Effects of Human Development Indices on Economic Growth in Selected Countries of North America, 1992 – 2022.

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Abstract
The study analysed the effect of human development indices on economic growth of five North America countries from 1992–2022 utilizing Gross Domestic Product (GDP) as the proxy for economic growth while birth rate (BR), death rate (DR), per capita income (PCI) and unemployment (UNEMP) were used as proxies for human development indices. Specifically; the study examined the effects of birth rate, death rate per capita, and unemployment rate on economic growth of selected North America countries; studied the effects of death rate on economic growth of the selected North America countries. The study utilised secondary data obtained from World Bank. The study utilized panel data model. The research finding shows that birth rate and unemployment variables had negative and significant effect on GDP while death rate had a positive and significant impact on GDP in the selected North America countries. Meanwhile, per capita income had a negative and insignificant effect on GDP. The study recommended that policies to tackle unemployment in North American countries should be prioritised.

Keywords: Economic growth, Human development indices, Panel Data Analysis, Per Capita Income Unemployment.

Introduction
The Human Development Index (HDI) is a composite measure of human progress. The objective is to redirect economic development towards policies centred on individuals (Ul Haq 1995). The Human Development Index (HDI) of 2010 is the geometric mean of three composite social indicators: the Life Expectancy Index, the Education Index, and the Income Index (United Nations Development Programme 2010). Sen's (1985) study on the theoretical foundation of human growth is rooted in his capacities approach, which posits that an individual's capacity to engage in various functioning vectors and to attain associated well-being outcomes serves as the most accurate measure of welfare.

According to Dwivedi (2004), economic growth on the other hand is a sustained increase in per capita national output or net national product over a long period of time. This implies that the rate of increase in total output must be greater than the rate of population growth. According to the UNDP (2024), Economic growth and Human Development Indices encircles elements such as GDP, inflation rate, interest rate, exchange rate, per capita income; reductions in unemployment and poverty levels; and improvements in literacy and life expectancy rates. Often included in the criteria for evaluating the degree of economic and human development are also the level of industrialisation, and amount of widespread infrastructure. It is the aspiration of every country to economically develop and carter for its population.

In view of the above, this study was motivated by the fact that many countries failed to understand the influence of human power resource in the economy of their nations but rather they have used GDP alone to ascertain economic growth. Human power is shown in the value

of HDI, which can influence the level of economic growth positively in the value of its GDP. It is up to the governments of these nations to manage the conditions in a way that economic growth increases the overall welfare of its citizens and the economy as the discernment that the idea of life doesn't show upgrades for an immense collection of people despite high GDP advancement. This study aimed at understanding the valuable effect of human development indices on economic growth in selected countries of North America from 1992 – 2022. The selected countries are Canada, Jamaica, Mexico, Panama and United States of America.
Perhaps human development indices are more economically viable or have some sort of advantage over just focusing on the increase in GDP and other economic metrics as it emphasizes people's well-being, including health, education and living standards. The specific objectives were to examine the effect of birth rate, effect of death rate, effect of per capita income, effect of unemployment on economic growth of the selected countries.

Literature Review

This work is anchored on the theories of economic growth and theory of human development. The theories of Economic Growth are theories postulated to boost development in an economy, based on the resources available and the dynamic observed between multiple economic variables. The theory of Economic growth includes **classical theories of economic growth, neoclassical theory (Solow-Swan or Exogenous Model), endogenous theory and** others like mercantilism. The primary purpose of these theories is to enable countries to withstand economic crises and facilitate overall progress. Theories of human development aim to explain how and why people change over time and some key theories are maturationist theory, psychoanalytic theory, Erikson's psychosocial theory, behaviourism theory, cognitive development theory, and biopsychosocial theory.

Tuaneh and Essi, (2017); Tuaneh (2018) Tuaneh and Okidim, (2019); Tuaneh, and Essi. (2021); Ewubare, and Tuaneh (2016); Tuaneh, Essi, and Etuk (2021) among others studied the inter-relationship among macroeconomic variables applying various methods. studied the interaction among macroeconomic stability indicators in Nigeria (1981-2016) using Variance Autoregression.

