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Do Country Indicators Matter to Economic Growth? A Multi-Country Panel Data Analysis

Dr. Gerry Gatawa

Saint Louis University

gogatawa@slu.edu.ph

Abstract

Countries give attention to socio-political-economic indicators because these could enhance economic growth and bring favorable benefits to various sectors such as the citizens, government, and businesses. This study intends to analyze the effect of country indicators such as population, health, education, poverty incidence, labor force, environment, military, and geography on economic indicators such as GDP and GNI. The study used panel data analysis among 113 countries from 2014-2018. Among the country indicators, the study found that military spending per personnel is a significant factor that can positively influence economic growth. The ability of countries to maintain peace and order encourages citizens to pursue productive activities that can sustain economic growth. The countries' spending on the military would allow businesses to flourish, the citizens to be productive, and the government to pursue their developmental aspirations.

Keywords: *Country indicators, economic growth, socio-political-economic indicators, military spending, panel data analysis*

Introduction

The people in a country can contribute to economic growth and development if they receive benefits that can motivate them. It is a challenge for every country to give attention to necessary country indicators to improve the social conditions of the people and enable them to participate in and contribute to economic development (Méndez-Picazo et al., 2021). These country indicators are those variables that affect people's living standards. Most countries' constitutions mandate budgetary allocations for these indicators, such as establishing institutions focusing on population, health, education, labor, development, environment, national security, and other social issues. These are important aspects of public finance decisions to guarantee good conditions for the citizens and for them to become effective human capital in the country, embodying beneficial physical capacities and human values. If the government fails to invest in these, the actual cost is the forgone opportunity for the citizens to improve their living standards and conditions. Worst, this can lead to economic demise and social turmoil leading to chaos, rebellion, and negative cultures such as gambling, drugs, drinking, and lack of skills due to poor training and education.

Across countries, there are differences in terms of developments related to country indicators that also translate into differences in economic growth. Governments would invest in improving the citizens' living conditions and facilitating economic and enterprising activities, which would help distribute income (Méndez-Picazo et al., 2021). When country indicators are supported and funded, the citizens can achieve self-sufficiency and personal development, such as confidence and dignity. Improving these indicators would shape the citizens' choices regarding employment, housing, education, health, and personal development. For example, employment opportunities are determined by the health and educational status of the people. If

people are healthy, they could be more productive, and if they are educated, they can have more employment choices and opportunities that would allow them to earn income. A reduction in unemployment can stimulate the market, bringing a greater quantity of demand and supply of goods (Méndez-Picazo et al., 2021). More so, if the citizens are secure and healthy, they could actively participate in providing goods and services in the country and so forth. These could increase the production of activities and open opportunities for entrepreneurship and market niches (Méndez-Picazo et al., 2021). Lastly, the citizens can contribute to national taxes, giving the government more opportunities to enhance their social and developmental projects.

However, there are also country indicators that could negatively affect economic growth. This would include poverty, hunger, crime, and environmental degradation. Popa (2012) found that poverty and unemployment rates have a negative relationship with economic growth based on her study in Romania and among European Union countries. Crime rates also reduce the quality of economic growth in which industrial activities, labor productivity (Motta, 2017), and general citizens' security. Environmental degradation indicates the irresponsible attainment of economic objectives. Consequently, it affects future resources that could negatively impact overall economic growth, requiring new production process methods, industrialization, and urbanization (Wang et al., 2020). If people cannot live in a decent place and social issues exist, it can deter their contribution to economic growth.

The country indicators are seen to be important, and yet there needs to be more literature giving attention to their economic contribution. Literature gaps exist even though these indicators require costly investments in the context of public finance. Theoretical assumptions were made on the relationship between country indicators and economic development; however, there was limited empirical evidence on the direct effect of these indicators on economic growth.

Moreover, there has been a huge gap in terms of panel data analysis, and also there have been significant changes in terms of the variable of social factors and economic indicators. Hence, it is necessary to bring updates to cater to this research gap. Popa (2012) mentioned that it is necessary to consider country indicators and their economic benefits. Yozgat (2014) also suggested that social, economic, and environmental factors should be measured and given attention in research because these bring impact globalization and sustainable development. Meanwhile, the study of Méndez-Picazo, et al. (2021) also admits that there is a need to introduce more variables to capture the relevance of factors to sustainable economic growth. In line with these literature gaps, this study explores whether country indicators contribute to their economic growth.

Review of Related Literature

The country indicators considered in this study are population, health, poverty incidence, labor force, environment, military, and geography, while the economic growth indicators would be the GDP and GNI.

Country indicators and economic growth

Sustainable development can be achieved if the country's resources or capital are well preserved for future benefit while attaining economic stability (Méndez-Picazo et al., 2021). Therefore, policies must be created to prevent the deleterious impact of economic growth (Bilal et al., 2017) while supporting various aspects that assure transparency and efficiency (Kalemi & Prodani, 2015).

