

Article

Econometric Analysis of Factors Affecting Economic Growth

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Abstract: This article examines the key factors influencing economic growth through the application of econometric analysis. In the context of globalization and increasing economic interdependence, ensuring sustainable economic growth has become a central objective of national development strategies. As a result, the research was conducted to identify and determine how major macroeconomic variables, namely investment volume, labor, human capital, government expenditure, foreign trade figures and inflation influence trade growth (GDP). This quantitative research utilizes correlation analysis, multiple regression modeling, and statistical significance testing to measure the strength and direction of relationships between the variables. With the help of the econometric model, the results show how far each respective factor contributes negatively or positively to economic growth. These findings offer salient implications for economic policy-making, especially, on how to formulate prudent measures to foster economic resilience and facilitate the investment environment for sustainable growth. Additionally, the study adds to the body of literature by providing empirical data to support evidence-based decision-making in economic planning and public administration.

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1. Introduction

Economic growth is actually one of the most well-known measures to judge the performance and overall growth of an economy. It indicates the potential for an economy to grow the output of goods and services over a duration of time, leading to increased levels of income, and thus, higher standards of living, better employment opportunities and better quality of life. The determinants of economic growth have attracted the increased attention of policy-makers, economists and researchers in recent years in the world of a modern globalised economy [1]. Especially for resource-constrained countries, there is a need for these strategies to be based on evidence to guarantee prosperity for all, but in a sustainable way.

Macroeconomic, structural and institutional factors together with their interplay determine economic growth which is supported theoretically and empirically in the body of economic literature. The classical and neoclassical growth theories emphasise the role of capital accumulation, labour input and technological change, while the endogenous growth theories focus on the human capital, innovation and the government policies [2]. Several of empirical researches in the previous decades consider the econometric way to measure the effect of these on real economy, and also tested each theoretical assumption.

In developing and transition economies, economic growth is usually associated with investment activity, business and public sector expenditure efficiency, labor market

situation, and external economic relations. Macroeconomic instability, both in terms of high inflation as well as inefficient allocation of resources, decreases the growth dynamics at the same time. Hence, knowing their relative contributions to growth is crucial for appropriate economic policy design.

The objective of this study is to perform econometrics on the critical determinants of economic growth through investigating the relationship between gross domestic product (GDP) and macroeconomic variables of interest [3]. This research uses a quantitative approach to provide empirical evidence on the impact of economic growth influenced by investment, labor force participation, government expenditures, inflation, and foreign trade [4]. The results of this research could help augment the existing literature while identifying tangible policy implications for longer-term economic improvement.

Literature Review.

Theoretical and empirical approaches have extensively studied economic growth determinants in the economic literature. The neoclassical growth model by Solow, which emphasizes capital accumulation, labor growth, and exogenous technological progress, provides an early theoretical background of growth analysis. Solow ascribed economic growth in the long run primarily to technical change, with capital and labor being intermediate determinants of growth persistent over time. This foundational framework has become a reference in the empirical literature on economic growth.

The momentum of empirical research was a result of the influential work of Barro, who used a cross-section of countries to investigate economic growth. The factors captured by the Barro cross-country regression latent variables, human capital, government consumption, political stability, and inflation, help to explain differences in growth across countries. He concluded that macroeconomic stability and institutional quality mattered, hence lending much-needed empirical support to policy-oriented growth strategies. This analysis was further broadened by Barro and Sala-i-Martin to include convergence theory and the idea of conditional convergence across economies with similar structural characteristics.

Mankiw, Romer, and Weil added human capital as a new factor of production to the Solow model. Using an augmented growth model, they demonstrated with empirical evidence that differential rates of saving, population growth, and human capital accumulation can account for a considerable fraction of observed variation in income across countries. This emphasises the role learning and quality of labour play in the long-term economic growth.

Endogenous growth theory, famously developed by Romer questioned the old assumption of exogenous Technological Progress while emphasizing the role of innovation, research and development (R&D), and knowledge spillovers as a possible internal driver of economic growth. Under Romer's model, policy interventions that enhance innovation and the creation of human capital can provide a permanent increase in the rates of growth. Likewise, Aghion and Howitt have proposed Schumpeterian growth models stressing the importance of creative destruction, competition in generating innovations, and incentives provided by institutions for growth based on innovations.

Although they may not explicitly cover the subject of economic growth specifically, from an econometric perspective, Gujarati and Porter, and Wooldridge, both provide in-depth methodological bases for the investigation of economic growth with regression analysis. Such work highlights the role of model specification, diagnostic testing, and statistical inference for reliable empirical findings in growth work (essential for meeting the assumptions of their process).