Hilary (2021) carried out a study on evaluation of Nigeria's crude birth rate relationship with her economic growth based on time-series information spanning 1970 to 2019, sourced from the Nigerian Bureau of Statistics, the Central Bank, the World Bank and other relevant agencies. The variables adopted unit roots and cointegration while the two stage least squares (2SLS) estimation technique was adopted in the analysis. They were all of order one and the result showed a cointegration among them. The 2SLS results showed significant positive relationships between crude birth rate and per-capita income, while an inverse relationship was found to exist between literacy rate and crude birth rate. Results also showed that literacy rate and total labour participation spurred the per capita income of Nigeria. And the paper concludes that the literacy rate is an important policy instrument that can lower the birth rate and raise per capita income in Nigeria.

Michael and Suparna (2023), an examined the effect of per capita income and the agricultural sector on goods and services tax receipts with economic growth as moderation in Brazil Russia, India, China, and South Africa (BRICS) nations. The study examined "the impact of per capita income and the agriculture sector on goods and services tax collections, with economic growth serving as a moderating variable in the BRICS nations. This study employs factors including the ratio of goods and services tax revenue, per capita income, agriculture sector contribution, and economic growth percentage. The data source originates from World Bank Data for the years 2010 to 2018. The employed study strategy was quantitative, utilizing panel data and multiple linear regression analysis methodologies. The Random Effect Model is chosen based on panel model evaluation. All variables concurrently exert a substantial

influence on goods and services tax revenues. Partially, per capita income, the agriculture sector, and economic expansion exert a considerable negative impact on goods and services tax revenues. This research offered insights to the governments of BRICS nations for formulating policies aimed at optimizing goods and services tax revenues through per capita income, the agriculture sector, and economic growth.

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In an investigation did in Nigeria, on the infant mortality rate and economic growth in Nigeria: An empirical analysis by Solberg *et al.* (2023), the study showed that Infant mortality rate can be mitigated drastically when there is provision for adequate health care for all Infants regardless of the parent's socioeconomic status, particularly in Nigeria where only the rich access good health care. The Novelty of the research examined the response of economic growth to the shocks of infant mortality in the context of Nigeria. This study utilized secondary data obtained from the World Bank Development Indicator (WDI) spanning from 1970 to 2022. The unit root test was applied which indicates that all series or variables of interest are integrated into order 1. The multiple linear regression (MLR) model was employed, and the results showed that infant mortality has a negative significant influence on economic growth which implies that when there is improved economic growth in Nigeria, infant mortality will decline drastically. Similarly, the impulse response function plot reveals that the impulse response is below the zero-line threshold which indicates a negative impulse response, and this also suggests that the infant mortality rate in Nigeria will decline by an improved or better economic growth. Therefore, the government need to adopt realistic economic policies to improve the national revenue that will secure economic growth and encourage improved budget allocation to the health sector that will enable sustainable health care which gives room for equality in providing adequate health care for all infants in Nigeria which in turn will reduce the cases of infant mortality rate

Sandra *et.al* (2022) in her study, also examined the analysis of unemployment, capita income and HDI on Economic growth on Indonesia, 2017 – 2020. The study determined the effect of Unemployment, Per capita Income, and Human Development Index (IPM) on Economic Growth in Indonesia in 2017-2020. The analytical method used in this regression research is descriptive analysis and panel data analysis using EViews 10 software, with secondary data obtained from the Central Statistics Agency (BPS) with a cross section covering 34 provinces in Indonesia which produces 136 observations, while the time series data starting in 2017-2020. The results showed that the 3 variables tested, Unemployment had a positive and significant effect on economic growth with a probability of 0.0000 < = 0.01, income per capita had a positive and significant effect on economic growth with a probability of 0.0000 < = 0.01, while the index Human Development (IPM) has a negative and significant effect on economic growth with a probability of 0.0542 < = 0.10. The results of the study of the coefficient of determination (R2) also show good results, where 86% of the variation in the growth dependent variable can be explained by the independent variables of Unemployment, Per capita Income and Human Development Index (IPM). While the remaining 13.83% is explained by other variables that are not included in the model.
In another examination on the role of fertility and population growth: empirical research from aggregate cross-national data 1960 to 1985. Two recently improved sets of cross-country panel data are combined to re-examine the effects of population growth and fertility on economic growth. Using a 107 country panel data set covering 1960-1985, result showed that high birth rates appear to reduce economic growth through investment effects and possibly through “capital dilution”, although classic resource dilution is not evident in the data. Most

significantly, however, birth rate declines have a strong medium-term positive impact on per capita income growth through labour supply or "dependency" effects (James et al., 1994).