Population

The population is every country's human capital, formulating social aspects such as norms, beliefs, culture, and politics. Every country aspires to provide social benefits to the

populace and encourage them to contribute to their economic growth. The population has served as a measure of economic development wherein the population served as the denominator in several aspects to determine the per capita measures such as education, health, wealth, etc. Literature has been adamant that population can impact economic growth, poverty, education, health, food issues, environment, and migration. While it is true that population can increase several risks (e.g., environmental pollution, poverty risk, unemployment rate, etc.), they can also serve as human capital that can improve the country's labor supply, savings, and encourage investments (Beck & Joshi, 2015; Popa, 2012). The high population can lead to high economic potential (Karaalp-Orhan, 2020). Human capital is crucial for sustainable economic growth; therefore, countries would have to invest and adopt long-term approaches to improve the social and living standards of the people (Beck& Joshi, 2015; Popa, 2012).

Health

Recent health pandemics (e.g., COVID-19) have shown the importance of healthcare spending. Health generally affects the public and can harm the population, consequently affecting economic growth. Moreover, health matters represent the socioeconomic status of the people in the country in terms of well-being, nutrition, education, physical activities (Niedworok et al., 2015), and unemployment (Bilal et al., 2017). Health inequality can arise if individuals do not have fair access to better healthcare. For instance, only those with higher socioeconomic status can afford better healthcare alternatives, while vice versa for those with lower status. Hence, to reduce health inequality, countries must spend on people's healthcare to restore their health and eventually contribute to economic growth (Grochowska-Niedworok et al., 2015). Indeed, the study of Karaalp-Orhan (2020) shows a bilateral causal relationship between health

and economic growth wherein countries with weak and health education conditions could hardly sustain growth and development.

Poverty Incidence

Poverty incidence refers to a lack of development in terms of the social and well-being of the people due to their incapacity to access opportunities and resources. The study of Karaalp-Orhan (2020) in Turkey reveals that development could hardly be attained, especially in regions and provinces, due to unequal access to social and economic resources. Accordingly, structural problems exist because there have been differences in proximity to the market and raw materials, transportation, availability of energy and mineral resources, economic incentives, technology, etc. Hence, it is necessary to close these gaps by improving the resource access of the people through sound strategies and financial and fiscal plans (Karaalp-Orhan, 2020; Kirillov et al., 2019). In general, the World Bank measures development using indicators such as rate of poverty, peace, freedom, life expectancy at birth, adult literacy, access to health care services, access to electricity, access to safe water, access to sanitation, infant mortality rate, maternal mortality rate, and prevalence of malnutrition (Tchouassi, 2012). This study would use access to water (Yozgat, 2014) and electricity as proxy variables.

Labor Force

The availability of a labor force is essential to economic growth. Labor is a key economic production input for converting economic resources into final goods. Thus, if the country exerts its effort to create employment through public debt and by inviting foreign direct investments, the labor force is an important resource that can contribute to maintaining foreign direct investments and overall economic growth (Ruspi et al., 2014). In addition, the effort of the government to spend on health and education allows them to create an active labor force. As

human capital theorists emphasize, more excellent labor force participation results from investments in education and health (Yozgat, 2016). The availability of labor force entices business firms (local and foreign) to establish their businesses in places with abundant and qualified labor force. Hence it will result in development (Karaalp-Orhan, 2020). Moreover, the accumulation of human capital can help the country to create innovation, enhance productivity, eradicate poverty, sustain growth, offer career opportunities, and improve the social status of the people (Dudzevičiūtė & Šimelytė, 2018; Yozgat, 2016).

Environment

The environment is an important country resource that needs to be preserved to benefit future generations. The environment is a social and economic concern (Wang et al., 2020) because it portrays how people act as stewards of natural resources versus their economic aspirations. It is a social concern because it portrays poverty (Dike, 2015), congestion (Horan et al., 2014), and lack of education of the people wherein they do not find environmentally friendly alternatives to meet their needs, thus, compromising their well-being of future generations (Méndez-Picazo et al., 2020). The country's focus on economic growth can create an environmental trade-off since it can lead to market failures and non-sustainable use of environmental resources (Beck & Joshi, 2015). Previous researches emphasize carbon (CO2) and greenhouse gas (GHG) emissions brought by the economic aggressiveness of each country that could devastatingly damage the earth's atmosphere, thus resulting in climate change (Wang et al., 2020; Beck & Joshi, 2015; Dike, 2015; Tchouassi, 2012). The inability of countries to adopt a plan to mitigate environmental concerns can create an economic trade-off because the country's future is compromised, and the depletion of environmental resources can be irreversible (Luna-Galván et al., 2017). Sustainable development should be seen in a manner where every country

must consider: (a) economic efficiency, wherein social and environmental costs are accounted for; (b) environmental care, wherein renewable resources should be used to replace unsustainable methods; and (c) social fairness wherein reducing inequality should be regarded (Shakir Hanna et al., 2014).

