Research Paper

EPRA International Journal of Economic and Business Review-Peer Reviewed Journal
Volume - 13, Issue - 4, April 2025 | e-ISSN: 2347 - 9671| p- ISSN: 2349 – 0187

SJIF Impact Factor (2025): 8.862 || ISI Value: 1.433 || Journal DOI URL: https://doi.org/10.36713/epra2012

TYPES, METHODS, AND THEORETICAL FOUNDATIONS OF MACROECONOMIC INDICATOR CALCULATION

Farmonov Ilhomjon Iqboljon o‘g‘li[1]

[1]*Lecturer of Kokand University, Uzbekistan*

ANNOTATION **DOI No: 10.36713/epra21084** **Article DOI:** https://doi.org/10.36713/epra21084

This article is devoted to the features of forecasting and analysis methods. Forecasting macroeconomic indicators is a complex and time-consuming process. The significant gap between expected indicators and actual results limits the widespread use of statistical and mathematical forecasting methods. In practice, this drawback is usually mitigated by using the simplest direct calculation methods. From this perspective, systematizing forecasting methods and considering their advantages and disadvantages concerning macroeconomic indicators is of great importance. Although extensive research has been conducted by scientists from various countries, a universal macroeconomic indicator system, particularly the system of expenditure indicators, which enables obtaining results with minimal deviation from actual values through forecasting, has not yet been developed. The purpose of this study is to present the main results of the research, along with providing a theoretical and methodological review that will be useful in practice, as well as in scientific and educational activities.

KEYWORDS: ***Macroeconomic indicators, GDP, GNI, employment, unemployment rate.***

INTRODUCTION

Measuring and analyzing a country's economic development requires the use of macroeconomic indicators. Indicators such as Gross Domestic Product (GDP), inflation rate, unemployment rate, and trade balance provide insights into the level of economic growth, stability, and development. Economists widely use these macroeconomic indicators to assess a country's economy, make forecasts, and make decisions aimed at ensuring sustainable growth. Macroeconomic indicators are calculated based on a combination of data collection methods, theoretical foundations, and statistical approaches. These calculations serve as key instruments for guiding monetary, fiscal, and social policies. For example, having information about the Consumer Price Index (CPI) allows governments to better control inflation, while labor market policies are based on unemployment indicators. This article examines the main categories of macroeconomic indicators, their calculation methods, and the theoretical foundations of measurement. By studying these aspects, it is possible to gain a deeper understanding of the complexity of macroeconomic analysis, as well as its crucial role in influencing economic policy and enhancing social well-being.

One of the main objectives of macroeconomic analysis is to assess the sustainability of development, determine the effectiveness of government regulation, and ensure the financial stability of the state. During the analysis process, the system of indicators is continuously monitored and forecasted. The effectiveness of the research largely depends on the methodology used the more accurate the analysis results, the more effective the study will be.

LITERATURE REVIEW

In S.M. Kholkhojayev's article "Scientific-Theoretical Foundations and Factors of Ensuring Macroeconomic Stability," several methods of measuring the overall economy in global practice are discussed. These include per capita Gross Domestic Product (GDP), the dynamic state of economic growth, and macroeconomic stability, among others. Achieving macroeconomic stability is recognized as one of the primary objectives in any national economy[1].

In Felicia O. Olokoyo's article, the long-term impact of macroeconomic indicators— including interest rates, foreign capital inflows, exchange rates, GDP growth, inflation, and trade— on stock market performance (market capitalization) in Nigeria is examined. Using data from the World Development Indicators (WDI, 2018) and the Central Bank of Nigeria's (CBN) 2018 statistical bulletin, the study employs Vector Error Correction Model (VECM) analysis to assess these relationships[2].

M. Ibrahim and Musah explore the link among macroeconomic indicators and stockreturns in Ghana. They find a long-run relationship between stock market returns and macro-economic indicators, where money supply and inflation have a positive impact on stock priceswhile industrial production, exchange rate and interest rate have a negative effect[3].

