

ASSESSING THE EFFECTIVENESS OF ‘GREEN ECONOMIC STIMULUS’ IN SOUTH KOREA: EVIDENCE FROM THE ENERGY SECTOR

Luis Mundaca, International Institute for Industrial Environmental Economics,
+46 46 222 02 57, luis.mundaca@iiee.lu.se
Beau Damen, International Centre for Environmental Management,
+84 4 3823 9127, beau.damen@icem.com.au

Overview

In response to the 2008-09 global financial crisis, a number of national governments adopted ‘green stimulus’ packages that aimed to revive economic activity in the short-term, and meet a range of environmental goals through the support and dissemination of low-carbon energy technologies. In fact, green stimulus packages were portrayed as a golden opportunity and entry point into a low-carbon economy, with the energy sector playing a critical role (IEA, 2009). Within this context, the Republic of Korea (South Korea) soon became the world leader and invested heavily in environmentally-driven initiatives. In response to the country’s second largest economic contraction on record in the final quarter of 2008, South Korea dedicated nearly 80% of its US\$ 38.1 billion stimulus package to green measures – a so called ‘Green New Deal’ (GND) (Barbier, 2010). Of this amount (approximately US\$ 30.7 billion), nearly 32% targeted energy-efficiency projects, renewable energy technologies and low-carbon vehicles (UNEP, 2009). However, while a number of predictions were made about the potential benefits of this green stimulus package (e.g. economic growth, reductions of CO₂ emissions), there is still limited knowledge about the actual outcomes and performance of policy measures.

To fill this knowledge gap, the purpose of this paper is to conduct an ex-post evaluation of the effectiveness of the South Korean GND as an instrument to deliver both an economic recovery and improved environmental outcomes. We use empirical evidence from the energy sector and applied environmental and economic effectiveness as evaluation criteria. For the purpose of this paper, it is proposed that to be effective as green economic stimulus the GND should meet two conditions. Firstly, the GND should meet the basic objectives of countercyclical economic stimulus by reviving economic activity in the short-term without creating a lasting fiscal liability for the government (economic effectiveness). Secondly, to be effective as an environmental policy instrument the outcomes of the stimulus package and each of its sub-programs should be consistent with national environmental objectives (environmental effectiveness).

Methods

The research involves complimentary methods to assess the economic and environmental effectiveness of the GND at the macro-level; including the so-called ‘Three T test’, a time series variability analysis and an econometric assessment. We use the energy sector as the main scope for our analysis when measured against climate-related indicators (e.g. CO₂ emissions, energy intensity, share of renewable energy in supply mix) adopted by the South Korean government as part of a broader commitment to green growth. The analysis is undertaken in two steps. We first evaluate the GND (economic and environmental assessment) as a point of departure to analyse related policy efforts (2008 onwards). Second, and building upon the effectiveness analysis, we take a longer-term perspective by analyzing Korea’s CO₂ emissions using an econometric model with time series data from 1971 to 2012.

The economic assessment of the GND is evaluated to the extent to which the GND can: 1) be considered to have improved key economic indicators such as GDP growth and employment; and 2) be considered to meet the ‘Three T’ test of effective countercyclical, economic stimulus. This test decomposes the GND in terms of whether the stimulus has (or not) been timely, targeted and temporary (Brahmbhatt, 2014). Timely refers to measures that are designed to provide stimulus when an economy needs it most. Targeted refers to measures that will have a large impact on spending and jobs per dollar of outlay. Temporary refers to the idea that measures should not become a source of permanent budget deficits or crowd out private sector investment (Brahmbhatt, 2014).

The environmental assessment of the GND measures the performance of the GND against South Korea’s climate-related green growth objectives. Building upon the I=PAT equation and Kaya Identity (Holdren & Ehrlich, 2014; Yamaji et al., 1991), the method decomposes CO₂ emissions from fuel combustion as a function of the following climate-related variables: population, GDP per capita, energy intensity, and CO₂ intensity of the energy mix (Mundaca T., 2013; Raupach et al., 2007). A variability analysis of these indicators (from 2000 until 2012) is also carried out to observe year-on-year changes and gain insight into how measures implemented at a specific point in time have influenced indicators of economic and environmental performance. Time series data (1971-2012) used for

this analysis comes from the IEA CO₂ Emissions from Fuel Combustion report and the OECD environmental statistics database (IEA, 2014).