Military

In general, military spending can be justified if it intends to preserve peace, security, and the people's lives. These are necessary to allow people to achieve social and economic development freely. If the people are secured, economic activities will stay stable, strengthening the country's capacity to provide basic services, maintain public order, and protect national borders. Additionally, it results in huge losses to the country due to high crimes, degradation of the environment, loss of lives of military and rebels' lives, and community unrest (Bitwakamba et al., 2018). Military spending is huge spending in public finance, but it may be necessary to prevent armed conflicts (Kurmaiev et al., 2020), internal and external political turmoil, civil wars and terrorist attacks (Karaalp-Orhan, 2020), and corruption (Dike, 2015).

Geography

The country's territory is the citizen's homeland, where they can nurture their social and economic activities. The country's geographic characteristics, such as climactic conditions, landforms, topography, vegetation, and soil, are important determinants of arable lands that can be utilized for the people's livelihood (Karaalp-Orhan, 2020). Arable lands are important in the agricultural sector, which contributes to the country's economic growth (Ciglovska, 2018). The agricultural sector complements the industrial sector in ensuring economic growth (Nwankpa, 2017) and overcoming poverty and hunger in the country.

Indicators of Economic Growth

Economic growth can be measured through proxy indicators such as gross domestic product (GDP) and gross national income (GNI). These are generally utilized are economic indicators that represent whether a country is developing and whether the citizens, as indicated by per capita, are improving in terms of well-being and quality of life (Karaalp-Orhan, 2020).

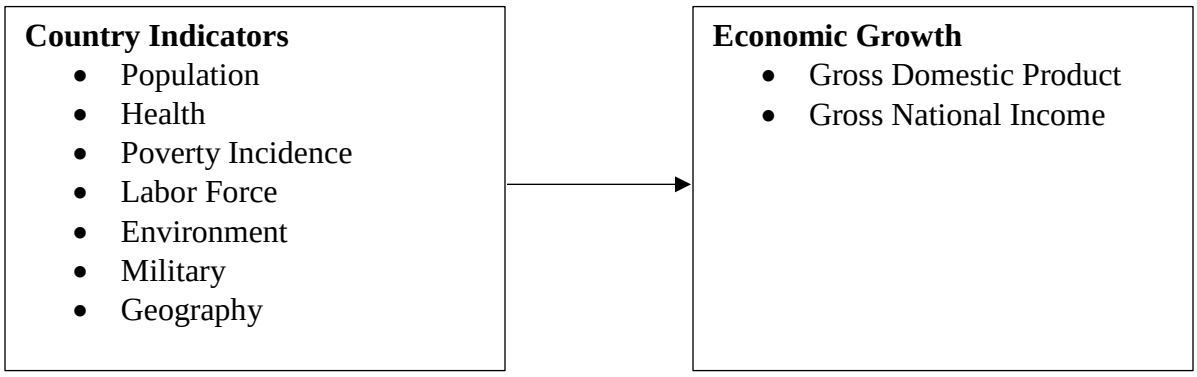
Gross Domestic Product

This measures the total value for the final use of output produced by an economy by both residents and non-residents. GDP has been used in several works of literature as an indicator of economic growth as it reflects the monetary value of goods and services generated by all residents within the country plus any product taxes and minus any subsidies not included in the value (Karaalp-Orhan, 2020; Kurmaiev, 2020; Wang et al., 2020; Dudzevičiūtė & Šimelytė, 2018; Peterson, 2017; Yozgat, 2016: 2014; Kalemi & Prodani, 2015; Ngongang, 2015). GDP is generally expressed in U. S. dollars, wherein the domestic currencies are converted using single-year official exchange rates. The GDP can be utilized per total (national), per capita, and growth. This study intends to determine whether social factors affect economic growth based on GDP.

Gross National Income

The GNI (i.e., GNP) has still been a dominant performance indicator of a country (Simonis, 2011). This comprises GDP plus the difference between the income residents receive from abroad for factor services (labor and capital) and deduct payments made to non-residents who contribute to the domestic economy. The GNI is calculated in domestic currency and converted to U. S. dollars at official exchange rates for comparisons across economies. To smooth price fluctuations and exchange rates, the World Bank uses a particular Atlas conversion method (Macrotrends LLC, 2010-2021).

Framework



Methodology

The study used a quantitative approach using panel data analysis from 2014-2018 to determine whether social indicators can influence economic growth. The study analyzed 113 countries (refer to Appendix A) with complete data sets for country indicators and economic indicators. The recent years of 2019 and 2020 were not considered since most countries still need to complete data sets during these years. The study derived data from public information from the websites:

(1)https://databank.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG/1ff4a498/Popular-Indicators#;

(2)https://www.macrotrends.net/countries/ranking/gdp-gross-domestic-product;

(3)https://datatopics.worldbank.org/world-development-indicators/themes/people.html.

