THE IMPACT OF HUMAN DEVELOPMENT ON THE GROSS DOMESTIC PRODUCT IN LATIN AMERICAN EMERGING MARKETS

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ABSTRACT

This article discusses the impact of human development in Latin American emerging countries on the GDP, it uses a mathematical model – A Walt test for granger causality to demonstrate the causal relationship between higher education and GDP in two countries: Mexico and Peru. It concludes that a causal relationship exists but it is not direct and depends on government policies such as employment promotion and how they evaluate a Nation's progress. The article ends in a discussion of the uses of GDP and Human Development index (HDI) to evaluate a Nation’s progress. Research shows that the uses are limited, and a more integral index is needed, such as Gross National Happiness. This index should be created by the policy makers in Latin American emerging markets to effectively measure and impact their National Wellness.
INTRODUCTION

The emerging markets continue to grow in importance to the world economy; however, the academic literature in this area is highly fragmented, and lies mainly in the finance field. For that reason, it is important to develop an understanding of some of the key elements in the development and growth of these emerging markets. While the Gross Domestic Product (GDP) has been a classic measure of a country’s wellness, there are other indicators that have become popular such as Human Development Index (HDI). Each year since 1990 the United Nations Development Programme (UNDP) has published the Human Development Index (HDI) which looks beyond the GDP to a broader definition of well-being. The HDI provides a composite measure of three dimensions of human development: living a long and healthy life (measured by life expectancy), being educated (measured by adult literacy and gross enrolment in education) and having a decent standard of living (measured by purchasing power parity, income). The index, UNDP representatives admit, is not in any sense a comprehensive measure of human development, these is because it doesn’t include important indicators such as gender or income inequality nor more difficult to measure concepts like respect for human rights and political freedoms. However, what it does provide is a broadened prism for viewing human progress and the complex relationship between income and well-being.

In the 1980s, the Kingdom of Bhutan, a kingdom nestling in the Himalayas between its powerful neighbors, India and China, included the Gross National Happiness (GNH) in their Constitution in which it states, “The State shall strive to promote those conditions that will enable the pursuit of Gross National Happiness. Its pursuit is not optional, apparently, but constitutional in legal parlance.”

The Gross National Happiness (GNH) is about removing obstacles of public nature to collective happiness through policies, programmers and associated public expenditure. Because official actions create conditions either for or against the success of society’s striving for contentment, government decisions and public expenditure, which is at present in a percent of GDP, are vitally important (Ura, 5). GNH will be an extremely beneficial indicator for economic emerging countries.

The Gross National Happiness, as presented by the planning commission –Bhutan 2010, includes the following elements under various broad categories (49):

Social: Human development
Economic: Self-reliance, Sustainability, Flexibility, Balanced and Equitable development
Political: Independence, Sovereignty and security of nation, state, and Governance
Cultural: Identity, Unity and harmony, Preserving and Promoting culture and heritage
Environmental: Preservation through environmentally sustainable development.

The central premise of this study was that investing in human development, such as increasing the educational attainment of the population, can help to increase the economic growth; however, this relationship is not always direct, and there are some key variables, such as employment, that can affect this relationship.

Economic growth itself will not be sustained unless preceded or accompanied by improvements in Human Development (HD). This study discusses two dimensions that are used to evaluate the Gross National Happiness of a country, Social and Economical.

Finally, it is discussed that Latin American emerging markets need a new indicator of the national wellness that goes beyond GDP and HD indexes and that could be their own measure of the Gross National Happiness. Latin American Markets should create their own Gross National Happiness (GNH) index which will be an integral measure that includes variables such as social, economical, political, environmental and cultural variables.
Theoretical Underpinnings

This study is focused on two of the dimensions of the Gross National Happiness, Social and Economical.

Social Variables: Education as part of Human Development

Human development has been defined as enlarging people's choices in a way which enables them to lead longer, healthier and fuller lives. Human development is about putting people at the heart of development. It is about people realizing their potential, increasing their choices and enjoying the freedom to lead lives they value.