Amira (2020) carried out an investigation directed on the impact of maternal mortality rate on economic growth 1981 to 2017. The continuing high rate of maternal mortality rates in Nigeria remains worrisome and has fail to show an outraged decline over the past few years after the enactment of the millennium goals and other measures to combat the demographic epidemic which is believed to have a negative impact on economic growth. The scale of maternity mortality rate in Nigeria has become so alarming that in every 1000 childbirth, five Nigerian women die during delivery between age 15 – 49. A statement was made that Nigeria is the most dangerous place in the world to give birth and with the worst maternal mortality rate after Sierra Leone, Central African Republic and Chad women who do not have access to health care are prone to unassisted delivery. The study has contributed to the body of knowledge and provided facts that there exists some degree of interdependence between MMR and economic growth (GDPGR) in Nigeria. Empirically, while the independent variables exert a significant statistical impact on GDPGR, some exert a positive and negative effect on economic growth in Nigeria. Thus, this study concludes that MMR has a significant and negative impact on the economic growth of Nigeria.

Another investigation was carried out about the statistical analysis on the impact of birth and death rate on Nigerian Economy from 2000 – 2015. The study examines the relationship of Birth rate and Death rate on Nigeria's Economy. The objectives of the study are to know if there is a relationship between birth rate and the Economy of Nigeria, to know if there is a relationship between death rate and the Economy of Nigeria, to predict the economy of Nigeria using the birth and death rate, to know the nature of the relationship that exists between amongst birth rate, death rate and the economy of Nigeria. In this study, descriptive and survey method were employed to selected patients in Braithwaite Memorial Hospital (BMH) Port Harcourt, Rivers State. The data are secondary data from Central Bank Statistical Bulletin 2000-2015. The study is to focus on birth and death rate on Nigeria Economy from 2000-2015 (16 Years). SPSS Statistical Software was used analyse the regression and correlation of the data set to test the hypothesis. Findings from this study reviews that there is a significant relationship between birth rate and the Nigerian economy, there is a significant relationship between death rate and the Nigerian economy, and also there is a significant relationship between birth rate, birth rate and the Nigerian economy. Base on this findings it is therefore recommended that there should be adequate and proper documentation of birth and death to enable Nigeria plan it economy growth, the government should establish more birth and death registration centres in both rural and urban areas to enable the country gather records which will be use to predict country's economy, there should be policies regulating births in the country to avoid optimum population that will reduce the Nigeria's economic growth by the Government (Kamalan, 2017).

An examination on the impact of infant mortality on economic growth in Nigeria between 1982 and 2018. The unit root test conducted revealed mix level of stationarity of the variables included in the analysis, this necessitated adoption of ARDL cointegrated technique. This study found that infant mortality has significant negative short run and long run impact on economic growth in Nigeria. The study recommended among other that for effective and sustainable economy growth in Nigeria, adequate investment in health sector through government and private partnership must be encouraged as matter of urgency in quest of attaining the targeted Sustainability Development Goals in Health sector of reducing infant mortality to reasonable ratio in Nigeria (Hamzat et al., 2021).

Faheem and Rakia (2022) investigated the association of educational expenditure and income inequality with economic growth in Pakistan, by using the annual time series data from 1980

to 2019. The ARDL bound testing co-integration approach confirms that there is long run relationship between the variables. The study includes economic growth as dependent variable whereas, education and income inequality as repressors. The results indicate that education is positively and significantly correlated with economic growth. While income inequality is negatively and significantly correlated with economic growth in long run and short run.