The secondary data were obtained from July to August 2021. The main criterion for selecting the data was the availability of data to obtain balanced panel data sets. Countries with incomplete data for both social and economic indicators were excluded.

Initially, the data were subjected to normality tests and multicollinearity tests. To check the normality of the data, the Shapiro-Wilk Test was conducted, and it found that the significance value was lower than 0.05, which means that the data significantly deviates from a

normal distribution. To check for multicollinearity, the variance inflation factor (VIF) was used, and it was found that the data has no multicollinearity issues (< 5 VIF). To minimize the effect of the non-normality of the data, the study used a natural logarithm (base *e*) on variables expressed in dollar amounts, quantity, and size to maintain a common base for the variables. Natural logs were used because coefficients in the natural log scale are directly interpretable as approximate in proportional differences (Gelman & Hill, 2007). The challenge in conducting panel data analysis is selecting the appropriate model by conducting rigorous tests to get unbiased results and generate worthwhile information. Mainly, panel data analysis can be done through static or dynamic panel data analysis.

There are three (3) presumed models in static panel data analysis such as: (1) pooled ordinary least squares (OLS); (2) fixed effect; and (3) random effects. Using the identified social indicators, the static models can be exemplified as:

Pooled OLS:

$$Y^{g} = \alpha + \beta_1 \text{lnPop}_1 + \beta_2 \text{Health}_2 + \beta_3 \text{Pov}_3 + \beta_4 \text{lnLabor}_4 + \beta_5 \text{lnEnv}_5 + \beta_6 \text{lnMil}_6 + \beta_6 \text{lnArabl}_7 + \varepsilon$$

Fixed Effect:

$$Y_{it}^{g} = \alpha_{it} + \beta_1 \text{lnPop}_{1it} + \beta_2 \text{Health}_{2it} + \beta_3 \text{Pov}_{3it} + \beta_4 \text{lnLabor}_{4it} + \beta_5 \text{lnEnv}_{5it} + \beta_6 \text{lnMil}_{7it} + \beta_7 \text{lnArabl}_{7it} + \varepsilon_{it}$$

Random Effect:

$$Y_{it}^{g} = \alpha_{it} + \mu_{it} + \beta_1 \text{lnPop}_{1it} + \beta_2 \text{Health}_{2it} + \beta_3 \text{Pov}_{3it} + \beta_4 \text{lnLabor}_{4it} + \beta_5 \text{lnEnv}_{5it} + \beta_6 \text{lnMil}_{6it} + \beta_7 \text{lnArabl}_{7it} + \varepsilon_{it}$$

Where the country is denoted by ***i***, the year is **t**, and the measures of economic growth are Y^{g} with g = GDP and GNI. The independent variables are the natural logarithm of the population (loop), healthcare spending per capita (Health), poverty incidence using the proxy

variable hunger rate (Pov), labor participation rate (Labor), environment using the natural logarithm of the average of carbon dioxide emission (CO2) and greenhouse gas (GHG) emission (lnEnv), the natural logarithm of military spending per active personnel wherein it is calculated as military spending divided by military size (lnMil) and the natural logarithm of arable land (lnArabl). The common intercept is $\boldsymbol{\alpha}$, the variation across countries is $\boldsymbol{\mu}$, and the coefficient of each independent variable is $\boldsymbol{\beta}$.

Further tests were conducted to determine the appropriate panel data model using Gretl statistical package since it is convenient and free. To choose pooled OLS and random effect, the Breusch-Pagan test was conducted. The null hypothesis states that the unit-specific error variance = 0. The result of the asymptomatic test statistic (prob-chi-square[1] >1059.74, p-value = 1.85933e-232) provides a low p-value which counts against the null hypothesis that the pooled OLS is adequate, in favor of the random effects alternative. This means that the random effect is more appropriate than the pooled OLS because there is a significant difference in the variance across the countries in explaining the dependent variables. To compare random effects and fixed effects, the Hausman Test was conducted. The null hypothesis states that: the generalized least square (GLS) estimates are consistent. The result of the asymptomatic test statistic (H = 30.1485 with p-value prob-chi-square [7] > 30.1485 = 8.91835e-005) indicates the rejection of the null hypothesis. A low p-value indicates that the GLS estimates are consistent, so the fixed effect is more favorable than the random effects model.