The human development index created by the Human development reports consultants provide a better picture that the the GDP (See Figure 2)
Figure 2 shows the difference between using GDP per capita as a measure of a country’s wellness and HD index. For example, Costa Rica and Mexico have the same HD index but a completely different GDP per capita, where Costa Rica has lower GDP per capita than Mexico. Likewise, Peru and Brazil had the same HD index in 2009, but Brazil had a higher GDP per capita than Peru.

Education and health are two widely used social variables in economic literature. At the macro level, educational parameters are the literacy rate and enrollment ratios. The plausible working variable at individual level for education would be educational accomplishment, state of being educated or illiterate.

**Education and GDP**

The interrelation between education and economic development has been discussed since ancient Greece. Adam Smith and the classical economists emphasized the importance of investment in human skills. Early attempts to measure the contribution of education to economic development were based either on the growth accounting approach or on the rate of return to human capital.

However, it was not until late in the twentieth century researchers engaged in formal and scientific analysis of this relationship. Several studies have investigated the relationship between economic growth and education such as Psaharoupolous; Pencavel; De Meulmester and Rochet; and, Jorgenson and Fraumeni. Their starting point was always the root of the economic growth itself. The pioneer theorists hypothesized that economic development depended on the increase of capital and the labor factor in the productive processes. A fundamental reason for economic growth was found to be the increase of productivity in these factors of production. Whereas researchers such as Pencavel affirmed that correlations exist across countries between economic growth rates and schooling enrollment rates including enrollment in higher education, another group of researchers such as De Meulmester and Rochet (1995), using more sophisticated econometric techniques, found that this relationship is not always a direct one.

Psacharopoulos’ data and research have been considered a starting point by several researchers (Table 1).
<table>
<thead>
<tr>
<th>Country</th>
<th>Growth Rate Explained</th>
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<th>Growth Rate Explained</th>
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<tbody>
<tr>
<td></td>
<td>(Until 1970s)</td>
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<td>(Until 1970s)</td>
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<td><strong>Europe</strong></td>
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<td><strong>North America</strong></td>
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<td>Denmark</td>
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<td>15</td>
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<tr>
<td>United Kingdom</td>
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<td></td>
<td></td>
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<td>Japan</td>
<td>3.3</td>
</tr>
<tr>
<td>Brazil</td>
<td>3.3</td>
<td>Malaysia</td>
<td>14.7</td>
</tr>
<tr>
<td>Chile</td>
<td>4.5</td>
<td>South Korea</td>
<td>15.9</td>
</tr>
<tr>
<td>Colombia</td>
<td>4.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ecuador</td>
<td>4.9</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<td>Ghana</td>
<td>23.2</td>
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<tr>
<td>Peru</td>
<td>2.5</td>
<td>Kenya</td>
<td>12.4</td>
</tr>
<tr>
<td>Mexico</td>
<td>0.8</td>
<td>Nigeria</td>
<td>16.0</td>
</tr>
<tr>
<td>Venezuela</td>
<td>2.4</td>
<td></td>
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</tr>
</tbody>
</table>

Table 1

Percent of the Economic Growth Rate (by Country) Explained by Education
Source: Psacharopoulos (893-921).
Based on the results in Table 1, it can be concluded that education is one of the factors that explains economic growth, but the explanation varies depending upon the level of development of a country. For instance, in Table 1, except for the United States’ case, there seems to be an inverse relationship between per capita production and education. The higher the economic level of the country, the lower the contribution of education to economic development.

**Economic Variables: GDP and Employment**

At the macro level, economic variables are mainly growth rate and per capita income. For individuals the meaning of this parameter is individual income, wealth and assets. Since there is a greater chance that these three parameters are correlated, the present study used merely personal income as the economic variable. In this study we will focus on two: GDP and Employment.

