

Article

The Effect of Inflation and Credit Interest Rates on Investment Activities in Emerging Economies: A Case Study of Uzbekistan

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Abstract: Investment activity is essential for economic growth, innovation, and competitiveness. Understanding the factors that influence investment decisions is crucial for policymakers and business leaders. This study investigates the impact of inflation rates and interest rates on investment activity in Uzbekistan's national economy. We utilized a dataset containing monthly economic indicators from the State Statistics Agency and the Central Bank of Uzbekistan, covering the period from January 2020 to December 2023. Employing econometric models and structural equation modeling (SEM), we analyzed the relationship between investment levels, inflation rates, and average interest rates. The econometric model was validated using various statistical tests, including the Durbin-Watson and Shapiro-Wilk tests. Our findings reveal a significant negative relationship between inflation rates and investment volumes, with a regression coefficient of -0.74 ($p < 0.01$). Similarly, average interest rates negatively impact investment volumes, with a coefficient of -0.54 ($p < 0.05$). The SEM analysis corroborated these results, showing a consistent negative impact of inflation and interest rates on investment activity. The results underscore the importance of maintaining stable macroeconomic conditions to encourage investment. High inflation and interest rates deter fixed investment. This study emphasizes the need for effective monetary policy to create a favorable investment environment. This research provides empirical evidence on the adverse effects of inflation and interest rates on investment performance. Policymakers should prioritize stabilizing these macroeconomic variables to stimulate investment and economic growth. Future research could extend this analysis to include other macroeconomic factors and different geographic regions.

Keywords: Investment, Inflation, Interest Rates, Structural Equation Modeling

1. Introduction

Investment activity is an important driver of economic growth, contributing to innovation, productivity and competitiveness. In any economy, understanding the factors influencing investment decisions is critical for policymakers, business leaders, and economists. This study focuses on the national economy of Uzbekistan, examining how macroeconomic variables such as inflation and interest rates affect investment activity.

Inflation, the rate at which the general price level of goods and services rises, reduces purchasing power and can create uncertainty in the economy. High rates of inflation can

discourage investment by increasing costs and reducing real returns on investment. Likewise, interest rates, the cost of borrowing money, play an important role in investment decisions. Higher interest rates can raise the cost of capital, making it more expensive for businesses to finance new projects and expand operations.

The relationship between these macroeconomic variables and investment activity has been studied extensively. However, there is a need for ongoing analysis, especially in the context of developing economies such as Uzbekistan. The country's economic landscape has undergone significant changes due to reforms aimed at liberalizing the economy and attracting foreign investment. Understanding investment dynamics in this context is vital for developing effective economic policies.

This study uses advanced econometric techniques including multivariate linear regression and SEM to analyze the impact of inflation and interest rates on investment performance. Using a comprehensive dataset from the State Statistics Agency and the Central Bank of Uzbekistan, we aim to provide robust empirical evidence on these relationships.

The results of this study will contribute to the existing literature by offering insight into the macroeconomic factors influencing investment in Uzbekistan. In addition, the results will help policymakers develop strategies to stabilize inflation and interest rates, thereby creating an enabling environment for investment and economic growth.

2. Literature Review

Inflation and investment

Inflation is widely considered to be the most important determinant of investment [1]. High rates of inflation can create uncertainty about future prices, discouraging long-term investment by reducing the value of money, reducing real returns on investment, and increasing the cost of capital [2]. Inflation acts as a tax on capital, thereby reducing investment incentives[3].

More recent studies have provided empirical evidence on the adverse impact of inflation on investment, indicating that high and unstable inflation rates negatively affect investment, creating an unstable economic environment[4]. This instability could lead to higher risk premiums, making it more costly for companies to raise capital. Moreover, inflation exacerbates macroeconomic instability, which in turn deters investment, increasing uncertainty and reducing investor confidence[5,6].

