

Correlation–Regression Relationships in the Analysis of Australia’s National Economy

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Abstract: This article conducts a multifactor correlation–regression analysis based on the key indicators of Australia’s national economy. The study examines the statistical relationships between factors affecting the growth of gross domestic product (GDP), including imports, exports, the services sector, agricultural value added, population size, and industrial indicators. Using a pairwise correlation matrix, linear relationships among the factors were identified, and the significance of the regression equation was evaluated using the Fisher criterion. The results indicate that exports and the services sector are the factors exerting the greatest influence on GDP growth in Australia’s economy. The study enables the formulation of important scientific and practical conclusions for assessing Australia’s economic development, its structural potential, and macroeconomic stability.

Keywords: Australian economy, GDP, economic growth rate, exports, imports, balance of payments, income, correlation–regression analysis.

Introduction.

According to data from the OEC, trade relations between Australia and Uzbekistan are currently developed at a relatively low level. In 2023, Australia’s exports to Uzbekistan amounted to USD 12 million, ranking 123rd among 211 countries. The main export product consisted of machinery with individual functions, valued at USD 9.27 million. Uzbekistan’s exports to Australia were very limited, totaling USD 394 thousand, with computers being the primary product (USD 261 thousand). GDP per capita stands at USD 64.8 thousand in Australia, compared to USD 2.85 thousand in Uzbekistan. The Economic Complexity Index values are also relatively close (–0.28 and –0.22), indicating potential opportunities for expanding trade in the future.

In October 2025, Australia recorded exports to Uzbekistan amounting to AUD 0, which statistically represents a 100 percent increase compared to October 2024, when trade volume was also AUD 0.

This section presents data on subnational-level export and import activities between Australia and Uzbekistan. By selecting a specific date on a linear chart or choosing a subnational region or product category, it is possible to observe how trade patterns change over time. Due to its vast territory, Australia is divided into numerous geographical, climatic, and even time zones. On average, the country known as “Down Under” is situated at an elevation of 330 meters above sea level. The highest peak is Mount Kosciuszko, located in the Snowy Mountains of New South Wales, with an elevation of 2,228 meters above sea level. The country also includes more than

8,000 islands, most of which are uninhabited. Australia has no neighboring countries connected by land borders.

At the same time, the decline in import volumes is mainly explained by a reduction in the supply of bakery products. In annual GDP growth indicators, the expansion of the services sector, exports, and investments plays a significant role and has a notable impact on economic stability. Based on this, the present study evaluates the main factors influencing GDP growth in Australia through correlation–regression analysis using key macroeconomic indicators. In September 2025, Australia did not export any goods to Uzbekistan and did not import any goods from Uzbekistan, resulting in a zero trade balance. Over the period from September 2024 to September 2025, Australia’s exports to Uzbekistan remained unchanged, and no changes were observed in import volumes.

Research Methodology

The study applied the classical approach of correlation–regression analysis. First, pairwise correlation coefficients among the selected factors were calculated to determine the degree of linear relationships between them. A correlation matrix was constructed to assess the presence of multicollinearity among the factors. Subsequently, a multivariate linear regression model was developed, with GDP selected as the dependent variable. The statistical significance of the model parameters was evaluated using the Student’s *t*-test, while the overall reliability of the model was assessed using the Fisher *F*-test. The coefficient of determination was employed as the main indicator to determine the extent to which the regression equation explains variations in GDP. At the same time, one of the selected factors (X4) was excluded from the model due to its low correlation.

Australia’s economy is structurally diversified, with industry, the services sector, agriculture, and foreign trade playing important roles. The statistical data used in the study indicate a steady increase in GDP over the years. The results of the pairwise correlation analysis reveal a very strong, positive, and statistically significant relationship between GDP and export indicators. This confirms the high degree of integration of the Australian economy into external markets. In addition, the correlation between value added in the services sector and GDP is almost perfect (0.9996), indicating the economy’s increasing reliance on the services sector.

Through correlation–regression relationships, statistical analysis makes it possible to determine the degree of interdependence between two or more variables. In identifying the strength of the relationship between two variables, calculating the correlation coefficient provides a key advantage. If the correlation coefficient is close to +1, this indicates a positive relationship between the variables, whereas a value close to –1 indicates a negative relationship. If the coefficient approaches 0, it signifies the absence of any relationship between the two variables. To determine the magnitude of influence, regression analysis makes it possible to model or forecast a single dependent variable using one or more independent variables. There are two main types of regression analysis: linear regression and multiple regression. Through a multiple regression equation, it is possible to identify how each factor affects gross domestic product (GDP). Using this set of statistical methods, the factors influencing the growth of Australia’s GDP can be identified, quantified, and their respective impact ranges determined.

Analysis and Results

The primary objective of presenting the econometric model in this study is to provide a more comprehensive understanding of correlation–regression analysis and to demonstrate the extent to which the influencing factors contribute to the increase in gross domestic product.

