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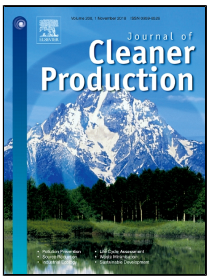

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Assessing eco-efficiency through the DEA analysis and decoupling index in the Latin America countries

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Abstract: This study was developed according to a two-step approach. In the first step, we provide an investigation of the changes in eco-efficiency under constant and variable return to scale, while on a second step the evaluation of the decoupling elasticity will be given. The impacts of energy, economic and environmental determinants (inputs) on the performance indicators of eco-efficiency were calculated as the inverse of the carbon intensity (ratio of the GDP over the CO_2 emissions, both from the World Development Indicators database), the changes in eco-efficiency and the decoupling elasticity between CO_2 emissions, and economic growth changes. Data was used for 16 Latin America countries, according to five-year periods, from 1994 to 2013. For all the five-time span considered, it is worth noting, that the degree of technical efficiency for the Latin America countries is lower than the degree of technological efficiency, thus indicating that a portion of the overall inefficiency is due to the fact that these countries are producing below the production frontier rather than to an inefficient use of technology. On average, the results have confirmed that the technological scale change in energy production is the dominant factor influencing the optimal production frontier in the sample of countries under analysis. Complementarily, according to the mixed results from the decoupling analysis, we may conclude that the increase/decrease of the CO2 per capita emissions was due to other economic and environmental factors rather than to a negative/positive effect of the GDP growth rate.

Keywords: Latin America; decoupling; eco-efficiency; data envelopment analysis.

1. Introduction

In 2014, the Latin America and the Caribbean (LAC) represented 8.5% of the world population. According to 2011 data, each inhabitant emits, on average, 2.1 kg of CO_2 per year, compared to the world average of about 4.9 kg of CO_2 per year. According to the Inter-American Development Bank, for each product unit, 0.3 kg of CO_2 is released (the global average is 0.4 kg of CO_2; IDB, 2014).

According to the Latin-American Energy Organization (OLADE, 2014), in the LAC countries, oil represents 43% of their energy supply, natural gas 26%, 14% biomass, coal 5%, nuclear only 1%, while renewable energy accounts for 25%. In this region, the use of renewable energy is situated slightly above 11% of the total energy supply. The LAC countries with the highest share of renewable energy (over 70% in its array of power generation) are Paraguay, Uruguay, Belize, Costa Rica, Colombia and Brazil, followed by Guatemala, Panama, Venezuela, Peru and Ecuador, which have a renewable share above 50% in its array of power generation. However, despite the efforts that were made

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