In X.J. Abdug'ayurova's article, the economic significance of forecasting and its various types are discussed. The study examines short-term, medium-term, and long-term forecasting of macroeconomic indicators, as well as forecasts for the development of economic complexes[4].

In G. Khusanova's article, several key indicators used to assess a country's overall economic performance in macroeconomic studies are discussed. These indicators help economists and policymakers understand the health of the economy, make informed decisions, and formulate appropriate economic policies[5].

In Z.Y. Ashurova's article "The Role of the State in Regulating Macroeconomic Indicators," key macroeconomic indicators—including economic growth, inflation rate, unemployment, and foreign trade balance—are analyzed, with a focus on the government's role in managing them through economic policy. In 2024, Uzbekistan's economic growth is projected to be around 5.5%, while the inflation rate is expected to approach 12%, and exports are forecasted to reach $18 billion. These growth trends are being driven by the government's economic policy successes, including improving the business environment, optimizing taxes, and supporting infrastructure projects. The article also explores the state's strategic approaches to maintaining economic stability and improving macroeconomic indicators, highlighting its significance in fostering economic growth and enhancing social well-being[6].

Muhanamani and Sivagnanasithi (2014) investigated the impact of macroeconomic indicatorson the Indian stock market and the study shows that industrial productivity, wholesale priceindex and money supply are positively linked with stock market returns in India[7].

METHODOLOGY

In this study, an econometric approach was applied as the methodology for calculating and analyzing macroeconomic indicators. The primary objective is to identify the relationships between macroeconomic factors and assess their impact on economic development. Multiple regression analysis was selected as the main method, as it enables a deeper examination of cause-and-effect relationships between variables.

Research Results. Forecasting methods are highly diverse. In particular, analytical modeling involves studying a process by creating a model that reflects its internal and external relationships and using it for analysis. This set of methods is applied when it is possible to reconstruct the conditions of a process's development using its model and then iteratively simulate its various development scenarios based on limited available data. Models enable the identification of specific patterns in the process by accurately representing the relationships between different factors.

In 2023, the sectoral composition of the economy was as follows: agriculture, forestry, and fisheries accounted for 24.3%, industry for 26.1%, construction for 6.2%, and services for 43.4% of total output.

The contribution to GDP growth by sector was:

Services sector: 2.6%

Industry: 1.5%

---

[1] *Xolxo'jayev, S. M. (2024). Makroiqtisodiy barqarorlikni ta'minlashning ilmiy-nazariy asoslari va omillari. YASHIL IQTISODIYOT VA TARAQQIYOT, 2(7).*

[2] *Olokoyo et al., Cogent Business & Management (2020), 7: 1792258, https://doi.org/10.1080/23311975.2020.1792258*

[3] *Ibrahim, M., & Musah, A. (2014). An econometric analysis ofthe impact of macroeconomic fundamentals on stockmarket returns in Ghana. Research in Applied Economics,6(2), 47–72, https://doi.org/10.5296/rae.v6i2.5146*

[4] *Abdug'ayurova, X. J. (2023). MAKROIQTISODIY KO 'RSATKICHLARNI PROGNOZ QILISHNING MOHIYATI, AHAMIYATI VA TURLARI. Educational Research in Universal Sciences, 2(1), 302-304.*

[5] *Khusanova, G. (2024). Asosiy makroiqtisodiy ko 'rsatkichlar va ularni hisoblash. Nordic_Press, 2(0002).*

[6] *Yusupovna, A. Z. (2024). MAKROIQTISODIY KO 'RSATKICHLARNI TARTIBGA SOLISHDA DAVLATNING ROLI. MODERN PROBLEMS IN EDUCATION AND THEIR SCIENTIFIC SOLUTIONS, 1(3), 359-367.*

[7] *Muhanamani, P., & Sivagnanasithi, T. (2014). Indian stockmarket and aggregate macroeconomic variables: Timeseries analysis. Journal of Economics and Finance, 3(6),68–74.*

Agriculture, forestry, and fisheries: 1%
Construction: 0.4%

In 2023, Tashkent city made the largest contribution to GDP formation, accounting for 17.1%. Tashkent and Navoi regions followed with 10.1% and 7.7%, respectively. The lowest contributions were recorded in Syrdarya region (2%), the Republic of Karakalpakstan (3.1%), and Jizzakh region (3.1%). Additionally, in 2023, GDP per capita at current prices amounted to 29.3 million UZS, reflecting a 3.8% increase compared to 2022.

