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Article

Correlation and Regression Relationships in Analyzing the National Economy of Canada

Musurmonova Muxlisa Samandar qizi

1. Trainee Assistant of the Department of "Digital Economics", Samarkand institute of economics and service
- * Correspondence: muxlissamurmonova97@gmail.com

Abstract: This article conducts a multifactor correlation–regression analysis based on the key indicators of Canada’s national economy. The study examines the statistical relationships between factors influencing the growth of gross domestic product (GDP), including imports, exports, the service sector, value added in agriculture, population size, and industrial indicators. Linear relationships among the factors were identified using a pairwise correlation matrix, and the significance of the regression equation was evaluated using the Fisher criterion. The results show that exports and the service sector are the factors with the strongest impact on GDP growth in the Canadian economy. The study provides important scientific and practical conclusions for assessing Canada’s economic development, its structural potential, and macroeconomic stability.

Keywords: Canadian Economy, GDP, Correlation, Regression, Econometric Model, Export, Import, Fisher Criterion.

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1. Introduction

Canada is situated in the north of Northern America in the world’s largest archipelago, the Canadian Arctic Archipelago. Ottawa serves as the city’s capital. Canada is, with an area of 9.98 million square kilometers, the second largest country by territory after Russia in terms of all countries of the world. This is just about 4% bigger than the area of the United States. As a result, Canada ranks among the world’s least densely populated countries with a population density of 3.9 people per square kilometer. Urban dwellers are 82.7% of the population [1]. By 2024, the country’s population was 41 million and GDP per capita was USD 54,282.62. Canada is a high-income country [2]. The average annual inflation rate during the observation period from 1960 to 2024 was at 3.8%. The inflation rate for 2024 was calculated at 2.4%. In October 2025, the inflation rate was calculated at 2.16% [Observatory of Economic Complexity (OEC), oec.world [3]. The economy of Canada is among the biggest and most stable in the world and is characterized by an advanced degree of diversification. Among the main sectors is the natural resource extraction sector, including oil and gas (mainly from the Alberta oil sands) and a variety of other natural resources. Mining and the lumber and timber industry are two major areas. Canada is one of the largest producers and exporters of crude oil worldwide [4]. Canada’s participation in free trade agreements, with the EU and the United States–Mexico–Canada Agreement (USMCA), has helped encourage international trade and strengthens ties in the economy, and the current study quantifies the determinants to GDP growth in Canada with macroeconomic correlation–regression analysis based on the study’s findings [5].

2. Materials and Methods

The analysis used the classical correlation–regression method. First, pairwise correlation coefficients were computed for those selected factors to evaluate the degree of linear relationships. A correlation matrix was then generated in order to evaluate the presence of multicollinearity among the factors. Then a multiple linear regression model was developed, with GDP chosen as the dependent variable. The significance of the model parameters was calculated by using the Student’s t-test, and the reliability of the model as a whole was measured by the Fisher criterion. For assessing the degree of fit of the regression equation to GDP variation, the coefficient of determination was considered. Statistical analysis through correlation–regression relationships makes it possible to find out the degree of correlation between two or more variables. The main purpose of presenting the econometric model in this study is to gain a more comprehensive understanding of correlation–regression analysis and to demonstrate how significant the influencing factors are in contributing to the increase in the volume of gross domestic product (GDP).

3. Results

Table 1. Outcome and influencing factors selected for correlation–regression statistical analysis.

Yillar	y	x1	x2	x3	x4
2015	1,55651E+12	6,83019E+11	6,58698E+11	85007381297	35704498
2016	1,52799E+12	6,85868E+11	6,68745E+11	87478688097	36110803
2017	1,64927E+12	7,20254E+11	6,78715E+11	94753221151	36545075
2018	1,72533E+12	7,66265E+11	7,02973E+11	1,05333E+11	37072620
2019	1,74373E+12	7,82419E+11	7,19047E+11	1,15259E+11	37618495
2020	1,65568E+12	7,03532E+11	6,5447E+11	98528945535	38028638
2021	2,02238E+12	7,87922E+11	6,76141E+11	1,21157E+11	38239864
2022	2,19041E+12	9,51485E+11	7,0435E+11	1,41244E+11	38935934
2023	2,17334E+12	9,76444E+11	7,39253E+11	1,54412E+11	40083484
2024	2,24364E+12	1,00485E+12	7,4332E+11	1,59075E+11	41288599

The characteristic of a multiple correlation relationship is that several important and essential factors are included in its regression equation. Correctly selecting the most significant 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, they 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 determined, and the 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 influencing factors is constructed (Table 2).

Table 2. Matrix of pairwise correlation coefficients among the influencing factors.

	y	x1	x2	x3	x4
Y	1				
x1	0,951001537	1			
x2	0,700565691	0,844230416	1		
x3	0,967180978	0,98437239	0,832453703	1	

x4	0,902262813	0,910430022	0,72505123	0,947108241	1
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According to the data in Table 2, the pairwise correlation coefficients show the strong positive relationship between the gross domestic product (GDP) (Y) and its predictors. Table 2 displays (r_{ij}) as the pairwise correlation coefficient between the factors (x_i) and (x_j). It is a well-known fact that it is not appropriate to incorporate variables which are strongly linearly correlated at the same time in multiple regression analysis. Because multicollinearity (e.g., high correlation among explanatory variables) can decrease model accuracy, decreasing the reliability of regression coefficients. The correlation matrix shows high interdependence between factors. For example:

- The correlation between Y and X3 is 0.9671;
- The correlation between X1 and X3 is 0.984;
- The correlation between X2 and X3 is 0.832.