**Education and Employment**

Employment is an influential factor. For example, in a thorough analysis of almost 23,000 seniors from the national longitudinal study of the high school classes of the USA in 1972, Maski and Wise found that students are very responsive to tuition, scholarship and alternative employment opportunities in deciding which college to attend. Salaries given by industry are also highly related. This sensitivity to the issue of monetary considerations is important: Willis and Rosen estimated that a 10% increase in starting salaries induced almost a 20% increase in college enrollments. In general, college enrollments respond to the pecuniary net returns from investing in higher education.

The question of the connections between higher education and the labor market are again among the key issues of debate whenever challenges for innovation in higher education are at stake (Teichler 10). For example, in its 1994 report entitled “Higher Education: Lessons of Experience,” the World Bank cited the tensions between higher education and employment as one of the key elements of the higher education crisis related to mismatch of supply and demand of graduates and lack of contact with the market. In the same way, The Organization for Economic Co-operation and Development (OECD) addressed the transition from higher education to employment in one of its largest projects in the early 1990s. Further, The United Nations Educational Scientific, and Cultural Organization’s (UNESCO) World Conference on Higher Education stated that the demands of the labor market are changing dramatically. Indeed, the patterns of employment are also changing. College courses which once met national needs are now irrelevant.
Not only is higher education being challenged, but government’s policies toward unemployment are also being questioned. Unemployment can be discussed by the match between supply and demand of graduates to the market; and the level of the economy and economic policies toward unemployment and education. There are three important stakeholders in this scenario: the higher education institutions, the private economic sector, and governments. These actors interrelate and affect important Economic variables, variables that are the focus of this study: higher education, economic growth and employment.

**Methodology and Results**

Human capital theorists agree to the existence of a correlation between higher education and economic growth; however, their methodology has been questioned. Correlational statistics have been the most widely used method by these theorists; but, correlation does not imply causation. They are also questioned because usually the economic growth rate is a dependent variable, and all other variables are independent. This study tests per capita GDP and higher education enrollments per capita as dependent variables and also as independent variables. This gives in depth information about these relationships, adding new information to the theory. By presenting the Granger causality test analysis that relates economic growth and higher education, this study remains in the same theoretical track that previous studies of Human Capital had established; and by introducing employment as a third variable in the causality analysis and showing its influence on higher education, this study challenges some points of the Labor Market segmentation theory. The question of whether the system of higher education and employment causes economic growth is addressed.

To illustrate, two Latin American emerging countries were selected: Peru and Mexico. Data on the countries presented in this study was obtained from several sources. Economic figures are obtained mainly from the Inter-American Development Bank reference materials, Statistical Abstract of Latin America, and also abstracted from World tables of the World Bank Report as well as and those sources listed in the references. Higher education figures were obtained mainly from the International Historical Statistics: The Americas. Data for the variables examined were obtained for the period 1970 through 2000.

**A Wald Test for Granger-Causality**

In an estimated VAR (p) system, if we want to test for Granger Causality, we need to test zero constraints for the coefficients (Lutkepohl 93). More generally we consider testing
\( \mathbf{H}_0 : \mathbf{C} \hat{\mathbf{p}} = \mathbf{c}, \)
\( \mathbf{H}_1 : \mathbf{C} \hat{\mathbf{p}} \neq \mathbf{c}. \)

where \( \mathbf{C} \) is a \((N \times (K^2p + K))\) matrix of a rank \( N \) and \( \mathbf{c} \) is a \((N \times 1)\) vector.

Assuming that

\[
\sqrt{T}(\hat{\mathbf{p}} - \mathbf{p}) \xrightarrow{d} \mathcal{N}(0, \Gamma^{-1} \otimes \mathbf{C} \mathbf{M}_u)
\]

in a LS/ML estimation, we get

\[
\sqrt{T}(\mathbf{C} \hat{\mathbf{p}} - \mathbf{C} \mathbf{p}) \xrightarrow{d} \mathcal{N}[0, \mathbf{C}(\Gamma^{-1} \otimes \mathbf{C} \mathbf{M}_u) \mathbf{C}'],
\]

and hence

\[
T(\mathbf{C} \hat{\mathbf{p}} - \mathbf{c})[\mathbf{C}(\Gamma^{-1} \otimes \mathbf{C} \mathbf{M}_u) \mathbf{C}']^{-1}(\mathbf{C} \hat{\mathbf{p}} - \mathbf{c}) \xrightarrow{d} \chi^2(N).
\]

This statistic is the Wald statistic.

