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Will Information and Communication Technology Developments Keep up with the Global Goals of Reducing Carbon Emissions?

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Introdução

Research suggests that ICTs can help tackle the challenges of global warming. But ICTs also pollute throughout their lifecycle. These two-way impacts lead to what is called the ICT paradox. Studies investigate the balance between these impacts and suggest that there is a threshold level in the overall carbon emission curve where ICTs start contributing to reducing pollution, which occurs after a country achieves a mature state of ICT infrastructure and economy. This phenomenon is known as the inverted U-shaped relationship between ICTs and CO2 emissions and is founded on the EKC theory.

Problema de Pesquisa e Objetivo

What also has an inverted U-shape curve is the current global goal of reducing the total CO2 emissions by 76% by 2030 before global warming reaches a point where no mitigation measures will produce significant effects anymore. This restriction poses challenges to ICT developments, which leads us to raise the following question: can the inverted U-shaped relationship between ICTs and CO2 emissions keep up with the current global goal of reducing carbon emissions?

Fundamentação Teórica

The reasoning behind the EKC theory is that accelerating economic growth will achieve higher world output and better ways of protecting the environment. In other words, some damage to the environment is necessary before achieving sustainable growth. Therefore, according to this theory, at some point in time environmental degradation will stop increasing and start decreasing due to advancements in technology and income. Research suggests this theory holds for ICT development as well.

Metodologia

We developed an ICT index consisting of the percentage of a few ITU's indicators. The index reflected the overall percentage of the spread of ICTs. Next, we used panel data from several institutions such as the World Bank and the UNECE to estimate a mathematical model associating ICT with CO2 emissions. In doing so we found the threshold level. Then, we estimated the global annual rate of ICT development and forecasted when countries will reach the threshold level.

Análise dos Resultados

Global ICT development advances 2.3% annually but at the country level it can range from as small as .1% to as large as 7.2%. If countries' ICT development advances at global pace, their current ICT index must be .27, considering the best-case scenario in which the threshold level between CO2 emissions and ICT development is at .46. Based on our data, global levels of ICT development can keep up with the Global Goals and most of the developed countries have already reached it. Developing countries need to progress at a higher pace than the global pace or they will not reach the peak by 2030.

Conclusão

Previous estimates in the literature suggested that countries achieve the threshold level between ICT and CO2 emissions when the percentage of the spread of ICT is about .30. Here we have found that the threshold level does not happen before .49. Experts on the EKC of ICT claim the curve is inverted U-shaped but our study suggests that it may perhaps be N-shaped. Our findings are partial

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at this point, and we plan to make the data more accurate by adding other ITU's indicators to the ICT index as well as extending the period if the data allow us to.

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