According to preliminary data for 2023, more than 69,400 industrial enterprises in the country produced goods worth 655.8 trillion UZS, reflecting a 6% increase compared to the corresponding period of the previous year.

The sectoral distribution was as follows:

Manufacturing industry: 84.4% (largest share)
Mining and quarrying: 8.4%
Electricity, gas, steam supply, and air conditioning: 6.7%
Water supply, sewerage, waste collection, and disposal: 0.5%

In January–December 2023, the volume of market services provided amounted to 470.3 trillion UZS, representing a 13.7% increase compared to the same period of the previous year.

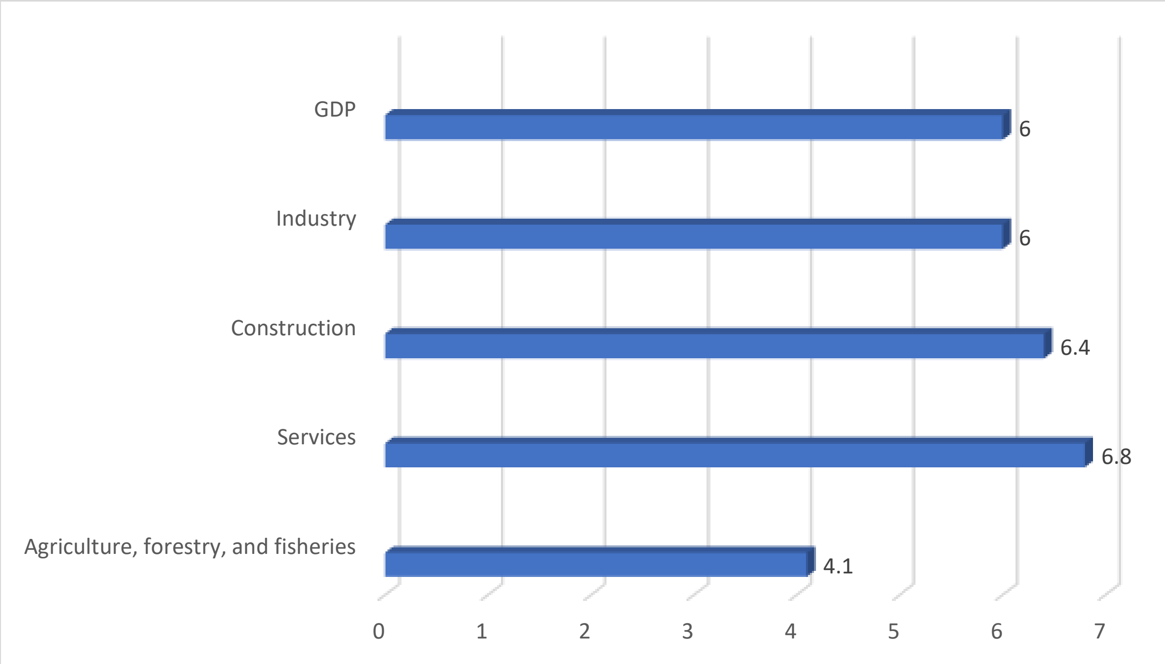

Figure 1. Growth rates of key macroeconomic indicators of the Republic of Uzbekistan as of 2023 (compared to the previous year, in %)[8].

Macroeconomic indicators are essential tools for assessing and analyzing economic processes. Their calculation methods are based on various methodologies and rely on economic theories. Accurate calculations and analysis play a crucial role in shaping effective economic policies.

To analyze the relationship between GDP, inflation, and unemployment in Uzbekistan, statistical data from the past 10 years (2015–2024) have been examined. Based on this data, a regression analysis was conducted using the Ordinary Least Squares (OLS) method.

