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Decoupling of Greenhouse Gas Emissions from Economic Growth in V4 countries

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Abstract

The growing concern of climate change has made greenhouse gas emissions, mostly as a result of anthropogenic activities, an important matter of research. The aim of the paper is to perform quantitative evaluation on the relationship between economic development and production of greenhouse gas emissions based on decoupling model theory. The paper focuses on the case of V4 countries in the period of 1991 – 2012. Throughout the more than 20 years examined, the countries spread out into many different forms of decoupling. The results of analysis suggest that in most observed partial variables occurs the strong decoupling of economic growth and greenhouse gas emissions, what can be considered as positive trend. Though decoupling elasticity convey a positive message, data indicate that, in order to meet its 2050 ambitious objectives to reduce greenhouse gas emissions, the V4 countries will need to accelerate their implementation of new policies, while restructuring the ways how they meet their demand for energy, food, transport and housing.

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1. Introduction

The emergence of resource and energy efficiency as well as the low-carbon economy as European policy priorities is grounded in a recognition that the prevailing model of economic development — based on steadily growing material consumption and production of harmful emissions — is not sustainable from the long term point of view. That is the reason why these issues have emerged as central themes in global discussions on the transition to

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a green economy (OECD, 2014; UNEP, 2014). The fundamental importance of these issues to future prosperity is likewise reflected in Europe's medium- and long-term planning. For example, one of the priority objectives of the 7th Environment Action Programme emphasizes the need to „turn the Union into a resource-efficient, green, and competitive low-carbon economy“ (EU, 2013).

At the strategic level, EU policy sets out a broad framework for resource efficiency and climate change policy, including a variety of long-term (non-binding) objectives. For example, the Roadmap to a Resource Efficient Europe (EC, 2011) includes a vision for 2050, wherein 'the EU's economy has grown in a way that respects resource constraints and planetary boundaries, thus contributing to global economic transformation. These are complemented by policies addressing specific pressures and sectors. The EU's 2020 targets on greenhouse gas emissions and energy consumption (EC, 2010) are prominent examples.

2. Material and Method

The relationship between economic growth and the state of the environment has been widely discussed since the second half of last century. Many authors argue that continued economic growth in a finite world is not possible, therefore the use of material resources to produce economic growth cannot go on forever (e.g. Daly, 1997; Stern, 2004; Anderson, 2010; Hronec, Huttmanova, Chovancova, 2009; Huttmanova, Adamisin, Chovancova, 2013).

Different indicators have beenused for measuring both the economic and environmental variables (Huttmanova, 2011; Adamisin & Vavrek, 2015; Chovancova & Rusko, 2008). The economic variable is usually GDP, either in absolute or per capita form, though many authors has noted, that GDP has some shortcomings, as it clusters diverse resources by weight, obscuring huge differences in scarcity, value and associated environmental impacts. It also provides a distorted picture of resource demands from overseas, because it includes only net imports of resources, rather than encompassing the raw materials consumed in producing imports (Anderson, 2010; Kotulic, Adamisin, 2012).

Many different environmental indicators have been used, and the results depend on the chosen indicator. Among environmental indicators can be included total CO_2emissions, wastes, GHG emissions,sulphur dioxide and particulate matter etc.

Since most of the world’s economies are striving towards economic growth, ways to achieve it with less environmental harm are being sought for. There have been several concepts proposed for this. These include increased eco-efficiency, de-materialisation, immaterialisation, de-linking and decoupling. The drawback in these approaches is to get more from less, which means using resources more efficiently to produce the same value with less material. The environmental impact remains the same, but only the economy grows faster. This is called the rebound effect (e.g. Binswanger, 2001).

Within environmental research these approaches has been applied to several areas, e.g. de-linking of material resources from economic growth (Vehmas, Luukkanen and Kaivo-oja, 2007), decoupling of GDP from traffic volume and CO_2 emissions from transport (Tapio, 2005), decoupling of carbon dioxide emissions per capita from income per capita in developed countries (Marzio, 2003), etc.

There are two basic forms of decoupling: absolute and relative decoupling (e.g. Ballingall, Steel and Briggs, 2003, UNEP, 2011). Relative decoupling of resources or impacts means that the growth rate of the environmentally relevant parameter (resources used or some measure of environmental impact) is lower than the growth rate of a relevant economic indicator (for example GDP). The association is still positive, but the elasticity of this relation is below 1 (Mudgal et al., 2010). Such relative decoupling seems to be fairly common. With absolute decoupling, in contrast, resource use declines, irrespective of the growth rate of the economic driver. This latter relation is shown by the Environmental Kuznets Curve that claims that if prosperity rises beyond a certain point, the environmental impact of production and consumption decreases. Absolute reductions in resource use are rare (De Bruyn, 2002; Steger and Bleischwitz, 2009); they can occur only when the growth rate of resource productivity exceeds the growth rate of the economy. Graphically is this distinction illustrated at fig. 1.

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