Finally, an evaluation on the impact of unemployment on economic growth in Pakistan: An empirical investigation. This study has attempted to scrutinize the impact of unemployment on the growth rate during the period 1974 to 2020 in Pakistan. This study has employed the Autoregressive Distributed Lag (ARDL) technique for empirical investigation. GDP growth rate is a dependent variable, employed as a proxy for economic growth. In the study, explanatory variables are unemployment, population growth rate, rate of inflation, foreign direct investment and government expenditure. The empirical findings from the study show that unemployment and inflation rates both show a negative relationship with economic growth and are significant statistically. The population growth rate has a positive and statistically significant impact on economic growth. Short run cointegration exists between the variables. It is suggested from the results that government should adopt adequate measures to generate employment opportunities to accelerate economic growth and reduce unemployment in the country (Salyha *et al* 2022).

Methodology

Research Design

The research design adopted in this study was the Ex post facto which is a quasi-experimental design as a pre-existing group is compared on a dependent variable and the variable data are past events. This research relied on past quantitative information that were accessible in secondary form. The research was based on annual statistical information from 1992 to 2022. Secondary data were generated from the World Bank and other relevant agencies. In which there were five variables Gross domestic product (GDP), Per capita income (PCI), Unemployment (UMEMP), Birth rate (BR) and Death rate (DR) of five North American countries.

Model Specification

This research was conducted to determine the relationship between dependent and independent variables, to support the research results, the research data were analysed using multiple linear research. In this study the data to be used was panel data where the mixture of time series and cross section was used. In general, the model of the panel data regression equation was as follow:

$Y_{it} = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \ldots + \beta_n X_{nit} + u_i + \epsilon_{it}$

$GDP_{it} = \beta_0 + \beta_1 BR_{it} + \beta_2 DR_{it} + . \beta_3 PCI_{it} + \beta_4 UNEMP_{it} + u_i + \epsilon_{it}$

Where:

Y_{it} = Dependent Variable representing GDP

X_{it} = Independent Variable representing BR, DR, PCI and UNEMP.

β_0 = Intercept or Constant

u_i = is the country-specific fixed or random effect

ϵ_{it} = is the error term

Given as:

Method of Data Analysis

Panel unit root was used to test for the stationarity of the series, panel cointegration was used to access the short-term and long-term equilibrium relationship between variables in a panel data setting. The study also adopted the autoregressive distributed lag (ARDL) to analyse the relationship between the dependent and independent variables, panel unit root to test for stationarity using the three methods: Levin, Lin, and Chu t-statistics; ADF Fisher Chi-Square; and PP Fisher Chi-Square. Descriptive statistics was as well used to give description of details of each variable.

Results and Discussion

Descriptive Statistics

The descriptive statistics for the variables are presented in Table 1

Table 1 Summary of descriptive statistics for the variables

Statistics	GDP	BR	DR	PCI	UNEMP
Mean	3295.436	17.48240	6.595130	19233.12	0.061602
Median	693.1600	17.67000	7.000000	6701.500	0.060400
Maximum	25462.70	27.96300	10.30000	76399.00	0.141100
Minimum	3.540000	9.400000	4.690000	360.0700	0.026000
Std. Dev.	5964.656	5.010342	1.394675	20343.13	0.019396
Skewness	1.997981	0.123589	0.097499	0.859752	0.695304
Kurtosis	5.817739	1.816028	1.824651	2.401328	4.146018
Jarque-Bera	153.4056	9.386854	9.108269	21.27192	20.83589
Probability	0.000000	0.009155	0.010524	0.000024	0.000030
Sum	507497.1	2692.290	1015.650	2961901.	9.486700
Sum Sq. Dev.	5.44E+09	3840.840	297.6030	6.33E+10	0.057559
Observations	154	154	154	154	154

Source: Author's Computation from EViews 10

The descriptive statistics of the variables data utilized throughout the investigation were shown in Table 1, paying attention to the mean, median, maximum, minimum, standard deviation, skewness, kurtosis, and probability of each variable. The mean value for GDP was around 3295.436, 17.48240 for birth rate (BR), 6.595130 for death rate (DR), 19233.12 for per capita income (PCI) and 0.061602 for unemployment (UNEMP) according to the findings. The standard deviation of the variables was a measure of the series' dispersion. GDP had the highest standard deviation of 5964.656, whereas unemployment had the lowest standard deviation of 0.019396. GDP and unemployment had the highest kurtosis of 5.817739 and 4.146018, indicating that these distributions were peaked because their values exceed the normal distribution of three, whereas the distributions of the other variables (birth rate, death rate and per capita income) were flat relative to normal because they were less than three. All the selected variables were all positively skewed indicating that the distributions have a long right tail. The standard deviation of all the variables were all lower than their means implying that these variables recorded a slow growth within the period under review.