The fixed-effect models (as shown in Appendix B) suggest economic growth as measured in terms of GDP can be significantly influenced population (β=0.45, p<5%), healthcare spending per capita (β=0.0002, p<1%), poverty incidence as indicated by hunger rate (β=-1.40, p<5%), environment (β=0.42, p<1%), and military spending per personnel (β=0.20, p<1%). In

terms of GNI, it can be significantly influenced by healthcare spending per capita (β=0.000096, p<5%), poverty incidence (β=-2.06, p<5%), environment (β=0.47, p<5%), military (β=0.16, p<5%), and arable land (β=-0.12, p<5%). The joint tests for fixed effect also show that the social indicators are jointly significant in explaining the changes in GDP and GNI. Further tests, however, failed to validate the results. The tests for differing group intercepts (fixed effect) rejected the null hypothesis that the groups have common intercepts across the countries. The tests for heteroscedasticity using the distribution-free Wald test for the GDP model (chi-square[113]=259299, p-value=0) and for the GNI model (chi-square[113] = 15502.8, p-value=0) also indicated that there are heteroscedasticity problems. Moreover, the autocorrelation tests using the Wooldridge test have shown that there are autocorrelation issues for both the GDP model (p<5%) and the GNI model (p<5%).

Due to normality, autocorrelation, and heteroscedasticity issues, the dynamic panel regression panel was considered. Hence the model can be modified from its static form into a dynamic model:

$$Y_{it}^{g} = \alpha_{it} + \beta\, Y_{it-1}^{g} + \delta_1 \ln Pop_{1it} + \delta_2 Health_{2it} + \delta_3 Pov_{3it} + \delta_4 \ln Labor_{4it} + \delta_5 \ln Env_{5it} + \delta_6 \ln Mil_{6it} + \delta_7 \ln Arabl_{7it} + \mu_i + \varepsilon_{it}$$

Where $\boldsymbol{Y_{it}^{g}}$ refers to the current GDP and GNI of the countries at a point in time, $\boldsymbol{\alpha}$ is the intercept, $\boldsymbol{\beta}$ is the slope of coefficient (short-run effect of Y_{it-1}), $\boldsymbol{\delta}$ is the slope coefficient of the independent variables, $\boldsymbol{\mu}$ is the individual specific effects, and $\boldsymbol{\varepsilon}$ is the error term. Equation (4), however, results in biased estimators, as pointed out by Nickel (1981), because the fixed-effect estimators are inconsistent and would be correlated with the error term, which violates the strict assumption of homogeneity of fixed estimators. Hence, the endogeneity and inconsistent estimators must be resolved using instrumental variables. Therefore, Anderson and Hsiao (1981)

specified earlier lags as instrumental variables, such as the first or second difference of the dependent variable. Their suggestion could be viable, but Arellano and Bond (1991) later claimed it is asymptotically inefficient because it does not exploit available moment conditions.

The dynamic panel data (DPD) was expanded by Arellano and Bond (1991) into a Generalized Method of Moments (GMM) that attempts to capture all available information by using additional lags of the dependent variables as instrument variables. The GMM follows a two-step estimator where the first stage assumes that the error term is homoscedastic and independent. The second stage derives estimates from the residuals obtained from the first stages; thus, it ignores the suppositions of homoscedasticity and independence (Khadraoui & Smida, 2012). Later on, modifications in the Arellano-Bond DPD estimator were introduced in Arellano-Bover (1995) and Blundell and Bond (1998). The modification included lagged levels as well as lagged differences. The original estimator is called *difference GMM*, while the expanded estimator is called the *system GMM*. The difference is that GMM transforms the data by removing the fixed effects to resolve endogeneity, and also, the system GMM resolves endogeneity, heteroscedasticity, and autocorrelation. By adopting the GMM equations, I formulated the equations as follows:

First difference equation:

$$\Delta Y_{it}^{g} = \alpha \Delta Y_{it-1}^{g} + \beta_1 \Delta \ln Pop_{1it} + \beta_2 \Delta Health_{2it} + \beta_3 \Delta Pov_{3it} + \beta_4 \Delta \ln Labor_{4it} + \beta_5 \Delta \ln Env_{5it} + \beta_6 \Delta \ln Mil_{6it} + \beta_7 \Delta \ln Arabl_{7it} + \Delta \varepsilon_{it} + \gamma \Delta \varepsilon_{it-1} \quad (5)$$

The difference GMM suggests that the farthest lag of ε_{it} is $\varepsilon_{it-2;}$ however, if exclusion criteria could not be met, the system GMM could expand the equation to lags of three or higher. Mainly, the Sargan (1958) test will be used to determine whether the instruments used are not correlated with the residuals. Thus the additional moment conditions for the equation would be:

$E[\Delta Y_{it-1}^{g} \mu_{it}] = 0$ where $\mu_{it} = \eta i + v_{it}$

$E[\Delta Y_{it}^{g} \mu_{it}] = 0$

Another important diagnostic of the GMM estimation is the autocorrelation tests of the residuals. The assumption is that the residuals of the difference equation have serial correlation, but the differenced residuals should not present significant AR(2). If AR(2) is insignificant, then the first-difference regression means no second-order serial correlation validates the results.

