RENEWABLE SOURCES USED TO PRODUCE ELECTRICITY IN EUROPE. CONFERGENCE OR DIVERGENCE?

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There are some ways to achieve sustainability. One of objective, described in European regional policy, is known as a convergence between European regions and countries. Moreover, there is a strong pressure, to develop sustainability by increasing renewable sources in electricity production. This abstract examines the results of policy, mentioned above. First of all it will show tendency in the rate of renewable sources in electricity production, during last 20 years in European Union. Moreover it will examine its balance between regions.

There are some approaches to define convergence. Usually, this process is known as a situation, when less developed regions go through positive changes faster than better developed regions. In relation to renewable sources in electricity production, convergence takes place, while rate of these sources increase faster in countries with low values at the firs period of analysis. It means that in future, disparities are decreasing, therefore, development will be sustainable. If disparities grow, there is a divergence.

This abstract will examine linear trend of rate of renewable energy in all energy production within European Union. This kind of model is described by equation as below and it is estimated by OLS method:

$$y_t = at + \varepsilon,$$

where y is a rate of renewable sources, used to produce electricity in each year, t time variable, a is a parameter. While $a>0$, there is an increase of analysed value y in time.

Models of convergence are a bit more complicated. The most popular analysis is β convergence analysis, based on Barro Model. Usually this model is estimated using methods of panel data analysis, such as GMM (dynamic panel model) or static models (FEM, REM, OLS). Although panel models gives better quantities of data, are better adjusted, we need just easy OLS model, to see the tendency.

$$\ln\left(\frac{Y_t}{Y_{t-1}}\right) = \beta \ln(Y_{t-1}) + \varepsilon,$$

where $\left(\frac{Y_t}{Y_{t-1}}\right)$ is a rate of growth of rate of renewable sources used to produce electricity, and Y is a rate of its sources in year t

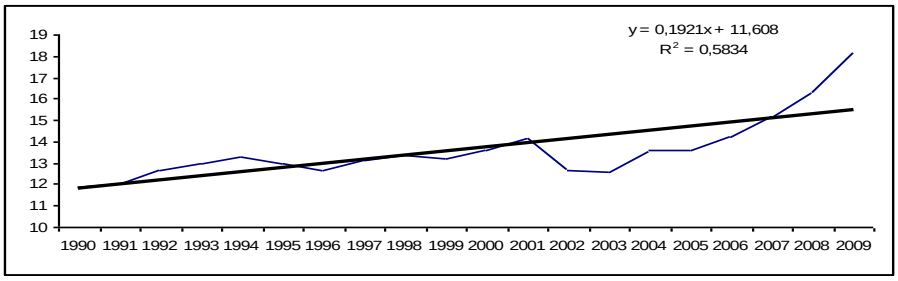
If $\beta<0$, convergence exists.

If β convergence exists, it is good to examine σ convergence, which occurs, when disparities between countries falls in time. The most popular measure of disparities is indicator V, based on standard deviation:

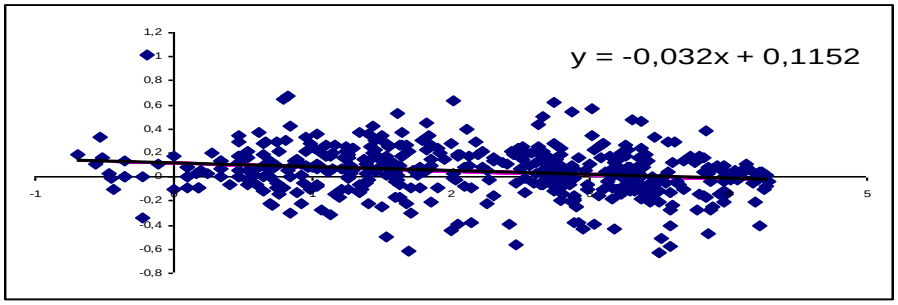
$$V = \frac{D}{X},$$

where D is a standard deviation and X is an average for all countries in each year.

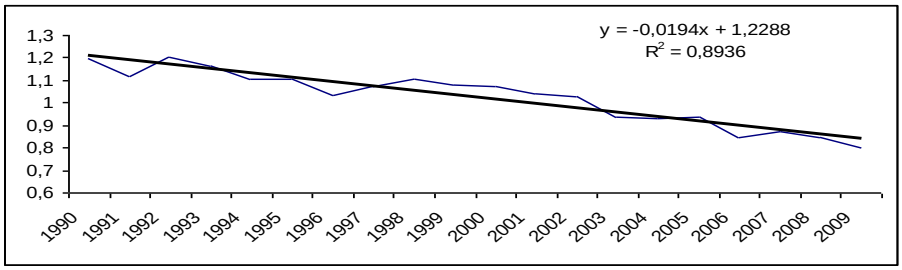
1. Linear trend of rate of electricity produced from renewable sources.



2. Model of β convergence. OLS estimation using panel data.



3. Examination of σ convergence.



Following analysis, which has been done, there is a positive trend in rate of renewable sources in electricity production In European. Every year this rate increases by 19%. Following analysis of β-convergence, parameter β = -0,03. Therefore, there is negative relation between rate of renewable sources and the speed of its grow. It means that there is a β convergence between countries. Moreover, analysis of σ-convergence confirms its existing. Disparities, measured by standard deviation indicator, decrease in time. Every year they are 2% lower.

Positive results of this analysis, are confirmation, that European policy, which aims to achieve sustainable development by increasing rate of renewable sources and keeping balance between countries, is successful.