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Biomass Energy and Economic Growth

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ABSTRACT: ***Using the Autoregressive Distributed Lag Bounds Testing (ARDL) method of co integration and error correction models, this paper examines the short- and long-run causality analyses between biomass energy use and economic development in the chosen 10 developing and rising nations. From 1980 through 2009, it has yearly statistics. The co integration test findings indicate that nine of the ten nations (Argentina, Bolivia, Cuba, Costa Rica, El Salvador, Jamaica, Nicaragua, Panama, Paraguay, and Peru) have cointegration between biomass energy use and economic development. The findings of the cointegration test indicate that in one of the 10 nations, there is no correlation between biomass energy use and economic development. Direct or indirect consumption of biomass energy is possible. Direct consumption is the conventional way of using biomass energy, and it entails a combustion process such as cooking. Industrial processes, and space heating Consumption via a third part the more sophisticated processes are contemporary consumption and the process of turning biomass into secondary energy. As a result, as the economy grows, so does business energy use. The use of electricity has grown commonplace, and older methods have been abandoned. The amount of biomass energy used reduces. During the time when coupled with increasing urbanization and industrialisationeconomic growth, and the shift away from conventional energy sources Compared to commercial fossil fuels, biomass energy consumption is higher. The pace of energy consumption has increased, as has the penetration of renewable energy sources. In certain nations, commercial fossil fuels have resulted in a decrease in the number of people. Conventional biomass energy use as a percentage.***

KEYWORDS: ***Biomass energy, consumption Economic growth, ARDL, Short-run causality, Long-run causality***

1. INTRODUCTION:

The economic effects of biomass energy production and consumption are often assessed using three socioeconomic indicators: gross output, value added, and employment. Input-output (IeO) models are often used to assess economic effects. Multipliers were created by IeO models to assess the connection between the initial impact of a demand shift and the overall consequences of that change.

In these models, output is defined as the entire value of production, while value-added is defined as total output minus variable costs and employment, which includes the total number of full- and part-time employees in the sector. The goal of this research is to use the ARDL technique to assess the connection between biomass energy consumption and economic development in Argentina, Bolivia, Cuba, Costa Rica, El Salvador, Jamaica, Nicaragua, Panama, Paraguay, and Peru. In the perspective of energy economics, this research may be considered a supplement to earlier studies. In other ways, however, it departs from current energy economics literature.

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To begin, it uses biomass energy consumption, which sets it apart from prior efforts. Second, it is the first research to look at the causal connection between biomass energy use and economic development in the countries studied [1].

The direction of causation between biomass energy use and economic development is critical for determining suitable energy policy, according to the authors of this study.

The causality literature will be provided in the study's second part. The third part discusses econometric theory. The empirical findings are presented in the fourth part, while the conclusions and policy implications are presented in the last section.

Energy use and economic growth

The neutrality hypothesis asserts that there is no causal relationship between GDP and energy use. Because energy use is such a tiny part of total production, it will have little or no effect on economic growth.

Second, the conservation theory establishes a one-way causation between GDP and energy use.

Energy conservation programs that decrease energy use and waste, such as efficiency improvement measures and demand control regulations, may not have a negative effect on economic development. When economic development is accompanied by a rise in energy use, these assumptions are supported. Third, the growth hypothesis proposes a one-way causation between energy use and GDP. Energy consumption, according to the growth hypothesis, has had a significant influence in economic development, both directly and indirectly. Energy conservation-oriented policies that decrease energy consumption may have an effect on economic development since an increase in energy consumption has a favorable impact on economic growth [2].

Fourth, the feedback hypothesis acknowledges that GDP and energy use have a bidirectional causal relationship.

The feedback theory describes how energy consumption and economic development are linked, with one serving as a complement to the other.

With the exception of the United States, there is very little study on the causal connection between energy use and GDP in America. In Guatemala, Nachane find evidence for the growth theory. For Colombia, Murray and Nan find unidirectional causation between real GDP and electricity usage. For Brazil, Cheng finds evidence of unidirectional causation from energy consumption to real GDP, as well as for Venezuela, the neutrality hypothesis, which finds no causality between energy consumption and real GDP [3].

In an 82-country panel that includes Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru, Uruguay, and Venezuela, Huang found no causality between energy consumption and real GDP for the low-income panel, but found unidirectional causality from

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real GDP to energy consumption for the middle- and high-income panels. For Chile, Colombia, and Uruguay, Chontanawat discovered unidirectional causation from energy consumption to real GDP, as well as unidirectional causality from real GDP to energy consumption for Boliva, Paraguay, Peru, and Venezuela. In Venezuela, Squalli finds evidence of unidirectional causation between power use and real GDP [4].

In Central America, Apergis and Payne established both short- and long-run causation between energy use and economic development. There was evidence of bi-directional causation between energy use and actual production, according to the researchers. In a multivariate approach, Apergis and Payne looked at the connection between energy use and economic development for a panel of nine South American nations from 1980 to 2005. The Granger causality findings show both short- and long-run causation from energy use to economic growth, indicating that the growth hypothesis is supported.

Looked at the causal connection between power consumption and economic development in seven South American countries: Argentina, Brazil, Chile, Columbia, Ecuador, Peru, and Venezuela. Their findings revealed that the causal relationship between power usage and economic development differs per country. For Argentina, Brazil, Chile, Columbia, and Ecuador, there is a unidirectional, short-run causation between electricity consumption and real GDP. Electricity consumption and economic development have a bidirectional causal relationship in Venezuela. In Peru, however, there are no causal connections [5].