Discussion of Results

The study aims to determine the effect of country indicators on economic growth. After validating the results, the study focused on using a dynamic regression rather than a static approach. Various tests to avoid biased results and to minimize errors. The validity of the regression models was tested in terms of heteroskedasticity, autocorrelation, and normality, as reported in Appendix B. Static panel regression had incurred various issues, so the study preferred to use dynamic panel regression. Tables 1 and 2 report the dynamic panel regression estimates using the one-and two-step differenced GMM of Arellano and Bond. The results were valid based on the autocorrelation tests (AR 1 & 2). The results of the autocorrelation test (1 & 2) and the Sargan Tests validate the values of the difference GMM in second lags. The study used the system GMM to bring in more efficient results, as Blundell and Bond (1997) proved using Monte Carlo simulations. Initial models considered two (2) economic growth variables: GDP and GNI. However, both GMM and system GMM present consistent results that there is a serial correlation issue in the model of lnGNI (as shown in Appendix C). Thus, the study only considered lnGDP as an indicator of economic growth.

The effect of country indicators can be reliably determined using lnGDP as the dependent variable. Table 1 presents the result of the difference GMM, while Table 2 presents the result of system GMM.

Table 1

The effect of country indicators on economic growth using different GMM

Variables	1-step dynamic panel: DV = lnGDP				2-step dynamic panel: DV = lnGDP			
	Coeff.	SE	Z	p-value	Coeff.	SE	Z	p-value
lnGDP(-1)	0.2312	0.0486	4.758	0.000***	0.2233	0.0531	4.205	0.000***
lnPop	-0.399	0.4675	-0.853	0.3938	-0.274	0.4672	-0.587	0.5570
Health	-0.000	0.0000	-0.354	0.7232	-0.000	0.0000	-0.112	0.9110
Pov	1.0869	1.7518	0.6205	0.5350	1.2286	0.8914	1.378	0.1681
lnLabor	0.1605	0.8888	0.1805	0.8567	0.0912	0.9735	0.094	0.9254
lnEnv	0.1952	0.2111	0.9243	0.3553	0.2539	0.1860	1.365	0.1723
lnMil	0.1924	0.0579	3.323	0.000***	0.1986	0.0662	3.002	0.003***
lnArabl	0.1347	0.1947	0.6918	0.4890	0.1546	0.1929	0.802	0.4226
Const	0.0463	0.0071	6.547	0.000***	0.0430	0.0075	5.742	0.000***
Sum squared residuals = 1.9703					= 1.9730			
S.E. of regression = 0.0773					= 0.0773			
Number of Instruments = 70 < 113					= 70 < 113			
Test for AR (1) errors: z = -0.9121 [0.3617]					z = -0.8024 [0.4223]			
Test for AR(2) errors: z = 0.5647 [0.5723]					z = 0.50073[0.6166]			
Sargan test: Chi-square = 109.76[0.0001]					Chi-square = 68.5683 [0.2362]			
Wald (joint) test: Chi-square = 78.1595 [0.0000]					Chi-square = 72.0464 [0.0000]			

Table 2

Estimate for the effect of country indicators on economic growth using the system GMM

Variables	1-step dynamic panel: DV = lnGDP				2-step dynamic panel: DV = lnGDP			
	Coeff.	SE	Z	p-value	Coeff.	SE	Z	p-value
lnGDP(-1)	0.2312	0.0486	4.758	0.000***	0.2233	0.0531	4.205	0.000***
lnPop	-0.399	0.4675	-0.853	0.3938	-0.275	0.4672	-0.59	0.5570
Health	-0.000	0.0000	-0.354	0.7232	-0.000	0.0000	-0.11	0.9110
Pov	1.0869	1.7518	0.6205	0.5350	1.2286	0.8914	1.378	0.1681
lnLabor	0.1605	0.8888	0.1805	0.8567	0.0912	0.9735	0.094	0.9254
lnμEnv	0.1952	0.2111	0.9243	0.3553	0.2539	0.1860	1.365	0.1723
lnMil	0.1924	0.0579	3.323	0.001***	0.1986	0.0662	3.002	0.003***
lnArabl	0.1347	0.1947	0.6918	0.4890	0.1546	0.1929	0.802	0.4226
Const	0.0463	0.0071	6.547	0.000***	0.0430	0.0075	5.742	0.000***
Sum squared residuals = 1.9703					= 1.9730			
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Sargan test: Chi-square = 109.76[0.0001]					Chi-square = 68.5683 [0.2362]			
Wald (joint) test: Chi-square = 78.1595 [0.0000]					Chi-square = 72.0464 [0.0000]			

The *difference between GMM* and *system GMM* was used in the panel data analysis to estimate the effect of country indicators on economic growth efficiently. Both methods show consistent results in both one- and two-step dynamic panels in which the instrumental variables are exogenously valid based on the results of Sargan Tests. The tests for AR (1 & 2) are not significant ($p>0.05$), indicating that the results are valid and the coefficient values of the country indicators are appropriate in their current values to explain the proportional change in GDP. Based on the Wald (joint) tests, the model is significant, which means that the independent variables are significant explanatory variables to the proportional changes in the countries' GDP. This would reflect that country indicators are jointly relevant factors influencing economic growth. The government's support in all of these indicators could jointly support the sustainability of economic growth.

