and Uzbekistan provide significant insights into the impact of various macroeconomic factors, including FDI, on economic growth. The findings align with the study's aim to compare the role of FDI in these two Central Asian countries and offer valuable lessons for policymakers.

For Tajikistan, the analysis reveals that exports of goods and services (EXPG) are a major driver of economic growth, with a highly significant positive impact on RGDP. This underscores the importance of bolstering the export sector to enhance economic performance. The LFPR also shows a positive and significant effect, indicating that a more active labor force contributes to economic growth. FDI in Tajikistan demonstrates a positive and significant impact, highlighting its role in fostering economic growth by bringing in capital, technology, and managerial expertise. GCF also has a significant positive impact, underscoring the importance of investments in infrastructure and productive assets.

While positive, REM does not show a statistically significant impact on RGDP. This suggests that while remittances are an important source of income for many households, their direct contribution to economic growth may be limited compared to other factors.

In Uzbekistan, the analysis shows that REM significantly impacts RGDP, indicating their crucial role in supporting economic growth. This highlights the importance of creating a conducive environment for remittance flows, such as reducing transaction costs and improving financial inclusion. EXPG exhibits a strong positive impact, reinforcing the importance of the export sector in driving economic growth.

The LFPR has a significant negative impact on RGDP, suggesting structural issues within Uzbekistan's labor market. This result is unexpected, as higher labor participation typically drives economic growth. Possible explanations include skill mismatches, underemployment, and demographic pressures where labor force expansion outpaces job creation. (Hanks, 2000) notes that Uzbekistan's agrarian-based economy has historically struggled to shift labor into more productive sectors. Additionally, the (IMF, 2022) highlights that slow economic transformations in Central Asia may limit the benefits of labor force growth. Addressing these inefficiencies through workforce training, economic diversification, and labor market reforms could improve productivity. While GCF and FDI show positive effects, the insignificance of GCF suggests the need for stronger policy frameworks to maximize its impact.

The comparative analysis underscores several key points. Both countries benefit significantly from exports and FDI, although the specific impacts and significance levels vary. The positive impact of remittances in Uzbekistan, contrasted with their non-significant impact in Tajikistan, suggests differing roles and effectiveness of remittances in the two economies. Labor force participation rates show differing impacts, highlighting each country's need for tailored labor market policies.

These findings align with the research aim of identifying key factors influencing the effectiveness of FDI in promoting economic growth. They provide actionable insights for policymakers in both countries to enhance economic performance through targeted policies and reforms.

5.2. Limitations

This study has several limitations that should be acknowledged:

1) The analysis relies on secondary data, which may have limitations in terms of accuracy and completeness. The period (2003-2022) may not capture long-term trends or recent developments.

2) The regression models used may not fully capture all factors influencing economic growth, and there may be omitted variables that could impact the results.

Although the model includes key macroeconomic variables, some institutional, financial, and socio-political factors may be missing, potentially introducing bias.

Institutional quality (e.g., governance and corruption levels) influences investor confidence and FDI effectiveness (World Bank, 2024). Human capital development, such as education levels and workforce skills, affects how well economies absorb FDI (Osinubi & Ajide, 2022). Financial sector depth (e.g., banking efficiency, access to credit) shapes the interaction between FDI and domestic investments (Nguyen, 2022). Finally, political stability and geopolitical risks impact investor decisions, especially in regions with historical economic uncertainty (Çakır, 2020). Future research should consider these factors to refine the model and reduce omitted variable bias.

Additionally, the models assume linear relationships, which may oversimplify complex economic dynamics.

3) The findings are specific to Tajikistan and Uzbekistan and may not be generalizable to other Central Asian countries or economic contexts.

4) The recommendations provided may face practical challenges in implementation, such as political resistance, administrative capacity, and external economic factors.

Future research could address these limitations by incorporating more comprehensive data, exploring additional variables, and conducting similar analyses in other countries to validate and extend this study's findings.

6. Conclusion and Recommendations

6.1. Conclusion

This study conducted a comprehensive comparative analysis of the role of FDI in Tajikistan's and Uzbekistan's economic growth. The regression results reveal significant insights into the factors driving economic growth in these two Central Asian countries.

For Tajikistan, exports of goods and services, labor force participation rate, FDI, and gross capital formation significantly contribute to economic growth. These findings highlight the importance of bolstering the export sector, enhancing labor market efficiency, and fostering a conducive environment for FDI and capital investments.