Replacing \( \Gamma \) and \( \mathbf{C} \mathbf{M}_u \) by their usual estimators \( \hat{\Gamma} = \mathbf{Z} \mathbf{Z}'/T \) and \( \hat{\mathbf{M}}_u \), the resulting statistic

\[
\lambda_w = (\mathbf{C} \hat{\mathbf{p}} - \mathbf{c})[\mathbf{C}((\mathbf{Z} \mathbf{Z}')^{-1} \otimes \hat{\mathbf{M}}_u) \mathbf{C}']^{-1}(\mathbf{C} \hat{\mathbf{p}} - \mathbf{c}),
\]

still has an asymptotic \( \chi^2 \) distribution with \( N \) degrees of freedom provided \( \mathbf{y} \), satisfies the conditions of asymptotic properties of the white noise covariance matrix estimators because under these conditions \( [\mathbf{C}((\mathbf{Z} \mathbf{Z}')^{-1} \otimes \hat{\mathbf{M}}_u) \mathbf{C}']^{-1}/T \) is a consistent estimator of \([\mathbf{C}(\Gamma^{-1} \otimes \mathbf{M}_u) \mathbf{C}']^{-1}\). Hence the following result is obtained.

**Asymptotic Distribution of the Wald Statistic**

Suppose (21) holds. Furthermore, \( \text{plim}(\mathbf{Z} \mathbf{Z}'/T) = \Gamma, \text{plim} \hat{\mathbf{M}}_u = \mathbf{M}_u \) are both nonsingular and \( \mathbf{H}_0 : \mathbf{C} \mathbf{p} = \mathbf{c} \) is true, with \( \mathbf{C} \) being an \((N \times (K^2p + K))\) matrix of rank \( N \). Then (Lutkepohl, 1991, p. 94)

\[
\lambda_w = (\mathbf{C} \hat{\mathbf{p}} - \mathbf{c})[\mathbf{C}((\mathbf{Z} \mathbf{Z}')^{-1} \otimes \hat{\mathbf{M}}_u) \mathbf{C}']^{-1}(\mathbf{C} \hat{\mathbf{p}} - \mathbf{c}) \xrightarrow{d} \chi^2(N).
\]

In practice it may be useful to make some adjustment to the statistic or the critical values of the test in order to compensate for the fact that the matrix \( \Gamma^{-1} \otimes \mathbf{M}_u \) is unknown and has been replaced by an estimator. Working in that direction we note that
where $F(N, T)$ denotes an $F$ random variable with $N$ and $T$ degrees of freedom (d.f.) Since an $F(N, T)$-distribution has a fatter tail than the $\chi^2(N)$-distribution divided by $N$, it seems reasonable to consider the test statistic

$$\lambda_F = \frac{\lambda_w}{N}.$$

The usual $F$-statistic for a regression model with nonstochastic regressors has denominator d.f. equal to the sample size minus the number of estimated parameters. Therefore this concept will be used in this research. Hence, the approximate distributions are obtained (Lutkepohl 94).

$$\lambda_F \approx F(N, KT - K^2p - K) = F(N, T - Kp - 1).$$

To test the hypothesis a Wald test of Granger causality test between the variables in question was applied. A short term (1970-2000) was considered for trivariate relationships between higher education and economic growth in the presence of the employment variable.

Vector autoregressive (VAR) models were used for forecasting and structural analysis, and also used to test for Granger Causality. VAR (p) models (VAR model of order $p$) have become increasingly used in this test. To test Granger Causality for VAR (p) system, zero constraints for the coefficients must be tested.