The econometric assessment also departs from the I=PAT equation and uses the same time series data (1971-2012). It employs a stepwise regression analysis to investigate the specific contribution of the various drivers of CO₂ emissions from a historical perspective. Different statistical tests are performed; including the estimation of variation coefficients and variance inflation factors.

Results

Our findings show that the GND has been effective as traditional economic stimulus when assessed against the observed improvement in key economic indicators. It is also consistent with the requirements of the Three T test. Our findings are in line with recent official reports stating that the GND has helped South Korea to avoid the worst effects of the crisis (OECD, 2010, 2011). The best evidence that the GND was effective from an economic perspective is that an anticipated recession did not occur and the strong and consistent rebound in economic growth following the downturn in the final quarter of 2008. The GND program was a key factor in restricting a rise in unemployment and boosting private consumption (c.f. OECD, 2010). However, based on the information assessed for our research it is unclear how much of these effects were the results directed toward the energy efficiency and low carbon energy measures incorporated into the GND.

In contrast, results show the GND is considered ineffective when measured against the climate related, green growth objective and policy directions adopted by the South Korean government. Compared to the baseline scenario, the rebound in economic growth following the crisis and the announcement of the GND corresponded with marked increases in CO₂ emissions, energy use and energy intensity. After increasing in 2009, the carbon intensity of the energy used during the recovery declined in 2010 and 2011, suggesting that less carbon intensive energy sources may have been employed during the recovery in a manner consistent with the objectives of the GND. However, the variability analysis shows that while renewable energy supply did grow at a stronger rate during the recovery, it was accompanied by strong growth in the use of fossil energy sources; particularly natural gas and coal in 2009 and then crude oil in 2010. The positive move towards less carbon intensive energy sources following the recovery was mostly attributable, not to the GND, but rather to the increased use of natural gas; a trend that was already underway before the onset of the crisis (c.f. IEA, 2012). In other words, in spite of the positive trends seen for renewable energy, the scale in Korea was too low (or marginal) to have a substantive effect on the CO₂ intensity of the energy mix.

These findings suggest that the GND and its sub-programs to promote energy efficiency and renewable energy lacked of ambition and/or were ultimately ineffective in the short-term at influencing the nature of the recovery, which resulted in worse short-term environmental outcomes when compared to the baseline scenario. In fact, econometric results show that GDP per capita has been the most significant driver of South Korea's CO₂ emissions (adjusted R² = 0.996). However, three scenarios (until 2050) were developed to explore the potential that the GND may have to reduce CO₂ emissions. Estimated scenarios show that action taken to enhance energy efficiency, such as the measures adopted in the GND and the impact of other more targeted energy policies (e.g. energy saving obligations, ambitious minimum energy performance standards) may result in measurable emissions reductions and environmental benefits over time. The level of ambition seems to be critical though.

Conclusions

In conclusion, our findings suggest that the GND was relatively effective as an economic policy instrument but ineffective as an instrument of environmental policy; at least in the short-term. From a climate perspective, improvements in carbon and energy intensity have been incapable of offsetting the negative effects of increased economic growth and the need for fossil energy sources. From an historical point of view, the econometric assessment confirmed that the level of CO₂ emissions has been largely determined by (the rate of) economic growth. On the short-term, the level of environmental ineffectiveness of the GND can be explained by numerous factors; including the lack of complementary pricing reforms, low level of ambition of energy efficiency measures, and insufficient renewable energy uptake. The research findings need to be tempered by limitations associated with the analysis, notably related to causality. Whereas the results appear to indicate that the mix of initiatives adopted with the GND—at least in the short-term—have been insufficient to promote a 'greener' economic recovery, it is worth considering the role that the GND may have played in providing impetus for long-term action to enhance green growth policies in the energy sector, such as the implementation of the Renewable Energy Portfolio Standard in 2012 or the Emission Trading Scheme in 2015.

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