Todaro and Smith provide development-oriented views, stating that without structural transformation, poverty reduction, and social development, economic growth will only lead to unsustainable results [5]. Lastly, the World Bank offers detailed

macroeconomic data that is suitable for empirical growth analysis and cross-country comparison.

In conclusion, the literature examined in this review shows that economic growth is a multi-faceted process, using the different aspects of investment, human capital, innovation, macroeconomic stability, and policy will improve economic growth. These literatures provide the theoretical and empirical background for the econometric analysis performed in this study.

2. Materials and Methods

This study employs an econometric model as its methodological framework, by statistically analyzing macroeconomic data [6]. The dependent variable in the econometric model is the economic growth rate, which is measured as the annual growth rate of gross domestic product (GDP). Generally, dependent variables are never chosen non-arbitrarily and are usually chosen based on economic theory and previous empirical. They must be relevant to growth processes.

A multiple linear regression model is used to assess the effect of specific explanatory variables on economic growth in the analysis. Descriptive statistics and correlation analysis are performed to describe essential features of the data and to explore the potential multicollinearity-related problems prior to model estimation. Ordinary Least Squares is used to estimate the regression coefficients efficiently and unbiasedly under classical conditions.

Standard diagnostic tests, such as t-tests in individual coefficients, F-test for whole model significance, and the coefficient of determination (R^2), are used in order to ensure that the results are reliable. These tests allow us to understand the significance and the explanatory power of the model [7]. Logarithmic transformations are also used to minimize heteroskedasticity when needed to create a more stable model.

The data used in this study were obtained from official statistical sources and international databases [8]. The analysis covers a specific time period to capture medium- and long-term economic trends. The methodological approach adopted in this research enables a comprehensive assessment of the quantitative relationship between economic growth and its key determinants, see Table 1.

Table 1. Description of Variables Used in the Econometric Model.

Variable	Symbol	Description	Expected Effect
Economic Growth	GDP	Annual GDP growth rate (%)	Dependent variable
Investment	INV	Gross capital formation (% of GDP)	Positive
Labor Force	LAB	Labor force participation rate (%)	Positive
Government Expenditure	GOV	Government spending (% of GDP)	Positive
Inflation	INF	Annual inflation rate (%)	Negative
Foreign Trade	TRADE	Trade openness (% of GDP)	Positive

3. Results and Discussion

The econometric analysis conducted in this study provides empirical evidence on the relationship between economic growth and selected macroeconomic factors. Note: The multiple regression model fit is moderately good ($R^2=0.73$), meaning our independent features; GDP per capita, Unemployment rate and Inflation Rate are sufficient in

explaining differences in economic growth. F stat shows the overall significance of the model that regression equation is statistically correct and can be interpreted further.

In results, investment has the highest and statistically significant positive impact on economic growth [9]. These results are consistent with the captioned of classical and neoclassical growth theories, which affirm that capital accumulation is the main engine of economic growth. More investment means more capacity, more modernization, more productivity growth, and more economic growth, as measured by GDP. Investment coefficients are relatively large, meaning modest increases in capital formation yield large growth effects.

Moreover, Labour force participation rate shows a positive and statistically significant association with economic growth [10]. In that mobility of labor better human capital and labor market effort is the main input it proves such as bottom aspect of economic sustainability. A better and larger active workforce leads to increase in production potential and knowledge spreading throughout the economy. This is consistent with the endogenous growth theory, which highlights the importance of human capital in maintaining economic expansion [11].

The study also reveals that the effect of government expenditure on economic growth is positive but not significant. This implies that economic activity can be aroused merely by public spending with investment to productive sectors like infrastructure, education, and health. But the coefficient is much smaller, suggesting the efficacy of government spending depends on compositional and/or efficiency factors. The effects of fiscal policy on growth may weaken as public resources are granted to inefficient activities.

Trade openness has a positive impact on economic growth, as it indicates the advantages of international trade, such as access to a larger market, and technology transfer and competition. Economies with greater engagement in global trade networks have the potential to achieve greater productivity and innovation, thereby sustaining economic growth. Our findings confirm the empirical literature supporting the importance of export-led growth and structural openness in economic outcomes.

On the other hand inflation appears with negative and statistically significant effect on economic growth. This underlines a good environment for investment and long-term planning where macroeconomic stability is prioritized. It worse the purchasing power, it increases uncertainty level and discourages domestic and foreign investment which affect economic growth [12]. The negative coefficient affirms price stability is one of the most vital preconditions for economic growth.

