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Fiscal expansion as decarbonization policy. South Korea's Green New Deal 2009-2013

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Summary of the topic and policy relevance

Besides emissions trading and carbon-energy taxation, public spending for developing and deploying low-carbon energy technology has been promoted as a way to bring down CO₂ emissions the energy sector. Since public support for additional public spending on low-carbon technology is hard to gain in times of chronically tight national budgets and other pressing political challenges such as unemployment, the 2008/09 economic crisis offered a window of opportunity to include 'green energy' elements in economic stimulus programs.

As the appearance of economic boom and bust cycles is a reoccurring phenomenon, and as climate change is and will be a policy challenge for at least several more decades, the call for green fiscal expansion will likely be repeated in the future. At the same time opportunity costs for public spending are high. Thus, both economic and environmental effectiveness of green stimulus policies should be assured. Hence, it is important to assess the effects of the 2008/09 wave of green stimulus programs in order to draw conclusions about the performance and adequacy of using public spending instruments to encourage low-carbon technologies.

Scope and Methodology

In this study South Korea's 'Green New Deal' (GND) economic stimulus program is assessed, which includes the green stimulus of 2009 and the (partly overlapping) 'Five-Year Plan' for Green Growth 2009-2013. South Korea quickly became one of the world leaders in green spending. By 2010, South Korea devoted USD\$ 38 billion to green stimulus spending, equivalent to 4% of its GDP. (Barbier, 2010)

For the purpose of this study we considered only those elements of the GND that are directly or indirectly related to low-carbon energy technology. While acknowledging that there are several criteria to assess the success of a policy intervention, this study focuses on environmental effectiveness, a key element in the 'Green New Deal' policy discourse. To that end, we used CO₂ emissions as the main indicator for environmental effectiveness of a low-carbon economy. We have decomposed this indicator into several drivers, one of which – namely GDP per capita – is at the same time the main indicator for the economic effect of the GND. Researching highly disaggregated drivers and not only global indicators allows for a better understanding of how policy interventions influence CO₂ emissions, that is if they have an influence at all. The drivers we looked at can be summarized in the following equation, a more detailed version of the "Kaya-Identity" (Kaya, 1990):

$$C = \sum_{ij} C_{ij} = \sum_{ij} P \frac{Q}{P} \frac{Q_i}{Q} \frac{E_i}{Q_i} \frac{E_{ij}}{E_i} \frac{C_{ij}}{E_{ij}}$$

where C is the sum of CO₂ emissions from i industry sectors and j forms of energy consumption in these sectors. P refers to population and Q/P is the production (GDP) per capita. Q_i/Q is the share of sector i in production and used to compute the structure effect on CO₂ emissions growth. E_i/Q_i denotes the energy intensity in sector i . E_{ij}/E_i is the share of energy form j in energy consumption in sector i and the basis for calculating the fuel-mix effect. Finally, C_{ij}/E_{ij} is the emissions factor of a certain form of energy in a particular industry sector, which is used to find out the contribution to CO₂ emissions changes by changes in the carbon intensity of energy.

Based on the equation above, several econometric tests were computed in order to identify key drivers of CO₂ emissions for the period under analysis. As a first step we carried out an additive decomposition analysis based on the Logarithmic Mean Divisia Index (LMDI) (cf. Ang, 2005), which gave us the gross contribution of various drivers to total CO₂ emissions from energy. Secondly, we tested the significance of several of the drivers that were included in the decomposition analysis. The tests included bivariate and partial correlations as well as linear regression statistics. In order to link the results of the decomposition analysis to the policy interventions under the GND, in-depths literature review and semi-structured interviews were carried out.

Knowledge gaps

Decomposition analysis of GHG emissions is a well-tested methodology. In the South Korean context several earlier studies have made use of decomposition tools (Chung, Tohno, & Shim, 2009; Jeong & Kim, 2013; Kim & Kim, 2011; Oh, Wehrmeyer, & Mulugetta, 2010). However, decomposition analysis has not yet been used to assess the success of environmental policy programs in South Korea – at least from a macroeconomic point of view. In fact, the GND is the first comprehensive attempt of South Korea thus far to work towards a low-carbon economy. Furthermore, there is only scattered research on recent green fiscal expansion policies in general (cf. Brahmabhatt, 2014; Strand & Toman, 2010), which typically do not include *ex post* analyses of the policy impacts on carbon emissions.

Expected results

Preliminary results show that the environmental effectiveness of the GND, measured in CO₂ emission reduction terms, is very low so far. The two main indicators, GDP and CO₂ emissions from energy use, showed a steep upwards trend for the implementation period of the GND. The preliminary analysis of various drivers shows that the GND has not only failed to have an abating overall impact on CO₂ emissions, but even coincided with an increased contribution to CO₂ emissions through increases in carbon intensity of the energy mix and energy intensity of the economy. This can be explained by fuel switching towards fuels with higher carbon content and changes in the structure of Korean industry. The GND also coincided with a rebound of GDP after the 2008/09 economic crisis. While this might be seen as evidence for economic effectiveness of the GND – as purely measured in GDP terms – other analyses have shown that the main factor for both the crisis and the rebound afterwards was the change in demand from exports (cf. Cho, 2009).

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