

CO₂ INTENSITY AND GDP PER CAPITA

Rögnvaldur Hannesson

Norwegian School of Economics, Bergen

Phone: +47 41650068

Rognvaldur.hannesson@nhh.no

Overview

The relationship between CO₂ intensity and GDP per capita is studied, using data from the World Bank on CO₂ content of GDP at fixed prices, country by country. For the world as a whole, CO₂ intensity has fallen since 1960, but at a declining rate, and has stagnated since the beginning of this century. This is surprising, as awareness of and attempts to decrease greenhouse gas emissions have increased since the beginning of this century. The stagnation disappears if China is removed from the sample, but the declining rate is still there. The paper investigates whether this is true for all countries.

Methods

Regression of carbon dioxide intensity on GDP per capita, country by country and with panel data, with linear and non-linear specification

Results

For most rich countries we get falling CO₂ intensity over time and a negative correlation with GDP per capita. Many poor and medium rich countries show the opposite, a positive time trend and a positive correlation with GDP per capita. For about a half of the countries with a negative correlation between CO₂ intensity and GDP per capita, and in particular the largest economies of the world, there is strong evidence that CO₂ intensity falls at a diminishing rate as countries get richer. There are indications that poor and medium rich countries experience a boost in CO₂ intensity as they embark on industrialization.

Ongoing industrialization in poor and medium rich countries is a likely reason for CO₂ intensity falling at a declining rate in recent years. Looking for evidence of this, we examined the development in extraction of minerals used in industrial production. Extraction of five out of eleven minerals grew more rapidly than GDP at fixed prices 1960-2017, and particularly rapidly from the 1990s to the present, while for four extraction grew at a rate between GDP and population. For two “traditional” minerals (lead and tin), extraction grew at about the same rate as population.

Conclusions

As countries get richer, CO₂ intensity falls, but at a declining rate. Hence, economic growth will not by itself go very far in reconciling economic growth and reductions in CO₂ emissions. In poor and medium rich countries that are industrializing, emissions may increase rather than fall as a result of industrialization. This will make it harder to reconcile economic growth and cuts in CO₂ emissions. Structural changes in GDP (more services) will not be enough; new technologies are needed.

References