Years	GDP Growth Rate (%)	Inflation Rate (%)	Unemployment Rate (%)
2015	7,8	5,6	9,1
2016	7.9	5.7	9.0
2017	4.5	13.0	9.3
2018	5.1	14.3	9.2
2019	5.6	15.2	9.0
2020	1.6	11.1	10.5

[8] *O'zbekiston Respublikasining Malayziyadagi Elchixonasi, https://uzbekembassy.com.my/uzb/news_press/iqtisodiyot/ozbekiston_iqtisodiyoti_raqamlarda.html?utm_source*

2021	7.4	10.0	10.3
2022	5.7	12.3	9.8
2023	5.5	8.8	9.6
2024	5.3	9.8	9.4

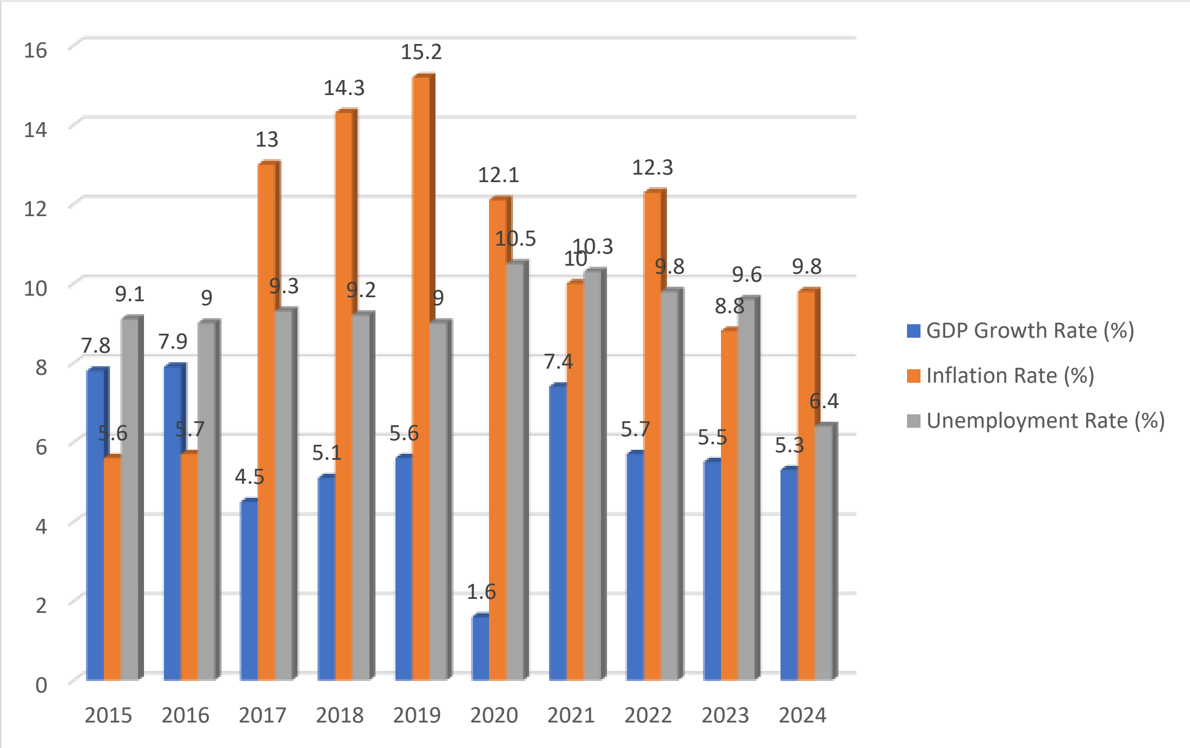

Figure 2. GDP Growth Rate, Inflation, and Unemployment Rates in Uzbekistan[9]

Based on the analysis conducted on the regression model

$\mathbf{Y_i=\beta_0+\beta_1X_{1i}+\beta_2X_{2i}+\ldots+\beta_nX_{ni}+\varepsilon_i}$

Y_i – dependent variable (e.g., GDP, inflation rate, or unemployment rate),

X_{ki} – independent variables (e.g., investments, export volume, monetary policy indicators),

β_k – model parameters,

ε – random error term.