The VAR system was constructed in Mexico and Peru using three variables: Higher education enrollments per capita, GDP per capita and employment rates. The VAR model was estimated using semi-annual data over the period 1970-2000. The size of the VAR model requires six-monthly data rather than annual series to generate enough degrees of freedom for estimation. Prior to testing for non-causality, it was necessary to establish the order of integration. To this end, an Augmented Dickey-Fuller (ADF) test was carried out on the time series in levels and different forms. First, variables were tested for stationary. The three variables are non-stationary; thus, are transformed taking first differences of logarithms.

To illustrate, Table 2 shows the optimum lag found for Mexico (same procedure was applied to Peru) The criteria for VAR order selection used were FPE criterion and the AIC (Akaike’s information criterion). The first column shows the orders used to estimate AIC and FPE. The second column presents the AIC estimated that is based in quite different reasoning than FPE. The last column shows estimated
and corresponding FPE (m) of the VAR models order m = 0, 1, 6. The order minimizing the FPE and AIC values is chosen as estimated for p. The p chosen is highlighted.

<table>
<thead>
<tr>
<th>VAR (m)</th>
<th>AIC (m)</th>
<th>FPE (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-18.76043</td>
<td>7.12E-09</td>
</tr>
<tr>
<td>1</td>
<td>-18.65552</td>
<td>7.74E-09</td>
</tr>
<tr>
<td>2</td>
<td>-18.10262</td>
<td>1.28E-08</td>
</tr>
<tr>
<td>3</td>
<td>-18.27343</td>
<td>1.01E-08</td>
</tr>
<tr>
<td>4</td>
<td>-18.04943</td>
<td>1.17E-08</td>
</tr>
<tr>
<td>5</td>
<td>-18.34868</td>
<td>8.19E-09</td>
</tr>
<tr>
<td>6</td>
<td>-21.5799</td>
<td>3.24E-10</td>
</tr>
</tbody>
</table>

Mim: p = 6

Table 2
Source: Morote (85)

In both cases the order chosen is 6. Then, the Wald test for restrictions on the parameters of VAR (6) is then applied. Thus the economic growth (GDP) and higher education (HE) and an employment rate (EM) were related as in the following VAR (6) model (a):

\[
\begin{bmatrix}
    GDP_t \\
    HE_t \\
    EM_t
\end{bmatrix} = A_0 + A_1 \begin{bmatrix}
    GDP_{t-1} \\
    HE_{t-1} \\
    EM_{t-1}
\end{bmatrix} + A_2 \begin{bmatrix}
    GDP_{t-2} \\
    HE_{t-2} \\
    EM_{t-2}
\end{bmatrix} + \ldots + A_6 \begin{bmatrix}
    GDP_{t-6} \\
    HE_{t-6} \\
    EM_{t-6}
\end{bmatrix}
\]

\( (a) \)

where A1-A6 are three by three matrices of coefficients with A0 as an identity matrix.

The null hypothesis of no Granger causality from Higher Education/Employment to Economic growth may be expressed in terms of the coefficients of the VAR (6) process as:

\[ H_0 : \alpha_{12,1} = \alpha_{13,1}, \ldots, = \alpha_{12,3} = \alpha_{13,3}, \ldots, = \alpha_{12,6} = \alpha_{13,6} = 0 \]

\( \alpha_{12,1}, \alpha_{12,2}, \ldots, \alpha_{12,6} \) are coefficients of \( HE_{t-1}, HE_{t-2}, \ldots, HE_{t-6} \) and

\( \alpha_{13,1}, \alpha_{13,2}, \ldots, \alpha_{13,6} \) are coefficients of \( EM_{t-1}, EM_{t-2}, \ldots, EM_{t-6} \) respectively in the equation system (a) where the system is being estimated as VAR(6)
Using the formulas (26) and (27) of chapter four, and considering \( T = 60 \) (sample size); \( K = 3 \) variables: higher education enrollments per capita, GDP per capita, and employment rate; \( p = 6 \) (optimal order) and \( N = \) twelve restrictions.

