How economic growth affects emissions? An investigation of the environmental Kuznets curve (EKC) in Portuguese and Spanish economic activity sectors

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It is a disquieting reality that increased economic growth for many years now in the Western world is at odds with environmental degradation. In this paper the relationship between economic growth and environmental variables is analyzed under two non-linear specifications, a quadratic and a cubic specification. The study is conducted for Portugal and Spain in the period 1975-2012, using annual data for 13 sectors and the PCSE method. GVA is used as proxy for income, while energy use and carbon dioxide account for environmental degradation.

There is evidence for an inverted U-shaped EKC. However, there are also other inverted N-shaped functions that explain the relationship between economic growth and emissions. Altogether, empirical results do indicate particular differences between Portuguese and Spanish sectors. Political mitigation measures are also analyzed. We use data at sectoral level, which is a step forward in terms of data richness given the scarcity of studies in the literature linking economic growth and mitigation of emissions of greenhouse gases (GHG) at the sectoral level.

Results seem to point for the existence of an EKC relationship between GVA and sectoral environmental CO_2 emissions but which differs across Portuguese and Spanish sectors. We also found that independently of the estimation procedure Portuguese sectors reveal an N-shape EKC relationship. In Spain results point for mixed statistical evidence of an N-shaped relationship and for an inverted N-shaped relationship. Results reveal to be sensitive to model specification and country analyzed. One key finding is that key group dictate the EKC relationship.

Although there is no strong evidence that Portuguese and Spanish economic sectors have passed the EKC turning point, there is evidence of positive effects of the growing use of renewable energy since higher energy consumption and production does not necessarily translates into higher emissions. Only using the PCSE estimation our results corroborate those empirical studies showing the Kuznets validity. Under the cubic specification, results confirm an N-shaped relationship between emissions and GVA for the group of economic sectors in Portugal; while for the same group in Spain, the statistical evidence shows a mixed EKC curve, more specifically either an N-shaped or an inverted N-shaped relationship.

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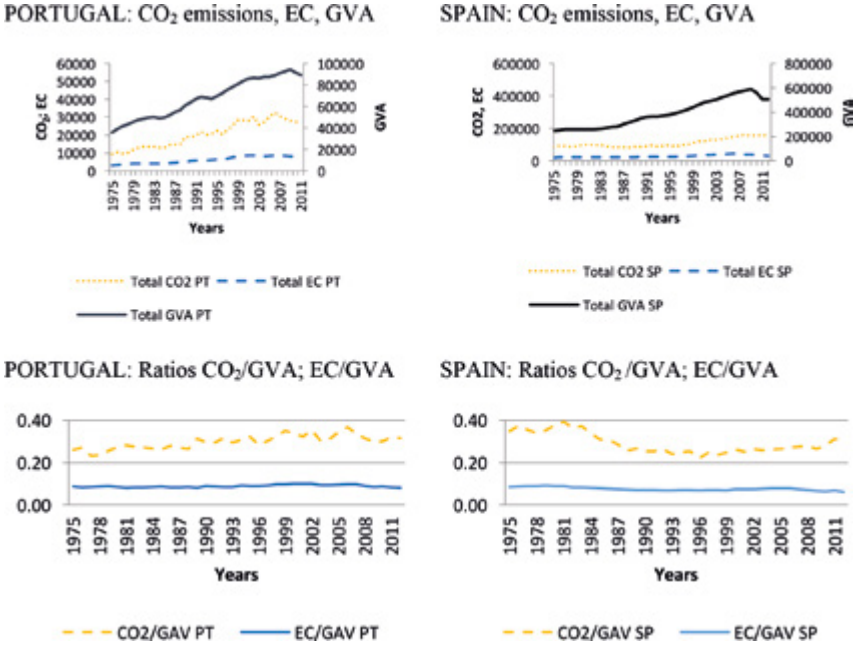
FIGURE 1

CO_2 emissions; Gross value added (GVA) and energy consumption (EC)*



Source: Own elaboration based on data from Energy Balance data, from the International Energy Agency (IEA). *CO2 emissions in millions of tons of CO2 equivalent, energy consumption in millions of TEP and values over GVA in millions of euros.