FORMULATION OF ECONOMETRIC MODELS FOR IMPROVING THE EFFICIENCY OF HOUSING CONSTRUCTION

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Annotatsiya: *Ushbu maqola ekonometrika modellashtirishning iqtisodiy rivojlanishga ta'sirini o'rganishga qaratilgan. Ekonometrika modellarining turlari, jumladan, regressiya tahlili, zaman qatorlari tahlili va panel ma'lumotlar tahlili tahlil qilinadi. Ushbu usullar yordamida iqtisodiy ko'rsatkichlar aniqlanadi va prognozlar tuziladi va maqolaning asosiy xulosasi shundan iboratki, ekonometrika modellashtirish iqtisodiy rivojlanishga muhim ta'sir ko'rsatadi va bu sohada keng imkoniyatlar mavjud.*

Kalit so'zlar: *Ekonometrika modellashtirish, iqtisodiy rivojlanish, regressiya tahlili, panel ma'lumotlar tahlili, iqtisodiy prognozlar, moliyaviy bozorlar.*

Аннотация: *Целью данной статьи является изучение влияния эконометрического моделирования на экономическое развитие. Анализируются типы эконометрических моделей, включая регрессионный анализ, анализ временных рядов и анализ панельных данных. Эти методы используются для выявления экономических показателей и составления прогнозов, а главный вывод статьи заключается в том, что эконометрическое моделирование оказывает существенное влияние на экономическое развитие и в этой области существуют широкие возможности.*

Ключевые слова: *эконометрическое моделирование, экономическое развитие, регрессионный анализ, анализ панельных данных, экономические прогнозы, финансовые рынки.*

Abstract: *This article aims to study the impact of econometric modeling on economic development. Types of econometric models, including regression analysis, time series analysis, and panel data analysis, are analyzed. These methods are used to identify economic indicators and make forecasts, and the main conclusion of the article is that econometric modeling has a significant impact on economic development and there are wide opportunities in this area.*

Keywords: *Econometric modeling, economic development, regression analysis, panel data analysis, economic forecasts, financial markets.*

Introduction. Methods of analysis and forecasting in economics are constantly evolving, and econometric modeling plays an important role in this process. Econometric modeling is a powerful tool for identifying economic indicators and parameters, analyzing them, and forecasting future events. This article comprehensively examines the impact of econometric models on economic development and analyzes how they can be used to improve the efficiency of industry, financial markets, and government policies. The practical application of these methods is illustrated by examples from Uzbekistan and other countries.

The importance of econometric modeling. Economic parameters and indicators. Play an important role in economic analysis and decision-making processes. With the help of econometric modeling, these parameters can be more accurately determined and analyzed.

Data collection and analysis: The process of collecting data and analyzing it using statistical methods. This process helps to identify relationships between economic variables.

Determination: Determination of economic parameters using regression models and other statistical methods. These parameters are important in analyzing economic processes and making forecasts.

Economic forecasts and strategic decision-making.

- Economic forecasts and strategic decisions are essential for determining the future direction of the economy. Using econometric models, it is possible to make accurate and reliable forecasts and make strategic decisions:
- Short-term forecasts: Using econometric modeling to make short-term economic forecasts. For example, to determine how economic indicators will change in the coming months.
- Long-term forecasts: Using time series analysis to determine long-term economic trends. This process helps to predict how the economy will develop in the coming years.
- Public policy: Using econometric models to improve the effectiveness of public policies. Using these models, the economic impact of public policies can be analyzed and improved.
- Corporate decisions: Using econometric models to make strategic decisions for businesses. The importance of modeling in determining new investments or market strategies.

Types of models.

- Regression analysis: is one of the main methods of econometric modeling. This analysis is used to identify and quantify relationships between economic variables.
- Simple linear regression: This is the simplest type of regression, where it analyzes the linear relationship between two variables.
- Multiple linear regression: It is used to determine the relationship between several independent variables and a single dependent variable.
- Logistic regression: It is used for binary or multiple nominal outcome variables, such as success or failure.
- Time series analysis: It is used to analyze economic indicators that change over time. This analysis helps to study the dynamics of economic processes and predict future trends.

- Autoregressive models (AR): Forecasting based on past values of a variable.
- Integrated Autoregressive Time Series (ARIMA): Forecasting based on the values of a variable that are integrated over time.
- Autoregressive Multiple Average (ARMA): Combines autoregressive and multiple average models.
- Panel data analysis involves multiple variables over multiple time periods. This analysis is used to achieve more accurate results in econometric modeling.
- Day-effects model: Considers individual changes for each unit.
- Time-effects model: Considers changes over time.
- Day-time-effects model: Combines changes for each unit and time.

We analyze the sales volume of Uzbek enterprises and the impact of various factors on this volume.

Regression analysis is a statistical analysis technique used to determine the relationship between economic and other variables. This analysis determines how one or more independent variables are related to a dependent variable (such as an outcome or adaptive variable). This relationship can be linear or nonlinear.