The results were:

\[
\lambda_f \text{ (Mexico)} = 0.977951,
\lambda_f \text{ (Peru)} = 1.730406.
\]

In contrast, \( F(N, T-Kp-1) = F(12, 60-3*6-1) = F(12, 41) = 2.0 \)

Thus, in a 5% level test, Granger non-causality was rejected from higher education/employment to economic growth. The fact that causality runs from the system higher education enrollments/employment to economic growth indicates that it is the rapid higher education enrollments per capita and employment which precedes the changes in economic growth.

Discussion: The Introduction of Gross National Happiness to Measure Country Wellness in Latin American Emerging Countries

As we demonstrated, the connection between education and economic growth is not direct, and a variable such as employment would affect this directionally. This study confirms the findings of the International Labor Office (ILO) that education is one of the key indicators in the labor market. The connections between higher education and the labor market are among the most frequently discussed issues of higher education. Teichler showed his preoccupation with the need for systematic knowledge and empirical evidence.

The results of this study confirm that the employment rate is a key factor in the higher education and economic growth relationship. Employment was found to be significantly related to higher education. Using the employment variable, some evidence was found confirming Blaug’s argument. In essence, he argued that explanations about the link between education and development should include institutional and sociological factors in addition to economic factors.

This study extends this theory specifically to higher education which provides better skills and higher quality in labor. Nevertheless, the investment would not contribute to improvements in economic growth if policy makers did not also relate education to labor. In other words, higher education must provide the education related to and needed by the labor market. Likewise, how education would impact on national wellness will be moderated by the quality of
education and how it affects the human development of a country. Economic growth itself will not be sustained unless preceded or accompanied by improvements in Human Development (HD) and using GDP rates as an indicator of a country’s economic wellness can conceal other areas that the government needs to focus on to generate that wellness.

Several researches have discussed the need for a more integral index, some have created the HD index of a country, and much of them suggested that it should consist of the health and education of its people, recognizing that this is very much a reductionist interpretation. Furthermore, Human Development reports consultants who created the HD index are exploring challenges including poverty, gender, democracy, human rights, cultural liberty, globalization, water scarcity, climate change, and mobility to measure human development (Human Development Reports http://hdr.undp.org/en/reports/global/hdr2010 ).

The researcher proposed to use The Gross National Happiness as a measure of Latin American emerging countries. The GNH as described in Buthan, rests on five dimensions: Social, Economical, Political, Environmental and Cultural. These pillars are divided into seventy-two quantifiable variables, designed to provide hard data about significant issues (Gross National Happiness Commission 20). My proposal is that Latin American emerging markets policy makers should evaluate them, modify them, or create their own indicators for their environment. Some emerging countries have begun the process of adapting the concept of having a Gross National Happiness indicator, such as in the Philippines, where in a pilot project designed to measure "happiness", statisticians in the Philippines discovered that people are happiest with family, religion, friends, love life, and health; and least happy with government, politics, and economy (http://www.friendsofhumanity.ch/uploads/pdf/article_gnhadvances_feb09.pdf ).

As we demonstrated, the connection between education and economic growth is not direct, and a variable such as employment would affect this directionally. In the same way, how education would impact to the GNH, will be moderated by the quality of education and how it affects the human development of a country. Economic growth itself will not be sustained unless preceded or accompanied by improvements in Human Development (HD).

Measuring a nation’s progress is important in any country, regardless of the level of its development. Over the years, progress has been conventionally and traditionally measured in terms of economic growth with gross domestic product (GDP) and gross national product (GNP) as standards. However, GDP and GNP do not really measure welfare, thus, other measures such as the human development index (HDI), families of measures of poverty, the Millennium Development goals indicators and happiness index, among others, have surfaced in an effort to improve the monitoring of the
development of a nation. It is time that Latin American emerging countries, prepare and develop their own measure of a national wellness and improve their own Gross National Happiness index.

REFERENCES


\[ \text{GDP} = \text{private consumption} + \text{gross investment} + \text{government spending} + (\text{exports} - \text{imports}) \]