2. DISCUSSION:

The ARDL technique was used to investigate the connection between biomass energy use and economic development in Argentina, Bolivia, Cuba, Costa Rica, El Salvador, Jamaica, Nicaragua, Panama, Paraguay, and Peru. The biomass energy consumption log (bct) is represented by BC, while the logarithm of real GDP is represented by py. The World Bank and the International Energy Agency provided the data. With the exception of Argentina, which has data from 1980 to 2005, the data spans the years 1980 to 2009.

The two-step cointegration techniques of Engle and Granger, which are based on residual analysis, and Johansen's maximum likelihood reduced rank approaches have been widely employed to assess the connection between energy use and economic development. However, critiques of these methods cast doubt on the findings. The statistical flaws in such models were highlighted by Harris and Rahbek and Mosconi. The Johansen method, according to Huang and Yang, is very sensitive to assumptions [6].

Within an error correction model, the ARDL technique allows for simultaneous estimate of the short-run and long-run components. All variables in the system must have the same order of integration when using Johansen cointegration methods. The ARDL may be used regardless of whether the underlying regressors are purely I (0), solely I (1), or mutually co integrated, thus no unit root pre-testing is required. The ARDL technique, on the other hand, is a more statistically significant way for determining the cointegration relation in small samples. The ARDL also allows for various optimum delays for the variables. Finally,

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although the ARDL method uses just one reduced-form equation, traditional cointegration technical's estimate the long-run connection using a set of system equations [7].

The joint F-statistic or Wald statistic, which tests the null hypothesis of no cointegration, is used in the limits testing process. We can't rule out the null hypothesis of no cointegration if the computed F-statistics are less than the upper CV. The first set of critical values is based on the assumption that all variables in the ARDL model are I (0), whereas the second set is based on the assumption that the variables are I. (1). The upper (for I (1)) and lower (for me (0)) limits of the F-statistics are utilized instead of conventional critical F-statistic values. The null hypothesis of no cointegration cannot be rejected if the F-statistic is less than the lower limits value. The H0 hypothesis is rejected if the calculated test statistic exceeds the upper critical limits value. The Akaike Information Criterion (AIC), Schwarz Bayesian Criterion (SBC), and/or Bayesian Information Criterion (BIC) are used to identify the proper lag structure (BIC). White's test for cross-sectional heteroskedasticity-consistent standard errors and covariance matrix are used to complete the estimations [8].

ARDL tests reveal a long-term connection between variables but not the direction of causation between them. It's critical to consider how biomass energy use and economic growth interact. By doing independent estimates of Dbct and Dpyt as dependent variables using the ARDL method, this may be accomplished.

The following error correction model for Granger causality is employed, which is based on a two-step process. The use of an error correction term to test for causality has the benefit of allowing testing for both short-run and long-run causality through the lagged difference explanatory variables and the lagged ECMt1 term. Long-run causation from independent factors to the dependent variable is determined by a statistically significant ECMt-1. According to Narayan and Smyth, the next step is to use the following error correction based on the Granger causality model after estimating the long-run model to get the estimated residuals.

For El Salvador, there is bidirectional causation between biomass energy use and GDP. Furthermore, the long run causality findings show that Argentina, Bolivia, and Nicaragua have bidirectional causation, whereas Cuba, Costa Rica, El Salvador, Jamaica, and Panama have unidirectional causality.

Any causal connections within the dynamic error correction model for Peru cannot be calculated, according to long-run causality findings. Finally, a robust causality finding for Argentina, Bolivia, Costa Rica, Nicaragua, Panama, and Peru reveals bi-directional causation. The findings of the strong causality tests for Jamaica and El Salvador are debatable [9].

As a consequence, only one of the 10 nations examined in this article had no cointegration. In nine nations, there is a cointegration and causal connection. As a result, we may infer that in the majority of the nations studied, there is a link between biomass energy use and economic development [10].

3. CONCLUSION

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From 1980 to 2009, this study examines the causal connection between biomass energy use and GDP in Argentina, Bolivia, Cuba, Costa Rica, El Salvador, Jamaica, Nicaragua, Panama, Paraguay, and Peru. We utilized a two-step method to investigate this connection. The ARDL limits testing method of cointegration was used in the first stage to investigate the long-run connection between the variables. A dynamic ECM model was used in the second phase to investigate causal connections between biomass energy use and GDP. The findings show that in certain nations, there is little evidence of a direct connection between biomass energy use and GDP.

This result implies that high levels of economic development are accompanied with high levels of biomass energy consumption. There is a one-way connection between biomass energy consumption and GDP in the nations examined, implying that biomass energy consumption stimulates economic development. These results suggest that energy policies focused at enhancing energy infrastructure and expanding energy supply are the best choices for these nations, since biomass energy consumption raises income levels. From economic development to biomass energy use, there is a one-way causation. It indicates that a biomass energy conservation strategy may be implemented with minimal or no negative impact on economic development. Biomass energy provides all of the energy that humans need. Biomass energy stimulates economic development and helps to alleviate poverty in developing nations by meeting energy requirements at all times and for all countries without the need for costly conversion equipment.

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