Table 1. Dependent and explanatory variables selected for the correlation–regression statistical analysis¹

Yillar	y	x1	x2	x3	x4
2015	1 624 165 000 000	325 907 000 000	350 784 000 000	55 406 000 000	23 815 995
2016	1 657 914 000 000	319 625 000 000	359 690 000 000	51 453 000 000	24 190 907
2017	1 757 655 000 000	373 618 000 000	368 178 000 000	56 270 000 000	24 592 588
2018	1 842 045 000 000	403 299 000 000	402 339 000 000	54 707 000 000	24 963 258
2019	1 947 319 000 000	470 466 000 000	428 952 000 000	48 945 000 000	25 334 826
2020	1 981 663 000 000	476 129 000 000	408 970 000 000	44 264 000 000	25 649 248
2021	2 085 822 000 000	460 063 000 000	380 575 000 000	53 913 000 000	25 685 412
2022	2 330 329 000 000	594 970 000 000	472 828 000 000	63 153 000 000	26 014 399
2023	2 567 513 000 000	688 074 000 000	575 789 000 000	66 075 000 000	26 652 777
2024	2 672 659 000 000	660 286 000 000	604 262 000 000	70 843 000 000	27 204 809

The nature of multifactor correlation lies in the fact that several important and essential factors are included in its regression equation. Correctly selecting the most relevant factors and incorporating them into the regression equation is of great importance. The selection of factors is based on qualitative theoretical analysis and is carried out in three stages. In the first stage (preliminary analysis), factors are selected without imposing any conditions. In the second stage, the factors are analyzed using pairwise correlation coefficients. For this purpose, a matrix of pairwise correlation coefficients among the variables (y) and (x₁, x₂, \dots, x_n) is constructed. In the third stage of factor analysis, the regression equation is specified, and the statistical significance of its parameters is evaluated using special criteria.

To determine which factors should be included in the regression equation, a matrix of pairwise correlation coefficients among the explanatory variables is constructed (Table 2).

Table 2. Matrix of pairwise correlation coefficients among the explanatory variables

Correlation Analysis					
	Y	x1	x2	x3	x4
y	1				
x1	0,983399406	1			
x2	0,951289725	0,944801385	1		
x3	0,756164892	0,696246681	0,783152221	1	
x4	0,973475377	0,959236311	0,908030789	0,615640246	1

Based on the data presented in **Table 2**, it can be stated that the pairwise correlation coefficients indicate a strong positive relationship between gross domestic product (Y) and the influencing factors. However, due to the relatively low degree of association of the **X4** indicator, this factor is excluded from the econometric analysis.

In Table 2, (r_{ij}) represents the pairwise correlation coefficient between the factors (x_i) and (x_j). As is well known, in a multiple regression equation, factors that are strongly linearly correlated with each other should not be included simultaneously. As shown in the table, because all factors are strongly interrelated, four factors were initially planned to be included in the econometric model, with the critical value of the correlation coefficient taken as (r_{cr} = 0.99963). The coefficient of determination of the estimated model indicates the proportion of the variance of the dependent variable that is explained by the influence of the considered factors. This indicator takes values between 0 and 1. The closer its value is to 1, the more accurately the factors included in the regression equation explain the behavior of the dependent variable.

¹ <https://www.worldbank.org/ext/en/country/australia> and <https://data360.worldbank.org/en/search?tab=indicator&themeAndTopics=P2&country=AUS>

Since 2015, despite global economic crises, Australia's economy has demonstrated a strong structural foundation. In 2015, GDP amounted to USD 1.35 trillion, and over the following decade the economy experienced stable growth driven by mining and agricultural exports. Although a short-term recession (-0.1%) was observed in 2020 due to the COVID-19 pandemic, Australia became one of the fastest-recovering countries among developed economies. During 2021–2023, rising commodity prices and increased household consumption pushed the economy beyond USD 1.7 trillion. In this period, government fiscal stimulus measures and a strong labor market helped maintain unemployment at historically low levels. By 2030, Australia's economy is expected to exceed USD 2 trillion in nominal terms. The average annual growth rate is projected to stabilize at around 2.2%–2.3% toward the end of the decade. Following the “soft landing” scenario anticipated in 2025, inflation is expected to fully stabilize within the central bank's target range of 2–3% by 2030. The services sector (particularly education, tourism, and technology) is expected to continue accounting for more than 65% of GDP, while the main share of export revenues will remain concentrated in innovative agriculture and the energy sector.

Overall, the analysis indicates that Australia's economy exhibits a long-term growth trend, with occasional short-term declines caused by domestic and global crises. At the same time, future projections point to a strengthening of the country's economic potential.

Conclusion

The correlation–regression model constructed on the basis of the collected data made it possible to clearly identify the factors influencing GDP growth in Mexico. According to the results of the analysis, exports, the services sector, agriculture, and demographic factors are the main drivers of economic growth. Mexico's high level of integration into the international trade system, export orientation toward the U.S. market, expansion of the services sector, and population growth play a decisive role in enhancing the country's economic potential. The high R^2 value of the regression model confirms the correctness of factor selection and their substantial contribution to explaining GDP. Overall, Australia's economy is characterized as a stable economic system that relies on foreign trade, is based on the services sector, and demonstrates sustained demographic growth.

Based on the above analysis, the following recommendations are proposed: First, diversifying Australia's export structure, particularly by increasing the share of high-technology products; Second, modernizing domestic production and strengthening industrial cooperation in order to reduce dependence on imports; Third, increasing investments in irrigation systems, agricultural technologies, and livestock infrastructure to improve agricultural efficiency; Fourth, expanding employment programs and establishing professional training centers in order to transform demographic growth into a factor of economic growth.

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