

A carbon Kuznets curve with oil prices: the Spanish case

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Overview

The objective of this research is to study a carbon Kuznets curve (CKC) with the influence of oil prices for Spain during the 1874-2011 period. The Spanish economy has been heavily dependent on the use of oil for most of its economic activities. Given that oil prices are a clear determinant for energy use, their fluctuations may have had a significant impact on the evolution of CO₂ Spanish emissions on that period. This may have turned out into a particular pattern of the CKC.

Method

The methodology that we use in this research is that of Pesaran et. al (2001) named Autoregressive Distributive Lag (ARDL) bounds test for time series analysis. A first advantage is that the time series regression can be carried out no matter the nature of the variables. A second advantage is that serial correlation and endogeneity problems are removed when long-run and short-run components are simultaneously taken with appropriate lags. Finally, the error correction model (ECM) can be easily derived from the ARDL framework making also possible to analyze the long-run information.

Pesaran, M. H., Shin, Y. and Smith, R. J. (2001) Bounds testing approaches to the analysis of level relationships, *Journal of Applied Econometrics*, 16,289–326.

Results

It is found a cointegrating link among CO₂ emissions, economic growth, its quadratic term and oil prices in an ARDL model with two lags. The elasticities estimated have the appropriate sign which confirms a CKC with a turning point in 1979 of 9065 US dollars. Regarding the oil price which results in an inelasticity value reinforces the effects that economic growth has on carbon dioxide pollution. The error correction model validates the results of cointegration analysis.

Conclusions

A long-run stable relationship is obtained among the typical variables that shapes the environmental Kuznets curve (EKC) named CKC in our study. In this model, we also prove that real oil prices become a relevant variable in the reduction of CO₂ emissions. The dynamic analysis indicates that economic growth, over time, makes its job on the reduction of CO₂ emissions as well. This is the accomplishment of the EKC hypothesis. However, there is margin for implementing specific policy options to reduce CO₂ emissions if as we have shown changes in oil prices produce the desired effect.

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