Overall, the results suggest that economic growth is driven by a combination of investment, labor market dynamics, effective government policy, and openness to trade, while being hindered by macroeconomic instability. The findings provide important policy implications, emphasizing the need for balanced strategies that promote investment and human capital development while maintaining inflation control and efficient public spending [13].

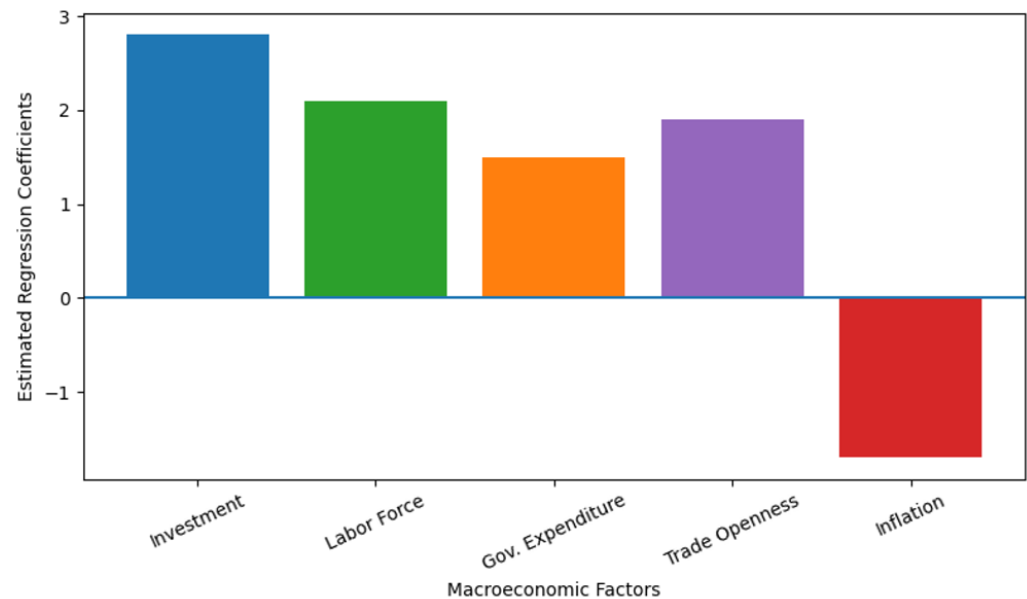


Figure 1. Impact of key macroeconomic factors on economic growth.

Figure 1 presents the estimated regression coefficients of major macroeconomic factors influencing economic growth. The colorful bar chart clearly illustrates the relative strength and direction of each factor's impact. Investment demonstrates the highest positive coefficient, confirming its dominant role in stimulating economic growth through capital accumulation and productive capacity expansion [14]. Just as positive is labor force participation, in which we see that human capital and labor market efficiency are of vital importance.

While government spending and trade openness, positively affect growth, with relatively low impacts. Our result indicates that public spending and joining international market increases economic performance through improved infrastructure, productivity, and competitiveness of country on international stage. On the other hand, inflation shows a negative correlation, which means that growing price instability has a negative impact on the economy by reducing investment and purchasing power [15]. In general the graph reinforces graphic economic results with a crucial element macroeconomic strategy for sustainable developments.

4. Conclusion

The econometric analysis in the present study was carried out to explore the various core determinants of economic growth, especially with due efforts on macroeconomic variables. The study has also empirically examined the explanatory power of several variables, GDP growth, as a measure of economic growth, investment, labor force participation, government expenditure, inflation and foreign trade, through multiple regression analysis. The findings substantiate the notion that economic growth is a multi-dimensional phenomenon, driven by both real and monetary channels, suggesting the considerable intricacy of the growth process in contemporary economies.

These findings are in line with the predictions of classical and endogenous growth theories, identifying investment and labor force participation as having a statistically significant and positive impact on economic growth. These results indicate that, for sustainable economic development, capital accumulation and the effective utilization of human resources are correlated. The positive impact of government expenditure and foreign trade openness, suggests that public spending with the right targeting and

integration into the global economy, can lead to increased productive capacity and competitiveness.

On the other hand, inflation is identified to have a negative impact on growth, which highlights the necessity for macroeconomic stability. The distortive effect of high and volatile inflation can influence investment choices, purchasing power, and long-term growth potential. Hence, price stability should continue to be a main focus of economic policy.

The conclusions from this study offer useful information to economic planners and policymakers. According to the econometric evidence, policies focusing on investment stimuli, labor market efficiency, trade openness, and macroeconomic stability are fundamental for sustaining long-term economic growth. Subsequent research could build upon this analysis by including further control variables, utilizing more advanced econometric methodologies, or undertake comparatives across nations so as to elucidate the complexity surrounding the subject of economic growth.

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