Interest rates and investments

Interest rates are another key factor influencing investment decisions. Classical economic theory states that higher interest rates increase the cost of borrowing, thereby reducing the attractiveness of investment projects [7,8,9]. Lower interest rates reduce the cost of capital and stimulate investment[10].

Empirical studies support this theoretical framework, showing that high interest rates discourage investment by increasing the cost of financing [11,12]. When interest rates rise, the present value of future cash flows decreases, making investment projects less attractive [13]. High interest rates lead to higher discount rates, reducing the net present value of investment projects and discouraging investment [14,15] .

In developing economies, the impact of interest rates on investment may be more pronounced due to the higher cost of capital and greater economic volatility [16]. Research shows that in developing countries, high interest rates can significantly deter investment, exacerbating problems in accessing affordable finance [17,18]. This is especially true for countries such as Uzbekistan, where financial markets are still developing and borrowing costs remain relatively high [19].

Investments in Uzbekistan

The economic transition in Uzbekistan was marked by significant reforms aimed at liberalizing the economy and attracting foreign investment [20,21]. Research on investment in Uzbekistan emphasizes the importance of stable macroeconomic conditions to stimulate investment [22]. Effective monetary and fiscal policies are necessary to control inflation and stabilize interest rates, thereby creating an enabling environment for investment [23].

Research also examines the role of financial support mechanisms in enhancing investment activity in Uzbekistan [24,25]. Well-designed financial policies, including targeted lending programs and fiscal incentives, can significantly increase investment [26]. However, macroeconomic stability is critical for the effectiveness of these policies [27,28,29,30].

3. Methodology

The dataset used in this study consists of monthly economic indicators from January 2020 to December 2023. Data was obtained from State Statistics Agency of Uzbekistan and Central Bank of Uzbekistan.

The main variables of interest in this study are:

Dependent variable is investment in fixed capital (*cap_invest*): representing the volume of investment in fixed capital in the national economy.

Independent variable is inflation rate (*infl_rate*): representing the monthly inflation rate.

Independent variable is average interest rate (*credit_rate*): representing the average interest rate on loans.

A multivariate linear regression model was estimated using ordinary least squares (OLS). The SEM model was estimated using maximum likelihood estimation (MLE) to provide efficient and unbiased parameter estimates.

Null hypothesis (H_0): There is a significant relationship between the volume of investment in fixed assets in the national economy and the combination of the inflation rate and the weighted average interest rate.

Alternative Hypothesis (H_a): There is no significant relationship between the level of fixed investment in a national economy and the combination of the inflation rate and the weighted average interest rate, suggesting that other factors not considered in this study may play a primary role. role in financial support of investment activities in the country.

4. Result and Discussion

The analytical graphical matrix of dependent and independent variables for the study is as follows (see Fig.).

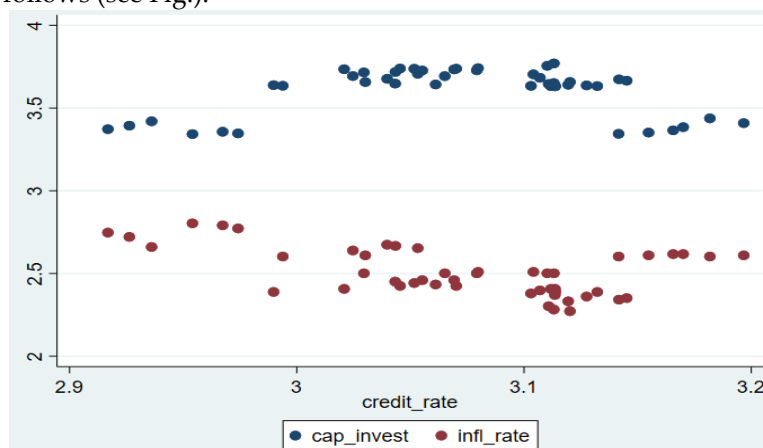


Fig. 1. Scatterplot of dependent and independent variables.

