Measuring Macroeconomic Rebound Effects for Non-energetic Resources

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ABSTRACT

The existence and nature of rebound effects have been widely discussed in the literature (e.g., see Dimitripoulos (2007), Maxwell and McAndrew (2011) and Sorrell and Dimitripoulos (2008) for surveys). This discussion has mainly taken place on the microeconomic level and in the context of energy efficiency improvements. Rebound effects for non-energetic resources as well as on the macroeconomic level have barely been covered so far. Our contribution aims to provide one potential approach to estimating rebound effects on the macro level for a variety of resources.

While there is no common typology of the rebound effect, the division into direct, indirect and economy-wide has been broadly accepted. Barker et al. (2009) additionally define the macroeconomic rebound as the sum of indirect and economy-wide effects. We follow this definition in our analysis. In a research project on resource efficiency potentials of innovative technologies in resource intensive production processes across Germany, an input/output table based assessment tool is used to estimate rebound effects. The analysis is based on 16 case studies for different production sectors.

For each case, specific resource efficiency measures are quantified and used to calculate a shift in the structure of the demand emanating from the respective sector. Following this, two types of rebound effects are analyzed. First, demand increases for goods from connected sectors resulting from the efficiency improvement are assessed. Mutual demand relationships in turn lead to an increase in the demand for goods from the original sector. This can be regarded as the indirect rebound effect. Second, the sum of these increases in demand equates to an increase in aggregate demand. By nature of the structure of the economy, this leads to secondary increases in the demand for products of the original sector. This can be considered the economy-wide rebound effect. Together, both effects make up the macroeconomic rebound effect.

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