The regression equation is as follows:

[9] *Source: Compiled by the author*

```
OLS Regression Results
==============================================================================
Dep. Variable:              YaIM_o'sish   R-squared:                       0.478
Model:                              OLS   Adj. R-squared:                  0.328
Method:                   Least Squares   F-statistic:                     3.200
Date:                  Thu, 27 Feb 2025   Prob (F-statistic):              0.103
Time:                          11:42:30   Log-Likelihood:                -16.587
No. Observations:                    10   AIC:                             39.17
Df Residuals:                         7   BIC:                             40.08
Df Model:                             2
Covariance Type:              nonrobust
===============================================================================
                  coef    std err          t      P>|t|      [0.025      0.975]
-------------------------------------------------------------------------------
const          23.2809      9.155      2.543      0.039       1.632      44.930
Inflyatsiya    -0.2857      0.155     -1.849      0.107      -0.651       0.080
Ishsizlik      -1.5355      0.956     -1.606      0.152      -3.796       0.725
==============================================================================
Omnibus:                        2.663   Durbin-Watson:                   2.615
Prob(Omnibus):                  0.264   Jarque-Bera (JB):                0.435
Skew:                           0.398   Prob(JB):                        0.805
Kurtosis:                       3.639   Cond. No.                         277.
==============================================================================

Notes:
[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.
"""
```

GDPt=23.28−0.2857×Inflationt−1.5355×Unemploymentt

A negative relationship between GDP growth and inflation, meaning that an increase in inflation leads to a slight decrease in GDP growth (coefficient: -0.2857).

A stronger negative impact of unemployment on GDP growth, indicating that higher unemployment significantly reduces GDP growth (coefficient: -1.5355).

Your interpretation effectively summarizes the regression results. Here are some additional insights. Impact of Inflation (-0.2857). A 1% increase in inflation leads to an average decrease of 0.2857% in GDP growth. The p-value (0.107) suggests that inflation's impact is not statistically strong at the conventional 5% significance level, but it is still reasonably close to significance.

Impact of Unemployment (-1.5355). A 1% increase in unemployment leads to an average decrease of 1.5355% in GDP growth, showing a stronger negative impact than inflation. The p-value (0.152) is also above 0.05, meaning the relationship is not statistically significant but still indicates a potential pattern.

R^2 Value (0.478). The model explains 47.8% of the variation in GDP growth, suggesting a moderate fit. There are likely other important macroeconomic variables affecting GDP that are not included in this model.

Comparison of Effects. The stronger negative coefficient of unemployment (-1.5355) compared to inflation (-0.2857) indicates that unemployment has a more substantial influence on GDP growth than inflation.The graphical analysis further confirms that unemployment and GDP growth are more strongly correlated than inflation and GDP growth.

This conclusion effectively summarizes the findings. You highlight the key relationships while acknowledging the statistical limitations of the model. A few refinements. Inflation and GDP Growth: The negative relationship is notable, but since the p-value is slightly above 0.05, the effect is suggestive rather than definitive. Unemployment and GDP Growth: The negative impact of unemployment is larger in magnitude, but the statistical confidence is weaker (higher p-value). Other Influencing Factors: You correctly point out that variables like investments, trade, government spending, and demographics likely play a role in GDP growth. Including these in a future model could improve explanatory power (R^2).

DISCUSSION

The research results confirm that inflation and unemployment have a negative impact on economic growth in Uzbekistan. According to the model developed based on regression analysis, a 1% increase in the inflation rate reduces GDP growth by an average of 0.2857%. Similarly, a 1% increase in the unemployment rate decreases GDP growth by

1.5355%. These findings highlight the importance of controlling inflation and unemployment in economic policymaking. The analyses indicate that the impact of inflation and unemployment on GDP growth in Uzbekistan varies in different aspects. The relationship between inflation and GDP growth rate is significantly strong, whereas the effect of unemployment in the regression model is not statistically reliable. This can be attributed to the high level of informal employment in the country's economy and the fact that it is not fully reflected in economic activity indicators. Additionally, since R^2=0.478, the model explains 47.8% of the variations in GDP growth, suggesting the presence of other important factors influencing economic growth.