On the other hand, the only significant country indicator of economic growth is military spending per personnel (β=0.1986, $p<0.05$). This means that government support for military aspects could significantly affect economic growth since military spending would translate into a peaceful and orderly society. This would allow the citizens to pursue social, cultural, and economic activities, enhancing development. Regarding social and cultural aspects, citizens can pursue various activities to enhance and improve their perception. In terms of economic aspects, the citizens, government, and businessmen can pursue enterprising and business activities that would allow greater productivity and sustainable growth. The presence of the military (e.g., police, army, navy, etc.) could prevent citizens' losses due to crimes, theft, terrorism, illegal activities, etc. The result affirms the study of Bitwakamba et al. (2018), wherein they specified that an adequate security system to prevent armed conflicts, crimes, and rebellions is necessary for economic growth. Military spending, however, is huge. Thus, countries must balance military spending with social and economic objectives.

Conclusions

The country indicators are among the focus of countries and governments to ensure that the needs of the citizens will be addressed. The study found that these indicators are jointly significant explanatory variables to the proportional changes in GDP. This is based on conducted dynamic panel data analysis among 133 countries from 2014-2018. This study highlights the relevance of the countries' population, health, poverty incidence, labor force, environment, military, and geography to economic growth and development sustainability. This calls for a paradigm shift among economists, finance managers, and public administrators to view social expenditures as investments that could sustain economic growth and development. The population of every country is an important resource, and they should support it in terms of

health, development, and education to enhance labor force participation, environment, peace and security, and livelihood. Economic growth and sustainable development could be attained if the citizens are supported in terms of social needs because it can motivate them to be productive and bring tangible economic contributions.

The study has found that military spending per personnel is a significant factor that can positively influence economic growth. The presence of the military (e.g., police, army, navy, etc.) could prevent citizens' losses due to crimes, theft, terrorism, illegal activities, etc. The ability of countries to secure and maintain peace and order in the country could prevent conflicts, crimes, and rebellion which are all relevant factors that could sustain economic growth. This would allow citizens to contribute to the flow of goods and services freely and do productive activities within their country. This will also encourage investors and businessmen to pursue their investments and businesses in the country. While military spending is huge, the implied return regarding economic growth and sustainable development can be observed.

Limitations and Recommendations for Future Research

This study focused on a panel data analysis of multi-factor variables to test whether the country indicators are relevant to economic growth. Future research may delve into conducting a time-series analysis to assess the effect of each economic indicator.

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Appendix

A. Countries considered in the study

Afghanistan, Albania, Algeria, Angola, Argentina, Armenia, Australia, Austria, Azerbaijan, Bangladesh, Belarus, Belgium, Benin, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Brunei Darussalam, Burkina Faso, Cabo Verde, Cambodia, Cameroon, Canada, Chad, Chile, China, Colombia, Congo, Dem. Rep., Croatia, Cuba, Czech Republic, Denmark, Ecuador, Egypt, El Salvador, Estonia, Ethiopia, Fiji, Finland, France, Gabon, Gambia, Georgia, Germany, Ghana, Greece, Guatemala, Haiti, Honduras, India, Indonesia, Iran, Iraq, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Kyrgyz Republic, Lebanon, Luxembourg, Madagascar, Malawi, Malaysia, Mali, Mauritania, Mexico, Mongolia, Morocco, Mozambique, Nepal, Netherlands, New Zealand, Nigeria, North Macedonia, Norway, Oman, Pakistan, Paraguay, Peru, Philippines, Poland, Portugal, Romania, Russia, Rwanda, Saudi Arabia, Senegal, Serbia, Sierra Leone, Slovak Republic, Slovenia, South Africa, South Korea, Spain, Sri Lanka, Sudan, Sweden, Switzerland, Tanzania, Thailand, Timor-Leste, Togo, Trinidad And Tobago, Tunisia, Turkey, Ukraine, United Kingdom, United States, Uruguay

