

## An Empirical Analysis of Energy Consumption and Economic Growth in Brazil

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### Abstract

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**Purpose:** The basic purpose of this investigation is to discourse the factors of energy consumption in the rising economy of Brazil by using the statistics of 4 decades (1971-2010). **Methodology:** This research paper will inspect the association of energy feasting with economic progress, economic development and inhabitants in Brazil by using simple ordinary least square method of linear deterioration. **Findings:** There is noteworthy solid affirmative relation of energy deployment with its pointers. As the pouring forces of energy feasting increase it will likewise upsurge. **Research limitations:** The consequences of this article can be diverse for advanced states and by using diverse representations while determining of variables. So, investigators and strategy creator can distillate on these features as well. **Originality/value:** The important of the learning is to sightsee the association of energy feasting with its factors in Brazil particularly the influence of economic expansion on energy convention in a rising and emerging economy.

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**Keywords:** Energy easting, Economic development, Economic expansion, Brazil and emerging economy

### 1. Introduction

Energy (electricity) is one among the major indicators of any country. One of the most vibrant constructing slabs of hominid's life is energy . Energy is a core factor for fiscal development of any country(D. M. s. islam & Ali). In contemporary years, it was examined that most of the oil trade in markets are fronting oil insufficiency due to bulky intake and on the other hand oil fabricating economies are not capable to encounter loads of their customers due to bulky amount of demand of the world(Mallick) .

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This deficiency of the oil can meaningfully shake all events taken place in any country. Energy consumption is unswervingly connected to well-being and affluence around the world. There are seven billion individuals on earth who use energy every day to make their lives more fecund more calmer and more resourceful.

Brazil is the amongst the top patrons of the energy. For the erection of buildings, conveyance, cultivation inhabitants of different economies devours large amount of energy (F. Islam, Shahbaz, Ahmed, & Alam, 2013) as the inhabitants increases, it will govern the level of energy essential –larger the population, the more the oomph will be consumed (Batliwala & Reddy). The economic progress of any country is meticulously associated to the ingesting of energy. Brazil is among the commercial energy consumer but still Brazil necessities much more energy to keep pace with its growth and economic purposes as well as to fulfill growing needs of its population.

Brazil economic growth rate is at 5.4% in 2011 (WDI). Brazil energy concentration per unit of GDP is sophisticated compared to India, U.S.A. and Asia as a whole by 4.7, 3.6 and 1.5 times respectively. This may be in line for to the fact that Brazil is in growth to swing from an Tea and rubber production economy to an developed society, increased suburbanization and high user demand. In tallying, the large enactment of Brazil Industries and monies in more and more projects is contributing to higher energy intensity.

The elementary purpose of this research was to expose the substantial connection between energy consumption, economic growth, financial growth and population and to recommend the appropriate polices of energy consumption in order to achieve the sound and nonstop economic development and good development in financial development in the economy whom population is continuously increasing.

Association catches by the earlier study sign post certain variance and the focal purpose of these encounters is diverse time spans and diverse procedures and models through which outcomes are determined. Much consideration was not set in study field to this area frequently research was lead in the period when Brazil was not as much established but now Brazil is world's rising nation. So we are cover the period of 40 years (1971-2010) to recognize the unabridged tendency in 40 years and to discovery the collective relationship among variables earlier and later growth.

For the persistence of creating a bond between the economic growth, financial development population and oil consumption in Brazil we have selected the simple Regression model. We will compute the standards taking Energy consumption (Oil) as dependent variable, whereas population financial development and economic growth will be taken as independent variable

## 2. Literature Review

Populace expansion and manufacturing expansion are the chief reasons for the application of energy bases over the historical some decades (Zaman, M.Khan, Ahmad, & Rustam, 2012). The prose on the connotation among development in financial events and economic evolution is identical note able in hypothetical prose. Nonfiction of financial expansion prominences the standing of finance in improving financial events whereas on the other the prose of energy expresses the part of energy practice in building comprehensive and plane growth in financial activities. (Shahbaz & Lean, 2012) studied that independent variables (economic growth, population) are co-assimilated with energy feasting. Good economic expansion in spires fit monetary activities in the state which in turn rise the energy feasting level.

Dissimilar studies have been showed to discourse the requisite in amongst disburse level of energy convention and financial growth. The general result exposed that there is a durable affirmative association amongst electricity feasting and financial growth. Diversity of investigates have been directed by (Hye & Riaz, 2008; Isma'il & Musa, 2012; F. Li, Suocheng Dong, Xue Lia, Quanxi Liang, & Wangzhou Yang, 2011; H. Li, Mu, & Zhang, 2011).

The Study on the connection amongst energy feasting and growth of financial events was ongoing by the prodigious effort of (kraft & kraft, 1978) in which they discovered that this mandatory amongst these two variables are one way guiding which means that association. The complete verdicts displayed that there is a solid affirmative connection between consumed energy level and rising financial activities like (Fuinhas & Marques, 2012) with annual time sequence figures, from 1965 to 2009 of Portugal, Italy, Greece, Spain and Turkey By Exhausting the ARDL constraints test method, they have initiated that there is robust relationship between financial growth and energy consumption in long path and short path both.

(D. M. S. Islam & Ali, 2011) originated that any dogma that bounds the practice of energy level will absolutely have a destructive impression on the financial events so the practice of energy should not be condensed but dissimilar ways to upsurge energy production should be discovered to lift up the financial activities. (M. Michieka & J. Fletcher, 2012) Talked the important aspects which effects the energy feasting by smearing Granger Causality tests they establish a one way maneuvering association running from GDP per capita to energy feasting. (Aqeel & Butt, 2001) also originate that economic growing gives growth to the feasting of more petroleum though in the circumstance of gas segment neither financial growth nor gas ingesting upshot each other. (Shahbaz & Feridun, 2011) have inspected the long run relation amongst energy consumption and economic growth through Autoregressive Distributed Lag (ARDL) bounds testing process to discover association between energy feasting they exposed the financial growth roots energy feasting there is a unidirectional crusade from GDP per capita to energy convention but not vice versa.