The extremely high cross-collinearity among the variables, particularly the strong interplay between X1, X2, and X3, further implies that if multiple of these factors are added to the regression model simultaneously, multicollinearity issues can arise. This makes it impossible to decouple the effects of each coefficient, as well as make the performance of the model less generalized. The coefficient of determination of the estimated model reflects the proportion of the variance of the dependent variable explained by the effect of the factors considered. This indicator assumes data values ranging from 0 to 1. As the value of this indicator is closer to 1, the higher we can see more about the regression equation of the dependent variable explained by the factors used in the regression equation. In the model created with respect to some determinants of GDP growth, the real value of the F-Fisher statistic (Table 3).

Table 3. Regression statistics table.

Regression Statistics					
Multiple R	0,99322284				
R-squared	0,986491609				
Adjusted R-squared	0,975684897				
Standard Error	43481213805				
Observations	10				
Analysis of Variance (ANOVA)					
	df	SS	MS	F	Значимость F
Regression	4	6,9034E+23	1,72585E+23	91,28508013	7,35134E-05
Residual	5	9,45308E+21	1,89062E+21		
Total	9	6,99793E+23			

Thus, the factors included in the regression equation are classified as highly significant, relatively significant, and insignificant. Based on the analysis results, the highly significant and insignificant factors included in the model were identified separately.

Exports and imports indicate the economy's dependence on the external sector and the expansion of production and trade processes. The consistent growth of all factors during 2015–2024 demonstrates the stable development of the Canadian economy. In 1960, Canada's GDP amounted to approximately USD 40.56 billion, during which the country's share in the global economy was relatively small. From 1960 to 1970, GDP increased steadily; moreover, through the expansion of oil and natural resource exports and industrial production, economic potential was strengthened, and Canada's GDP reached USD 88.19 billion.

4. Discussion

Canada's GDP grew steadily for this period; USD 274.77 billion to USD 596.08 billion. During this time, international trade—especially close economic ties with the United States—helped the nation enjoy stable growth. In the early 1990s, global economic conditions changed with economic conditions affecting the Canadian economy. This caused GDP growth rates to slip a bit, and GDP decreased by USD 32.58 billion between 1991–1994 (from USD 612.52 billion to USD 579.94 billion). Since then, GDP was about USD 744.77 billion in 2000, solidifying the country's status in the international economy system [6]. Meanwhile, the period 2000–2008 saw sustained growth in Canada's GDP, with oil, natural gas, and other resources exports accounting for high growth; in 2008, it is around USD 1.552 trillion. It led to a stable increase in GDP from 2010–19. The years 2019–2020 have been very challenging to the Canadian economy since the COVID-19 pandemic where GDP has seen short-term declines. But by 2021, economic activity picked up again, and growth resumed. For instance, GDP in 2021 equates to about USD 2.022 trillion [7]. During 2022–2024, Canada's GDP also showed growth dynamics again in a similar manner. Canada's nominal GDP in 2023 was USD 2.142 trillion, a contraction by 0.8% compared with 2022 but consistent with the post-pandemic recovery era; however, it indicates the post-pandemic recovery phase. GDP is reported to have become USD 2.243 trillion in 2024 (see below). Statistical models predict that Canada's 2025 gross domestic product will be roughly USD 2.26–2.30 trillion. In the coming years – 2025–2030– it is expected that Canada's GDP will be on an upward trend, and will reach between USD 2.6–2.7 trillion at its peak growth rate, after which the situation is projected to calm. This is an indication of the country's long-term stable economic growth, especially good integration into a global stage on which other countries are all too familiar. Throughout Canada's long-term economic development and economic stability, the graph tells us the trend is in that direction. At the same time, future forecasts point to a continued growth of its economic potential.

5. Conclusion

The correlation–regression model allowed us to see much more clearly the drivers of GDP growth in the Canadian economy based on the gathered data. The results indicate that imports, exports, and demographic factors contribute to the bulk of the economic growth. Among other factors, the integration of Canada into the foreign trade system, the orientation of export to the U.S. market, the growth of the service sector and the increase in population are decisive to the level of increasing the nation's economic potential. The large R^2 value of the regression model indicates good factor selection and is indicative as it demonstrates a major contribution in explaining GDP dynamics. On the whole, the Canadian economy is described as a stable economic system reliant on foreign trade and supported by demographic expansion. In light of the above discussion, the recommendations are based on: First, to reduce dependence on imports we must modernize domestic production and build industrial cooperation. In the second place, to diversify the export structure, especially by expanding the share of high-technology products. Third, to reinforce government programs seeking to develop value added to the service segment, particularly logistics, transport and IT services. Fourth, to turn demographic growth into a growth driver through a large scale implementation of employment programs and skills development and training centers.

REFERENCES

- [1] World Bank, "World Bank Open Data: GDP and Economic Indicators—Canada." [Online]. Available: <https://data.worldbank.org/country/canada>

- [2] Statbase, "Open Data: GDP and Economic Indicators—Canada." [Online]. Available: <https://statbase.org/data/can-gdp/>
- [3] Trading Economics, "Canada GDP and Economic Indicators." [Online]. Available: <https://tradingeconomics.com/canada/gdp>
- [4] Office of the United States Trade Representative (USTR), "United States–Mexico–Canada Agreement (USMCA)." [Online]. Available: <https://ustr.gov/trade-agreements/free-trade-agreements/united-states-mexico-canada-agreement>
- [5] World Bank, "Inflation, Consumer Prices (Annual %)—Canada." [Online]. Available: <https://data.worldbank.org/indicator/FP.CPI.TOTL.ZG?locations=CA>
- [6] World Bank Data360, "Canada: Economic Indicators." [Online]. Available: <https://data360.worldbank.org/en/economy/CAN>