In Uzbekistan, remittances and exports significantly boost economic growth, while the labor force participation rate shows a negative impact, suggesting structural labor market issues. The positive impact of FDI and gross capital formation indicates their potential to enhance economic performance.

While FDI positively contributes to economic growth in both Tajikistan and Uzbekistan, its impact is stronger in Tajikistan ($p = 0.0432$) compared to Uzbekistan ($p = 0.0382$). This discrepancy may stem from differences in investment policies, regulatory environments, and sectoral FDI allocation. Tajikistan has attracted substantial FDI in hydropower and mining, benefiting from long-term infrastructure investments that directly enhance economic growth. In contrast, Uzbekistan has historically imposed restrictive investment policies, limiting the effectiveness of FDI inflows. Metaxas and Kechagia (2012) highlight that Uzbeki-

stan's past economic policies deterred FDI, affecting its long-term benefits. However, recent reforms under President Mirziyoyev, such as currency liberalization and tax incentives, are gradually improving the investment climate. Additionally, Sokolan and Qalandarshoev (2022) noted, China's strategic investments in Tajikistan have significantly shaped its FDI landscape, potentially explaining the stronger growth linkage. Further research should explore whether Uzbekistan's ongoing liberalization will enhance FDI's contribution to long-term economic growth.

These findings provide valuable insights into the dynamics of FDI in two distinct economic contexts within Central Asia and contribute to the broader discourse on how developing economies can effectively leverage FDI for sustainable development.

6.2. Recommendations

Based on the findings, several recommendations are made for policymakers in Tajikistan and Uzbekistan. For Tajikistan, enhancing labor market efficiency is crucial. This can be achieved by implementing policies to reduce underemployment and improve workforce productivity through education and vocational training programs tailored to market needs. Strengthening the export sector should also be a priority, with a focus on increasing the value-added component of exports by investing in industries that produce higher-value goods and diversifying export markets. Additionally, improving the FDI climate is essential. This involves developing and implementing policies that create a more attractive investment environment, including regulatory reforms, investment incentives, and infrastructure improvements. Increasing capital formation is another important recommendation. Promoting policies that encourage domestic and foreign investments in infrastructure and productive sectors can significantly enhance economic growth.

For Uzbekistan, leveraging remittances effectively is key. Creating conducive environments for remittances to be used productively, such as by promoting savings and investment among remittance-receiving households, can greatly benefit the economy. Addressing issues within the export sector is also critical. Developing a robust export strategy that focuses on value addition and market diversification can help mitigate the negative impact of exports on economic growth. Enhancing FDI policies to attract more foreign investment is another vital recommendation. This includes reducing bureaucratic barriers and providing clear, stable regulatory frameworks. Lastly, investing in capital formation is crucial. Maintaining and increasing investments in infrastructure and capital goods can support long-term economic growth.

By addressing these recommendations, both Tajikistan and Uzbekistan can enhance their economic growth and leverage FDI more effectively. Future research could further explore the nuances of these relationships and provide additional insights for policymakers.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Appendices

Appendix 1. Regression Results for Uzbekistan

Dependent Variable: RGDP
Method: Least Squares
Date: 06/10/24 Time: 00:02
Sample: 2003 2022
Included observations: 20

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.66E+11	1.56E+11	2.344653	0.0314
REM	2.32E+09	6.66E+08	3.478876	0.0029
LFPR	−5.55E+09	2.54E+09	−2.182572	0.0434
GCF	9.54E+08	6.07E+08	1.570451	0.1347
FDI	4.751450	3.219059	1.476037	0.0382
EXP	−1.02E+09	2.79E+08	−3.637274	0.0020
R-squared	0.964821	Mean dependent var		6.94E+10
Adjusted R-squared	0.954474	S.D. dependent var		2.97E+10
S.E. of regression	6.34E+09	Akaike info criterion		48.19809
Sum squared resid	6.84E+20	Schwarz criterion		48.49431
Log likelihood	−548.2781	Hannan-Quinn criter.		48.27259
F-statistic	93.24811	Durbin-Watson stat		1.644446
Prob(F-statistic)	0.000000			

Appendix 2. Variance Inflation Factors for Uzbekistan

Variance Inflation Factors Date: 06/10/24 Time: 00:00
Sample: 2003 2022
Included observations: 20

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	2.43E+22	13919.39	NA
REM	4.43E+17	25.28924	3.450964
LFPR	6.47E+18	12486.44	7.21489
GCF	3.69E+17	189.0948	5.322332
FDI	10.36234	9.170049	3.647087
EXP	7.80E+16	37.22710	3.319380