Unit Root

In economic research, the majority of macroeconomic time series data are non-stationary, and utilizing these non-stationary variables in empirical analyses may yield spurious outcomes and, consequently, erroneous policy recommendations (Granger & Newbold, 1977). In examining the correlation between HDI and economic performance in selected North America countries, panel unit root tests ascertain the stationarity of variables and identify whether long-term trends or short-term fluctuations prevail, which is crucial given that HDI components may vary across countries and over time. The pre-diagnostic tests evaluated the null hypothesis of a unit root. The null hypothesis of a unit root is rejected in favour of the stationary alternative when the p-value is below 5%. Disavowing the null hypothesis indicates that the series lacks a unit root. Stationarity denotes unchanging moments and joint moments, ensuring that the statistical features of a variable remain consistent over time. Stationarity is an essential prerequisite in panel data analysis to guarantee significant regression modelling and accurate interpretations.

Table 2 summarized the results of the panel unit root test.

Variables	Level			1st Difference		
	Levin, Lin & Chu t	ADF - Fisher Chi-square	PP - Fisher Chi-square	Levin, Lin & Chu t	ADF - Fisher Chi-square	PP - Fisher Chi-square
GDP	2.81551 (0.9976)	1.26375 (0.9995)	5.25944 (0.8732)	-5.73867 (0.0000)	56.9016 (0.0000)	91.7901 (0.0000)
BR	-2.45341 (0.0071)	27.7770 (0.0020)	19.3076 (0.0365)			
DR	-5.86371 (0.0000)	25.6533 (0.0042)	4.32447 (0.9315)			
PCI	1.45293 (0.9269)	3.46222 (0.9684)	10.4537 (0.4016)	-5.54170 (0.0000)	52.6501 (0.0000)	80.8113 (0.0000)
UNEMP	-2.11074 (0.0174)	22.8983 (0.0111)	16.9405 (0.0757)			

Source: Author's Computation from E-views 10

Note: Probability Values (PV) are in brackets

The panel unit root test findings evaluate the stationarity of essential variables: GDP, Death Rate (DR), Birth Rate (BR), per capita income (PCI), and unemployment (UNEMP) employing three methodologies: Levin, Lin, and Chu t-statistics; ADF Fisher Chi-Square; and PP Fisher Chi-Square, as presented in Table 2. The tests often indicate that the majority of variables were stationary at levels. The tests for birth rate (BR), death rate (DR), and unemployment (UNEMP) substantially reject the null hypothesis of a unit root, signifying that these variables are stationary without the need for differencing. Likewise, GDP and per capita income (PCI) seem to be stationary at the first difference, with a consistent rejection of the unit root hypothesis in all tests. This strengthens the reliability of the variables for econometric modelling. The results affirm that the examined variables were appropriate for advanced panel data analysis, whether at their original levels or initial differences. These results establish a robust basis for subsequent econometric examinations, including cointegration analysis, to investigate more intricate linkages.

Table 3: Order of Integration

GDP	1.26375	0.9995	56.9016	0.0000***	1(1)
BR	27.7770	0.0020***			1(0)
DR	25.6533	0.0042***			1(0)
PCI	3.46222	0.9684	52.6501	0.0000***	1(1)
UNEMP	22.8983	0.0111**			1(0)

Source: Author's Computation from E-views 10
*** Significant at the 1% level, ** Significant at the 5% level

Result in Table 3 shows that three variables (birth rate, death rate and unemployment) were stationary at levels whereas the other two (GDP and per capita income) were stationary at first difference. This implies that all the variables which were used in the study were found to be stationary at level and first difference according to their ρ- values.