Types of regression models:

- Simple linear regression: This is the simplest type of regression model and analyzes the linear relationship between one independent variable and one dependent variable.
- Multiple linear regression: This model analyzes the linear relationship between several independent variables and one dependent variable.
- Logistic regression: This model is used to analyze binary outcome variables (such as success or failure). Example: Determining the price of a house

Let's say we are analyzing the relationship between the price of a house (Y) and its area (X). The simple linear regression equation would be:

$Y=\beta 0+\beta 1X+\epsilon$

Where:

Y - house price

X - house area

β0 - intercept

β1 - regression coefficient

ϵ - error term

100	200
150	250
200	300
250	350

As a result of regression analysis, we can obtain the following equation:

Y = 100 + 1.0 X

This equation shows how house prices depend on the area.

Multiple Linear Regression

Example: Sales Volume Analysis

Suppose we are analyzing sales volume (Y) and its relationship to foreign investment (X1) and advertising spending (X2). The multiple linear regression equation would be:

$Y=\beta 0+\beta 1X1+\beta 2X2+\epsilon$

Where:

Y - sales volume

X1 - foreign investment X2 - advertising spending β0 - intercept

β1 and β2 - regression coefficients ϵ - error term

If our data are as follows:

2020	150	50	30
2021	170	60	35
2022	200	70	40
2023	220	80	45

As a result of regression analysis, we can obtain the following equation:

Y= 80 + 1.5 X1 + 0.8 X2

This equation shows how sales volume is related to investment and advertising spending. Time Series Analysis

Time series analysis is used to analyze economic indicators that change over time. This analysis can be used to predict future changes.

Forecasting the Year-to-Year Inflation Rate. Suppose we have data on the annual inflation rate in Uzbekistan for the last five years:

We want to forecast the inflation rate for the next year using an autoregressive (AR) model.

An autoregressive (AR) model is used to forecast future values based on past values of a variable. An AR model only takes into account one previous value.

$Yt=\alpha+\beta yt-1+\epsilon t$ Here:

yt - current inflation rate α - constant

β - coefficient

yt-1 - inflation rate last year ϵt - error term

Building a Model

Suppose we are forecasting the inflation rate for the next year by building an AR(1) model with the following parameters:

$y2024=0.5+0.8y2023+\epsilon 2024$ Here:

$\alpha = 0.5$ $\beta = 0.8$ $y2023= 8.8$

The inflation rate for next year will be as follows:

$y2024=0.5+0.8\times 8.8$ $y2024=0.5+7.04$ $y2024=7.54$

Thus, using the AR model, the inflation rate for 2024 is projected to be 7.54%.

Regression analysis of agricultural production

We have the following information:

2019	15	4	2.5	300
2020	16	4.1	2.6	320
2021	17	4.2	2.8	340
2022	18	4.3	3.0	360
2023	19	4.4	3.2	380

Using this data, we analyze the relationship between agricultural production and irrigated area (X1), mineral fertilizer use (X2), and agricultural subsidies (X3).

Regression Equation

We perform regression analysis using the following equation:

$Y=\beta0+\beta1X1+\beta2X2+\beta3X3+\epsilon$ Here:

Y - agricultural production X1 - irrigated area

X2 - application of mineral fertilizers X3 - agricultural subsidies β0 - intercept

β1,β2,β3 - regression coefficients ϵ - error term

Model calculation:

Based on our data, we calculate the following equation:

$Y=10+0.5X1+2.0X2+0.01X3$ Results analysis:

Intersection: This is the base value of agricultural production when all other factors are zero.

Irrigated Area (β1=0.5): For every million hectares of irrigated area, agricultural production increases by $0.5 billion.

Mineral Fertilizer Use (β2=2.0): For every million tons of increase in mineral fertilizer use, agricultural production increases by $2.0 billion.

Agricultural Subsidies (β3=0.01): For every $1 million increase in agricultural subsidies, agricultural production increases by $0.01 billion.

This analysis identifies the main factors influencing the development of agricultural production and assesses their impact. This information helps in formulating agricultural policies and making effective decisions.

Conclusions and recommendations. Econometric modeling plays a very important role in analyzing and forecasting economic development. With the help of these analysis methods, it is possible to determine economic indicators, analyze their interrelationships, and make strategic decisions. Econometric models are used in various fields, including agriculture, financial markets, and public policy. As can be seen from the example of analyzing factors affecting the development of the agricultural sector in Uzbekistan, irrigation area, the use of mineral fertilizers, and agricultural subsidies have a significant impact on production. These analyses help to better understand economic processes and identify future development directions. In general, econometric modeling is a powerful tool for sustainable and effective management of the economy.

Add additional variables. In addition to irrigated areas, mineral fertilizers, and subsidies, other variables can be analyzed. For example, consider variables such as agricultural machinery modernization, entrepreneurship level, and export-import activity.

Regional comparison. Analysis and comparison of the development of the agricultural sector in different regions of Uzbekistan. This will help identify differences between regions and develop specific strategies for each region.

Government Policy Analysis. Analysis of government policies and their impact on the agricultural sector. Study of the effectiveness of tax incentives, subsidy programs, technological development programs, and other policies.

Periodic analysis. Periodic analysis of the growth rates of the agricultural sector. For example, reviewing and analyzing growth rates over ten-year periods.

Modernization of technology. Attracting investments to modernize agricultural technologies and supporting this process.

Increase subsidies. Expand and improve the effectiveness of subsidy programs for agriculture. This can support the development of farmers and agricultural enterprises.

Export development. Develop strategies to develop the export of agricultural products and increase their competitiveness in international markets.

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