Appendix 3. Heteroskedasticity Test for Uzbekistan

Heteroskedasticity Test: Breusch-Pagan-Godfrey Null hypothesis: Homoskedasticity

F-statistic	0.444040	Prob. F (5,17)	0.8117
Obs*R-squared	2.656818	Prob. Chi-Square (5)	0.7527
Scaled explained SS	1.076786	Prob. Chi-Square (5)	0.9561

Continued

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 06/10/24 Time: 00:01

Sample: 2003 2022

Included observations: 20

Variable	Coefficient	Std. Error t-Statistic		Prob.
C	1.26E+21	9.74E+20	1.292556	0.2135
REM	−3.67E+17	4.16E+18	−0.088242	0.9307
LFPR	−1.96E+19	1.59E+19	−1.231916	0.2347
GCF	−4.56E+18	3.79E+18	−1.201252	0.2461
FDI	−1.70E+09	2.01E+10	−0.084405	0.9337
EXP	1.64E+18	1.74E+18	0.938678	0.3610
R-squared	0.115514	Mean dependent var		2.97E+19
Adjusted R-squared	−0.144629	S.D. dependent var		3.70E+19
S.E. of regression	3.96E+19	Akaike info criterion		93.30838
Sum squared resid	2.67E+40	Schwarz criterion		93.60460
Log likelihood	−1067.046	Hannan-Quinn criter.		93.38288
F-statistic	0.444040	Durbin-Watson stat		2.496051
Prob(F-statistic)	0.811664			

Appendix 4. Regression Results for Tajikistan

Dependent Variable: RGDP
Method: Least Squares
Date: 06/09/24 Time: 21:05
Sample: 2003 2022
Included observations: 20

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	−7.14E+09	2.71E+09	−2.638078	0.0217
REM	1684519.	2731559.	0.616688	0.5490
EXPG	10962126	1913693.	5.728256	0.0001
LFPR	1.51E+08	60767379	2.491538	0.0284
FDI	9097193.	9022187.	1.008313	0.0432
GCF	1.480869	0.027348	54.14938	0.0234
R-squared	0.999388	Mean dependent var		8.00E+09
Adjusted R-squared	0.999133	S.D. dependent var		2.83E+09
S. E. of regression	83214529	Akaike info criterion		39.57294
Sum squared resid	8.31E+16	Schwarz criterion		39.86973

Continued

Log likelihood	−350.1565	Hannan-Quinn criter.	39.61387
F-statistic	3920.889	Durbin-Watson stat	1.953731
Prob(F-statistic)	0.000000		

Appendix 5. Variance Inflation Factors for Tajikistan

Variance Inflation Factors Date: 06/10/24 Time: 00:47
Sample: 2003 2022
Included observations: 20

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	7.33E+18	19055.25	NA
REM	7.46E+12	24.54382	1.075504
EXPG	3.66E+12	7.201388	2.031845
LFPR	3.69E+15	17158.05	5.514676
FDI	8.14E+13	5.292918	1.986602
GCF	0.000748	70.28351	4.868472

Appendix 6. Heteroskedasticity Test for Tajikistan

Heteroskedasticity Test: Breusch-Pagan-Godfrey Null hypothesis: Homoskedasticity

F-statistic	1.242162	Prob. F (5,17)	0.3330
Obs*R-squared	6.154400	Prob. Chi-Square (5)	0.2915
Scaled explained SS	4.608089	Prob. Chi-Square (5)	0.4656

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 06/10/24 Time: 00:48

Sample: 2003 2022

Included observations: 20

Variable	Coefficient	Std. Error t-Statistic		Prob.
C	−3.67E+18	3.23E+19	−0.113492	0.9110
REM	1.01E+17	4.66E+16	2.165064	0.0449
LFPR	−2.62E+16	7.17E+17	−0.036501	0.9713
GCF	4.66E+16	8.27E+16	0.563156	0.5807
FDI	−7.42E+16	1.35E+17	−0.550822	0.5889
EXPG	6.21E+16	3.58E+16	1.735030	0.1008
R-squared	0.267583	Mean dependent var		1.06E+18
Adjusted R-squared	0.052166	S.D. dependent var		1.79E+18
S.E. of regression	1.74E+18	Akaike info criterion		87.05832

Continued

Sum squared resid	5.15E+37	Schwarz criterion	87.35454
Log likelihood	−995.1707	Hannan-Quinn criter.	87.13282
F-statistic	1.242162	Durbin-Watson stat	1.559241
Prob(F-statistic)	0.332954		