Fiscal expansion fetches nearby several variations within the state moreover it can distress the deployment level of energy as well. (Sadorsky, 2011) scrutinized the pecuniary expansion with dissimilar investment and stock marketplace variables and clinched that there is momentous influence of financial growth on the feasting of energy. (Cobana & Topcu, 2013) premeditated the supreme lively connection amongst energy practice and fiscal growth by smearing system-GMM model for a section of 27 republics and instituted a very robust signal that financial expansions has affirmative impact on energy consumption whether measured by banking variables or stock market variables. (Kakar, Khilji, & Khan, 2011) reinvestigated by smearing Johansen Co incorporation and Vector Error Correction model that convention of energy is strappingly affected by financial development in long run so fiscal development can be a lively measure in overwhelming the energy scarcity.

(Fong, Matsumoto, Lun, & Kimura, 2007) premeditated that consumption of energy is grounded on household size, more the family higher the energy feasting more over as the way of life improves more energy is used. Complications of population on the level of energy disbursed are the apparent feature of the energy and population's association. Both are caused by every other (Batliwala & Reddy, 1993).

The writings on the connotation between fiscal expansion and fiscal well being of emerging countries are well recognized. In this paper we will emphasis on the association between energy usage, growth in economic activities, fiscal development and population in Brazil

## 2. Data and Variables

This study has been established to re explore the features distressing the Energy feasting for that determination economic growth (GDP), and population (POP) are occupied as pointers of energy feasting.

### 3.1. Model Specification

$$EC = \beta_0 + \beta_1 GDP_t + \beta_2 POP_t + \epsilon_1$$

Now, energy consumption and it is a dependent variable in the model. GDP is elaborate as economic growth rate as independent variable and Population (POP) has also been occupied as independent variable.  $\beta_0, \beta_1, \beta_2$  are model coefficients. The value of  $\beta_0$  is constant, the expected sign of  $\beta_1$  is positive but the expected sign of  $\beta_2$  can be affirmative or destructive based upon the calculating instrument of its variable.

## 4. Methodology

In this research, simple OLS method has been pragmatic to discover out the upshots. OLS regression is central and meekest technique and typically known as forecast method. The time series data for the pointers used in this investigation encompasses of 40 years from 1971 to 2010 and it is occupied from world development indicators (WDI)

The motive behind selecting the preliminary dated of study is grounded upon two vital factors i.e., accessibility of the data of energy feasting and to asylum the shifting decoration after 1970's energy crisis that has marvelous effect on the fiscal activities of Brazil as it is one of the wildest emerging country.

#### 4.1. Energy Consumption

Energy consumption is resolute as energy used in per capita dignified in kilograms of oil corresponding. Data has been occupied from World Development Indicators (WDI).

#### 4.2. Economic Growth

Growth of GDP per capita in proportion (%) has been taken to regulate the economic development of Brazil in this study. Data has been taken from World Development Indicators (WDI).

#### 4.3. Population

Entire population has been occupied to calculate the relationship of population and energy consumption. Statistics has been occupied from World Development Indicators (WDI).

<b>Variable</b>	<b>Name</b>	<b>Proxy</b>
<b>Dependent variable</b>	Energy Consumption(EC)	Energy consumption is measured in kilogram (kg) of oil equivalent.
<b>Independent Variable</b>	Economic Growth(GDP)	Growth in real GDP
	Population(POP)	Total population

## 5. Results

Source	SS	df	MS	Number of obs = 23		
Model	25258.2457	2	12629.1228	F( 2, 20)	=	56.47
Residual	4473.22867	20	223.661433	Prob> F	=	0.0000
				R-squared	=	0.8495
				Adj R-squared	=	0.8345
Total	29731.4744	22	1351.43065	Root MSE	=	14.955

  

ec	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
gdp	.7563935	1.302188	0.58	0.568	-1.959922	3.472709
pop	2.07e-06	2.23e-07	9.26	0.000	1.60e-06	2.53e-06
_cons	-112.4067	36.95654	-3.04	0.006	-189.4967	-35.31669

## 6. Interpretation

The value of  $\beta_0$  is -112.4067 which shows that in the absence of these two variables in a state can have a negative effect on the energy become the cause of absence of energy feasting. Results shows that there is positive relation of energy usage with all variables as the value of economic growth is .7563935, and population coefficient value are 2.07e-06. The value of  $R^2$  is 0.8495 which is defined as explanatory power of the model and adjusted  $R^2$  of the model is 0.8345 adjusted  $R^2$  explains the forte of the model and adjusted  $R^2$  explains the forte of model when some other terms are added in model, it can be less than or equal to  $R^2$ .

## 7. Findings and Conclusion

This investigation efforts to discover the connection between energy consumption and its lively gauges for Brazil over OLS regression examines for the period of 1971 to 2010. results designate that energy feasting is absolutely associated with the economic development, fiscal development and population.

With the help of literature this study accomplishes that as the energy consumption upsurge economic progress and financial progress also inclines to surge so any strategy linking to less feasting of energy will completely have negative impact on the economic and financial activities of Brazil. Brazil's main energy deployment had mounted enormously from 1999-2010. Brazil's policy creator should emphasis on discovering energy resources to overcome the growing plea of there ever growing populace. These discoveries of different nations whether emerging or developed can be dissimilar by using different representations while measuring of variables. So, investigators can distillate on these features as well

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