Decomposition of energy-related GHG emissions in agriculture over 1995–2008 for European countries

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The European Union Trading Scheme does not consider the agricultural sector as part of the negotiations of carbon credits, nevertheless countries are concerned about adopting other environmental policies that aim at reducing Greenhouse Gases (GHG) emissions in the agricultural sector. For the design of a policy of this kind, it is important to understand how the intensity of GHG emissions (GHG emissions/ agricultural value added) has evolved and what factors contribute to the variation of that intensity.

The objective of this work is to identify the effects in which the intensity of GHG emissions (EI) in agriculture can be broken down and analysed, as well as their evolution and which of them has more importance in determining the intensity of emissions in agriculture. For that, we used the 'complete decomposition' technique in the 1995–2008 period, for a set of European countries. The change of EI can be decomposed into five effects: (i) changes in GHG emissions compared to the fossil fuels consumption (EF effect), (ii) changes in fossil fuels consumption compared to the use of Nitrogen in agriculture (FN effect), (iii) change in use of Nitrogen in agriculture per ha of utilized agricultural area (NA effect), (iv) change in utilized agricultural area per worker (AL effect) and the inverse of average labour productivity in agriculture (LVA effect). It is shown that in most countries studied, there was an increase in agriculture emissions intensity, and in only five countries this variable declined. The greatest decrease was seen in Italy (-0.01), while the highest raises were found in the Netherlands (+0.394), Belgium (+0.277) and Luxembourg (+0.203). NA effect and LVA effect were the ones that had a greater contribution to the variation of emissions intensity. In the countries in which the variation of EI is positive, the effect of NA is the main one responsible for this increase (for instance 100%, 118.6% and 104% for Netherlands, Belgium and Luxemburg respectively), which means that the use of Nitrogen per cultivated area is an important factor of emissions. The effect LVA proves to be the most important, specifically in the countries where the change in EI is negative (for instance 113.9% for Italy). This means that in countries where labour productivity increases (LVA decreases), emissions intensity tends to decrease.

FIGURE 1
Effects of decomposition of emissions intensity variation (1995-200) by country.