The data presented in Fig. 1 show strong relationships between the dependent and independent variables, with specific densities indicating specific positions. The density of data points visually demonstrates significant correlations, as evidenced by the concentration of points along the axes.

In the next step, a multivariate time series linear regression equation and a structural equation modeling (SEM) regression equation including the main variables were developed. In addition, Gauss-Markov tests of significance (including Breusch-Pagan, Durbin-Watson, and Shapiro-Wilk tests) were performed. The model was also assessed for potential multicollinearity problems using the variance inflation factor (VIF) test.

A multivariate regression equation was developed for the study (see Table 1).

Table 1. Regression equation for the volume of investment in fixed capital

8	Coef .	Saint-Err .	t-value	p-value	[95% Conf.	Interval]	Whitefish
infl_rate	-.746	.128	-5.81	0	-1.004	-.487	
credit_rate	-.543	.266	-2.04	.047	-1.079	-.008	
Constant	7.147	1.019	7.01	0	5.094	9.2	
Average dependent variable	3,606	SD dependent variable	0.140				
R-square	0.637	Number of observations	48				
F-test	17.439	Prob > F	0.000				
Akaike crit. (AIC)	-75.094	Bayesian crit. (BIK)	-69.481				
p<0.01, p<0.05, p<0.1							

The multivariate regression model developed for the study is as follows.

$$cap_invest = -0.74 \text{ inflation_rate} - 0.54 \text{ Credit_rate} + 7.14 \text{ (1)}$$

According to Table 1, the multivariate regression model shows significant results in the ANOVA table with a high F value of 17.439 and an R-square value of 0.63 and an adjusted R² of 0.61. In addition, based on the hypothesis testing of the regression model, if $F < 0.05$ and $t < 0.05$, the null hypothesis ($H_0: y = 0$) is rejected, indicating that the main hypothesis ($H_0: y = 0$) is not significant. Therefore, we reject the main hypothesis and accept the alternative hypothesis ($H_1: y \neq 0$), which is statistically significant.

As a result, an increase in inflation in the national economy by 1% leads to a decrease of 0.74% in the volume of investments in fixed capital in the national economy. Similarly, a 1% increase in weighted average lending rates in the national banking system leads to a 0.54% decrease in the volume of investment in fixed capital in the national economy.

The Durbin-Watson test result for the multivariate regression equation is 0.51. In addition, the Shapiro-Wilk W test recorded a value of 0.14 in the study.

During the study, the main hypothesis $H_0: y = 0$ and its alternative $H_1: y \neq 0$ were tested at a significance level of $\alpha > 0.05$.

After Durbin-Watson and Shapiro-Wilk tests at $p > 0.05$, the null hypothesis was confirmed. Thus, we conclude that the Gauss-Markov assumption, which states that there is no correlation between the error terms and the independent variables, holds true in our analysis. Therefore, the econometric model satisfies the basic Gaussian-Markov conditions satisfactorily.

Multicollinearity in the model under study was checked using the VIF test, which showed the absence of multicollinearity in the constructed model. The model of the volume of investment in fixed capital and the factors of its influence (cap_invest) in the national economy had a VIF value of 1.85. In addition, based on the analysis of the multivariate regression model, it was found that the main hypothesis $H_0: y = 0$, $H_1: y \neq 0$ is significant when $r < 10$. As a result, the alternative hypothesis was rejected. Given that the VIF test result falls below the $r < 10$ threshold, this Gauss-Markov condition is also satisfied.

