Efficiency of public spending in support of R&D activities

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The objective of the study is to assess the efficiency of public R&D in terms of stimulus of private R&D at the macroeconomic level. The study sought to make use of readily available indicators and statistics to measure the level of efficiency of public R&D spending and public R&D support for private R&D and to compare efficiency indices among OECD countries.

The analysis rests on the concept of efficiency which is based on the relationship between public R&D spending (inputs) and the additional R&D in the business sector induced by such measures (output).

The differences observed in efficiency performance across countries can then be explained in relation to control variables. Among those are exogenous framework conditions, e.g. the nature of competition, the quality of the business environment, the IPR regime, the access to market and to external financing conditions, etc.

This study uses two main methods that have been widely used in the literature, namely a parametric regression approach, the Stochastic Frontier Analysis (SFA), and a non-parametric method called Data Envelopment Analysis (DEA). Both methods relate the output, i.e. private R&D spending (BERD) and alternatively the R&D personnel employed in the business sector, to inputs. The study considers public R&D funding in the business sector including other direct payments towards R&D from government to industry (BERDBYGOV), expenditures on higher education research and development (HERD) and R&D conducted in public labs (GOVERD) as relevant input measures. Both methods estimate an efficiency term, that is, the extent of slack in government expenditures. In other words they allow the estimation of efficiency frontiers and efficiency losses.

The obtained technical efficiency scores of public R&D spending across countries can then be explained by exogenous factors or framework conditions varying across countries in a second stage. While the SFA allows to simultaneously estimating the R&D equation and the efficiency terms, Tobit models are used after unconditional efficiency scores are calculated with DEA. By applying the DEA and the SFA method, this study uses two approaches which represent the most commonly used in the literature to assess the efficiency of public spending at the macroeconomic level.

Based on the results obtained, it is assessed whether quantitative efficiency analysis at the country level is suitable to draw conclusions on recommendations for reinforcement or retargeting innovation policy to meet the national goals of the revised Lisbon agenda.

For the efficiency scores it has been shown that three groups of countries emerge. The first group refers to the most efficient countries in terms of R&D public support. The countries that belong to this group are Australia, Canada, Finland, Germany, Japan, Netherlands, New Zealand, Singapore, Switzerland, and the USA. The second group is composed by France, Hungary, Italy, Korea, Norway, Sweden, Spain and the United Kingdom. The third group of the less efficient countries in terms of R&D public spending includes China, Croatia, Czech Republic, Israel, Latvia, Poland, Romania, Russia, Slovak Republic.