B. Results of Pooled OLS, Fixed and Random Regression

Dependent variable: lnGDP

Var.	Pooled OLS		Random Effect		Fixed Effect	
	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value
Const	13.53	0.000***	12.57	5.07e-132***	11.92	1.01e-05***
lnPop	0.1146	6.84e-07***	0.168	0.0003***	0.445	0.0125**
Health	0.0003	3.02e-058***	0.0001	3.75e-032***	0.0002	4.11e-014***
Pov	-1.451	3.78e-07***	-1.52	0.0001	-1.401	0.0118**
lnLabor	-0.264	0.1187	-0.25	0.2966	-0.361	0.2565
lnEnV	0.827	5.69e-138***	0.736	7.72e-067***	0.419	2.12e-05***
lnMil	0.0847	0.0003***	0.177	2.30e-017***	0.199	3.29e-017***
lnArabl	-0.010	0.5750	0.001	0.9707	-0.039	0.4770
Durbin-Watson		0.0325		1.0305		1.030494

Dependent variable: lnGNI

Var.	Pooled OLS		Random Effect		Fixed Effect	
	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value
Const	13.374	1.02e-179***	23.631	3.91e-022***	23.631	3.91e-022***
lnPop	0.1121	6.84e-07***	-0.192	0.2127	-0.192	0.2127
Health	0.0003	3.02e-058***	9.62e-06	1.61e-05***	9.62e-05	1.61e-05***
Pov	-1.301	3.78e-07***	-2.059	2.20e-05***	-2.059	2.20e-05***
lnLabor	-0.280	0.1187	-0.139	0.6122	-0.139	0.6122
lnEnV	0.836	5.69e-138***	0.469	4.69e-08***	0.469	4.69e-08***
lnMil	0.091	0.0003***	0.156	1.59e-014***	0.156	1.59e-014***
lnArabl	-0.008	0.5750	-0.119	0.0132	-0.119	0.0132 **
Durbin-Watson		-		0.868015		0.868015

(1) Breusch-Pagan Test

Null hypothesis: Variance of the unit-specific error = 0

	lnGDP	lnGNI
Asymptotic test statistic: Chi-square(1)	= 1046.72; p-value = 0	= 1055.56; p-value = 0

(2) Hausman Test

Null hypothesis: GLS estimates are consistent

	lnGDP	lnGNI
e asymptotic test statistic: Chi-square(4) value	17.7024 0.0133872	65.1068 1.43132e-011

(3) Joint Tests on named regressors (Random effect)

	lnGDP	lnGNI
e asymptotic test statistic: Chi-square(4) value	1950.44 0	26.3561 3.30486e-030

(4) Joint Tests on named regressors (Fixed effect)

	lnGDP	lnGNI
e asymptotic test statistic: F(7,445) value = P(F(7,445)>36.4937	36.4937 2.700550e-040	182.038 0

(5) Test for differing group intercepts (Fixed effect)

Null hypothesis: The groups have a common intercept

	lnGDP	lnGNI
st statistic: F(112,445) ith p-value = P(112,445)	139.973 1.68583e-289	182.038 =0

C. Results of Dynamic Panel Data

(1) Estimate for the effect of social aspects on economic growth using the difference GMM

Variables	1-step dynamic panel: DV=lnGNI				2-step dynamic panel: DV=lnGNI			
	Coeff.	Std. Error	Z	p-value	Coeff.	Std. Error	Z	p-value
lnGNI (-1)	0.712	0.0602	10.47	0.000***	0.745	0.078	9.564	1.13e-021***
lnPop	-0.121	0.3027	-0.402	0.6877	-0.042	0.392	-0.106	0.9155
Health	-0.000	0.0000	-0.260	0.7945	-0.000	0.000	-0.430	0.6673
Pov	0.596	1.1958	0.4982	0.6183	0.679	1.335	0.5083	0.6112
lnLabor	0.527	0.5737	0.9177	0.3588	0.808	0.698	1.157	0.2475
lnμEnv	-0.04	0.1747	-0.232	0.8169	-0.045	0.197	-0.230	0.8180
lnMil	0.128	0.0388	3.299	0.001***	0.142	0.053	2.699	0.0069***
lnArabl	-0.048	0.1205	-0.397	0.6915	-0.067	0.156	-0.420	0.6746
Const	0.028	0.0052	5.364	8.16e-08***	0.028	0.006	4.810	1.51e-09***
Sum squared residuals = 1.092					= 1.1421			
S.E. of regression = 0.0575					= 0.0588			
Number of Instruments = 70 < 113					= 70 < 113			
Test for AR (1) errors: z = -0.7254 [0.4682]					z = -0.7046 [0.4811]			
Test for AR(2) errors: z = -4.2368 [0.0000]					z = -3.9763[0.0001]			
Sargan over-identification test: Chi-square = 187.182[0.0000]					Chi-square = 92.1392 [0.0061]			
Wald (joint) test: Chi-square = 182.59 [0.0000]					Chi-square = 147.033 [0.0000]			

Note: The test for AR (2) is significant thus in both one- and two-step dynamic panels; thus, a serial correlation issue is encountered for the dependent variable ln. The system GMM could not be processed due to near or exact collinearity encountered.