The SEM regression model developed for the study is as follows.

$$cap_invest = -0.74 \text{ infl_rate} - 0.54 \text{ Credit_rate} + 7.14 \quad (2)$$

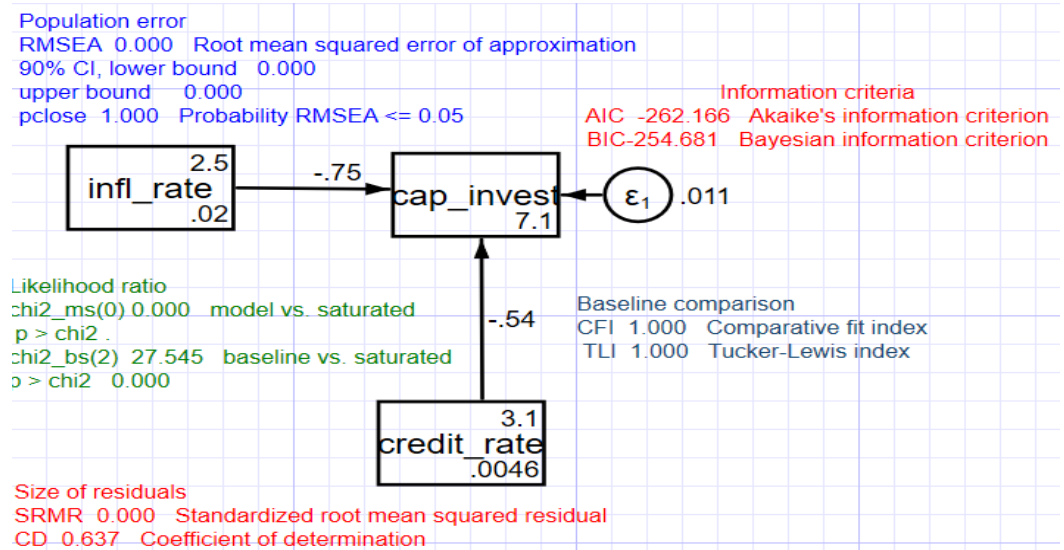


Fig. 2. SEM model diagram for the volume of investment in fixed capital

As shown in Fig. 2, the SEM regression model showed positive results regarding its performance. This demonstrates the quality of the model and the overall accuracy of correctly estimating and carefully testing the relationships between variables, which is commendable.

Assessing the performance of a SEM regression model typically requires various statistical measures and evaluations. Specifically, these include the chi-square test, comparative fit index, root mean square error of approximation, and standardized root mean square residual. The SEM regression model showed a positive fit to the data on these measures, indicating its effectiveness in illuminating the observed relationships and providing meaningful insight into the study's hypothesis.

5. Conclusion

Analysis of the relationships between the volume of investment activity in the national economy, the level of inflation and the weighted average interest rate on loans based on a multivariate regression model and the SEM model allowed us to make the following proposals and recommendations:

- with an increase in inflation in the national economy by 1%, the volume of investments in fixed capital decreases by 0.74%. This result can be explained by several mechanisms. First, high inflation reduces the purchasing power of money, making it more expensive for businesses to purchase and invest in fixed assets. Second, rising inflation often leads to economic uncertainty, which discourages businesses from making long-term investment commitments. In addition, the expectation of tightening monetary policy, such as raising interest rates to control inflation, may prompt businesses to delay or reduce investment projects.

- with an increase in weighted average interest rates on loans in the national banking system by 1%, the volume of investments in fixed capital in the national economy decreases by 0.54%. This result occurs due to an increase in the cost of borrowing for businesses. Higher interest rates on loans raise the cost of financing investment projects, deterring firms from making capital expenditures. Moreover, high borrowing costs can limit companies' cash flows and profitability, limiting their ability to invest in fixed assets.

These analytical findings highlight the influence of macroeconomic factors, such as inflation and interest rates on loans, on investment decisions in the national economy. An increase in inflation or interest rates on loans leads to a reduction in fixed investment, reflecting the complex interaction between economic conditions and business investment behavior .

These findings highlight the importance of maintaining stable inflation and interest rates to create an enabling environment for investment in the national economy. Effective monetary and fiscal policies are critical to mitigate the negative impact of these macroeconomic variables on investment activity.

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