APPLICATION OF THE LOGARITHMIC DERIVATIVE IN ECONOMICS

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ANNOTATSIYA:

This article examines the use of the logarithmic derivative in economic analysis. The logarithmic derivative is a powerful tool for assessing the rates of change of economic variables such as output, income, costs, and prices. The application of this method makes it possible to simplify elasticity calculations, analyze the dynamics of macroeconomic and microeconomic indicators, and forecast the behavior of economic systems. The article provides examples of the practical use of the logarithmic derivative in calculating production functions, analyzing price indices, and determining growth rates of national income. The study demonstrates that the use of logarithmic derivatives increases the accuracy of economic calculations and simplifies the modeling of complex economic processes.

Introduction

In economics, the analysis of various indicators and the assessment of their dynamics are of key importance for managerial decision-making and the construction of economic models. Mathematical methods play an important role in the study and forecasting of economic processes. One such tool is the logarithmic derivative. It is especially useful for evaluating relative changes and calculating the elasticity of economic variables. Elasticity shows how a change in one indicator affects the change in another, which is important for analyzing demand, supply, and other economic variables.

The logarithmic derivative performs several important functions in economic analysis. First, it allows for the evaluation of growth rates of indicators such as production volume, income, or costs. Second, it is used to calculate elasticity, which reflects the sensitivity of one indicator to changes in another. Third, the results obtained using logarithmic derivatives are presented in a convenient form for economic modeling and forecasting.

Modern macroeconomic and microeconomic analysis also actively uses the logarithmic derivative to study the dynamics of complex processes and the influence of various factors. For example, it is applied in the analysis of production functions, price indices, national income growth rates, and investment activity. The logarithmic derivative helps simplify complex calculations and improve the accuracy of analysis.

Thus, this paper is devoted to the study of the application of the logarithmic derivative in economics, the analysis of its practical examples, and the evaluation of the advantages of its use in calculations and forecasting economic processes.

Main Part

The logarithmic derivative is an effective tool for analyzing changes in economic indicators, as it allows the evaluation of relative changes and the calculation of elasticity. Elasticity shows how one economic indicator changes under the influence of another. For example, income elasticity of demand reflects changes in consumption depending on changes in income.

First, the logarithmic derivative is widely used in the analysis of production functions. A production function usually depends on several factors, such as labor, capital, and technology. If the production function has the form

$Q = f(L, K)$,

then its logarithmic derivative makes it possible to express relative changes using a specific formula.

Each term represents the elasticity of output with respect to an individual factor. Thus, the logarithmic derivative makes it possible to assess the sensitivity of the production function to changes in each factor.

Second, the logarithmic derivative is applied in the analysis of price indices and inflation. If P is a price index, then dP / P reflects the relative change in prices, that is, the inflation rate. This method is widely used in macroeconomics to assess the dynamics of various indicators.

Third, the logarithmic derivative helps analyze the growth rates of investments and national income. If Y is national income, then dY / Y shows its relative change. This is important for macroeconomic forecasting and decision-making.

In addition, the logarithmic derivative simplifies calculations in multifactor economic models. In complex functions, conventional calculations can be cumbersome, whereas the

logarithmic derivative allows working with relative changes, making the analysis faster and more accurate.

In practice, the logarithmic derivative is especially useful when applied to the Cobb–Douglas production function. This makes it easy to determine the elasticity of output with respect to each factor, which is extremely convenient for analyzing production processes.

Thus, the logarithmic derivative is an important tool of economic analysis. It simplifies mathematical calculations, makes it possible to assess the sensitivity of indicators, and is used to forecast macroeconomic and microeconomic processes.

Conclusion

The logarithmic derivative is an important tool of economic analysis that allows the evaluation of relative changes in indicators and the calculation of elasticity. The application of this method simplifies the analysis of production functions, price indices, national income growth rates, and investment activity.

The use of logarithmic derivatives makes it possible to identify the sensitivity of economic variables to changes in factors, which increases the accuracy of forecasts and the effectiveness of decision-making. Due to its simplicity and universality, the logarithmic derivative is widely used in both microeconomic and macroeconomic analysis.

Thus, the study and application of logarithmic derivatives contribute to a deeper understanding of economic processes, enhance the analytical capabilities of researchers, and help develop well-founded strategies for economic management.

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