Cointegration Test

In the context of studying the influence of Human Development Indices (HDIs) on the economy of North American countries, panel cointegration methods help to determine whether there is a stable, long-run relationship between HDI components such as birth rate, death rate, per capita income and unemployment and economic performance indicators like GDP.

Table 4: Summary of Panel Cointegration Test on all models

Statistic	No constant, No Trend (NCNT)	Probability
Panel v-Statistic	-0.511446	0.6955

Panel rho-Statistic	1.044307	0.8518
Panel PP-Statistic	-1.276496	0.1009
Panel ADF-Statistic	-0.550509	0.2910
Panel v-Statistic - weighted statistic	-3.060816	0.9989
Panel rho-Statistic - weighted statistic	1.742948	0.9593
Panel PP-Statistic - weighted statistic	1.978619	0.9761
Panel ADF-Statistic - weighted statistic	1.131930	0.8712
Group rho-Statistic	2.237231	0.9874
Group PP-Statistic	0.868724	0.8075
Group ADF-Statistic	0.694048	0.7562
Remark	Nil	Nil
Conclusion	Accepted	Accepted

The results in Table 3 indicate that there is no long-term association among the analysed variables, as all p-values were above the 5% significance threshold. Therefore, the analysis concludes that no long-term association exists among the factors

Long and Short Run Model

The result of the ARDL model examines the relationship between GDP and key variables, including birth rate (BR), death rate (DR), per capita income (PCI) and unemployment (UNEMP). It provides insights into how these variables affect GDP over both the long and short term.

Table 5: Pooled Mean Group (PMG) Panel Autoregressive Distributed Lagged (ARDL) Model

Variables	Coefficient	Std. Error	T-stat	Prob.
		Long Run Equation		
BR	-0.231241	0.023542	-9.822512	0.0000***
DR	1.961192	0.130136	15.07031	0.0000***
PCI	-1.40E-05	1.26E-05	-1.112146	0.2709
UNEMP	-14.70900	1.580834	-9.304582	0.0000***
		Short Run Equation		
COINTEQ01	-0.105041	0.099988	-1.050539	0.2981
D(LGDP (-1))	-0.050224	0.133898	-0.375091	0.7090
D(LGDP (-2))	-0.182334	0.055595	-3.279666	0.0018
D(BR)	-0.053577	0.037053	-1.445951	0.1539
D(BR (-1))	0.131238	0.081152	1.617190	0.1116
D(BR(-2))	0.040947	0.148090	0.276500	0.7832
D(BR (-3))	0.009268	0.107524	0.086191	0.9316
D(DR)	-0.379897	0.291914	-1.301400	0.1985
D(DR (-1))	-0.357724	0.092604	-3.862938	0.0003***
D(DR (-2))	0.068369	0.130976	0.521991	0.6038
D(DR (-3))	0.030151	0.130260	0.231470	0.8178
D(PCI)	0.000250	0.000166	1.499333	0.1395
D(PCI (-1))	4.44E-05	2.28E-05	1.945972	0.0568
D(PCI (-2))	4.99E-05	4.50E-05	1.109336	0.2721
D (PCI (-3))	-7.11E-06	4.95E-06	-1.437137	0.1563
D(UNEMP)	0.997681	1.923772	0.518606	0.6061

D (UNEMP (-1))	2.210887	1.812327	1.219916	0.2277
D(UNEMP (-2))	0.857381	1.057072	0.811091	0.4208
D(UNEMP(-3))	1.564442	1.601854	0.976645	0.3330
Mean dependent Var	0.050106		S.D. dependent var	0.073224
S.E. of regression	0.018251		Akaike info criterion	-5.304975
Sum squared resid	0.018321		Schwarz criterion	-3.352649
Log likelihood	507.4831		Hannan-Quinn criter.	-4.511945

Source: Author's Computation from E-views 10, 2024
*** Significant at the 1% level, ** Significant at the 5% level

The birth rate coefficient (BR) was -0.231241, indicating a negative value that was statistically significant at the 1% level. A one-unit rise in the birth rate will lead to a 23.1% fall in GDP. Consequently, the decline in birth rate adversely impacted the economic growth of North American nations. Notably, our discovery aligns with our initial expectations for the study. The discovery of a negative and substantial influence of birth rate in our regression results aligns with the findings of research by Okwori, *et al*. (2015) and Guga *et al*. (2015), which indicate a detrimental impact of population increase on economic growth. Nevertheless, our results contradict those of Tartiyus, *et al.* (2015) who argue population growth to have a favourable and significant effect on economic growth.