Other important factors influencing economic growth in Uzbekistan include: Investments – Capital investments are one of the key drivers accelerating GDP growth. Foreign trade volume – The impact of exports and imports on the economy is also significant. Government expenditures – Public spending on infrastructure and social projects affects economic activity. Demographic factors – Population growth, labor market conditions, and migration processes influence economic growth.

Technological progress – Innovations and increased production efficiency can stimulate economic growth. Based on these findings, future research can achieve more precise results by incorporating additional variables into the regression model. In particular, considering factors such as investments, export-import balances, and fiscal policy would be appropriate.

RESULTS

Impact of inflation on GDP growth. A 1% increase in inflation reduces GDP growth by an average of 0.2857%. This suggests that inflation could be a significant obstacle to economic growth in Uzbekistan. Impact of unemployment on GDP growth: A 1% increase in unemployment decreases GDP growth by 1.5355%. However, this relationship is weaker compared to inflation and may have lower statistical reliability. Model's explanatory power: With R^2=0.478, the model demonstrates moderate explanatory strength in capturing GDP growth rate variations. Role of other factors: GDP growth is influenced not only by inflation and unemployment but also by factors such as investments, foreign trade, government expenditures, and technological advancement. The findings indicate that reducing inflation and increasing employment should be key priorities in Uzbekistan's economic policymaking. At the same time, the impact of inflation and unemployment on GDP growth differs, with inflation showing a more reliable effect.

CONCLUSION

This study analyzed the impact of inflation and unemployment on GDP growth in Uzbekistan. The results indicate that both inflation and unemployment negatively affect economic growth, but their degree of influence differs. An increase in inflation significantly reduces GDP growth, whereas the effect of unemployment is relatively weaker and statistically less reliable. The study also highlights the necessity of considering other factors that influence GDP growth. A deeper analysis of investments, foreign trade, government expenditures, and technological advancements is essential for developing a comprehensive economic growth model. To expand the scope of future research, attention should be given to the following directions. Incorporating additional variables – Including factors such as investments, export-import balances, and fiscal policy in the model can improve result accuracy, Using more advanced econometric models – Applying methods such as time series analysis and panel data models can yield deeper insights, Regional analysis – Examining the impact of inflation and unemployment on GDP growth across different regions of Uzbekistan can help shape more effective economic policies, Assessing external factors – Analyzing the influence of global economic trends and regional integration on Uzbekistan's economy can provide valuable insights. These findings offer important recommendations for enhancing Uzbekistan's economic policymaking and ensuring sustainable economic growth. Controlling inflation, increasing employment, and considering other growth-driving factors will play a crucial role in shaping the country's future economic strategy.

LIST OF USED LITERATURE

1. *Farmonov, I. (2024). XALQARO DARAJALARDA MAKROIQTISODIY KO 'RSATKICHLARNI HISOBLASH USLUBIYATI. QO'QON UNIVERSITETI XABARNOMASI, 13, 97-100. https://doi.org/10.54613/ku.v13i.1032*
2. *Iqboljon o'g'li, F. I. (2024). RAQAMLI IQTISODIYOTNI IQTISODIY O'SISHGA TA'SIRI. University Research Base, 742-745.*
3. *Worlu, C. N., & Omodero, C. O. (2017). A comparative analysisof macroeconomic variables and stock market perfor-mances in Africa (2000-2015). International Journal ofAcademic Research in Accounting, Finance andManagement Sciences, 7(4), 95–102. https://doi.org/10.6007/IJARAFMS/v7-i4/3436*
4. *Radha, & Gopinathan. (2019). An empirical analysis of impactof macroeconomic variables on Indian stock market.International Journal of Recent Technology andEngineering, 8(3), 2033-2038.*
5. *Olokoyo et al., Cogent Business & Management (2020), 7: 1792258https://doi.org/10.1080/23311975.2020.1792 258Page 17 of 17*