Conversely, the death rate exhibits a significant positive relationship with GDP, with a 1-unit increase in death rate associated with a 1.961192 increase in GDP. This result may reflect the role of death rate as a proxy for economic factors, such as changes in dependency ratios or shifts in workforce dynamics.

Similarly, unemployment (UNEMP) variable was negatively (-14.70900) correlated with GDP and statistically significant at 1%. This result makes sense as higher unemployment is usually correlated with a loss of income and job security, which would negatively impact GDP.
In the near term, only the death rate (DR) significantly influenced GDP, as evidenced by the p-values for its coefficient. The mortality rate was determined to significantly jeopardize the economic progress of North American nations. The findings indicate that a 1% rise in recorded mortality cases will immediately result in a substantial decrease in GDP by approximately 3.57% in the short term. This outcome suggests that a high mortality rate in a nation may diminish its workforce, thereby impairing its capacity to effectively engage in productive activities, which subsequently affects the country's economic progress.

The error correction term, indicating the rate of return to equilibrium following a disturbance, was negative (-0.105041) as anticipated, although it lacked statistical significance. This indicates that divergences from the long-run equilibrium may not rectify swiftly or reliably, implying feeble adjustment mechanisms in the short term.

The lack of significance in the short-run dynamics suggests that immediate changes in birth rate, death rate, per capita income and unemployment are not strong drivers of GDP. This could reflect the time it takes for demographic changes to influence economic activities or structural rigidities in the economy that delay the translation of these changes into GDP outcomes.

Hypothesis Testing
Birth Rate (BR)

The birth rate (BR) variable coefficient was -0.231241, with a t-statistic of -9.822512 and a probability value of 0.0000, which is below the 5% threshold (0.05). The null hypothesis was rejected, while the alternative hypothesis was accepted. The results indicate that the birth rate significantly influences the economic growth of North America. The rise in birth rate will adversely affect economic growth.

Death Rate (DR)

The death rate variable coefficient was 1.961192, with a t-statistic of 15.07031 and a probability value of 0.0000, indicating significance below the 5% level. This suggests that the null hypothesis was rejected, and the alternative hypothesis was accepted. This implies that death rate has substantial effect on economic growth of North America. It can be concluded that the increased death rate will have negative effect on economic growth.

Per Capita Income (PCI)

PCI on the other hand, had a coefficient of -1.40E-05 and a t-statistic value of -1.112146 with a probability value of 0.2709 which was greater than alpha (0.05). It signifies that null hypothesis was accepted. So, here we can say that increasing PCI will have negative influence on economic development but not a substantial one as it was not significant

Unemployment (UNEMP)

The unemployment coefficient was -14.70900, with a t-statistic of -9.304582 and a probability value of 0.0000, which is below the 5% significance level. This indicates that the null hypothesis was dismissed, and the alternative hypothesis was embraced. The results indicate that unemployment significantly impacts the economic growth of North America.

Conclusion

The findings of this research are significant for human development and economic prosperity. If human development index factors positively influence economic growth, the government will prioritize enhancing these indices to stimulate economic growth, ultimately leading to further development of the populace. The analytical results indicate that the birth rate and unemployment rate adversely affected GDP, but the death rate positively influenced economic growth at a 1% significance level. This indicates that a rise in birth rate and unemployment will result in a decline in GDP in North America.

Recommendations

Based on the findings from this study the following recommendations were made:

1. Death rate decreases GDP, as such the government should focus on providing good health facilities that will help improve the lives of its citizens.
2. Birth rate was negatively significant from the study thereby having the tendency of decreasing the economy.
3. The government should ensure regulation of birth rate in the countries. Policy makers should aim to reduce unemployment in order to increase the GDP.

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