

Topic: Effectiveness of Innovation Policies

Impact of public support on firms' innovation performance Evidence from Luxemburg's firms

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Motivations and main objectives

The impact of innovation policy on firms' innovative performance is one of the major issues to be dealt with in society in constant evolution and with strong competitiveness. An abundant literature has substantially improved our understanding of the effects of public support schemes on firms' innovation. This literature focuses almost on principal public policies designed to encourage firms engaging in innovative activities: protection measures for innovation (Griliches 1990, Gallini 2002), direct public fiscal policies (David *et al.* 2000, Hall and van Reenen 2000, Falk 2004, Jaffe 2002), different measures for improving relations between scientific world and private sector or availability of human resources for science and technology (Veugelers and Cassiman 2005, Hall *et al.* 2003, Cohen *et al.* 2002). This contribution adds to the empirical literature that focuses on the effectiveness of innovation public policies by using response to the fourth CIS-4 which provides information for different public supports to innovation, by covering a wide range of sectors of activities and by applying the survey data for a more interactive way of the innovation process.

Our study concerns the Luxemburg innovation system which presents some particularities. Indeed, despite a favorable economic performance, the national R&D expenditures are low comparing to the European average. More than 85% of national R&D expenditures are undertaken by private firms where a majority is made by just a few companies. Although increasing shares of public investment on R&D and recent institutional innovation (the University of Luxemburg was created in 2003, the National Research Fund in 1999), Luxemburg still is a relatively young public research system where linkages between firms and public research organizations are not well developed. Only in the last years, the government considers innovation as national priority while considerably improving public measures for innovation.

Taking into account these distinctive characteristics, it seems to be interesting to assess the effectiveness of some available public dispositive on Luxembourgish firms' innovativeness. The objective of our contribution is twofold. First, we specifically develop a conceptual framework that allows us to investigate the impact of the national innovation support system on firms' innovation capacity. Second, we try assessing the impact of complementary innovative activities on the innovation capacity of firms.

Data and methodology

We use the fourth Luxemburg's Community Innovation Survey (CIS4) data-set conducted by Eurostat in different member states in 2006. The Survey has been done face-to-face on a sample of 555 firms located in Luxemburg, with 10 employees or more and belonging to manufacturing and service sectors. The main objective is to collect data relative to innovation strategies of Luxemburgish firms between 2002 and 2004.

The purpose of this paper is to study the impact of different public measures and complementary innovation strategies on the innovation performance of firms. Numerous notions and indicators of firms' performance have been used and discussed in the literature, which can be characterized by measuring either innovative inputs or outputs (R&D expenditures, propensity to innovate, and share of new products or processes in turnover or patents' application). In our contribution we construct our dependent variable as a composite indicator of firm's performance from two measures of innovativeness such as product innovation and process innovation. These variables are drawn from the CIS Survey, in which firms are asked to indicate whether they introduced new or improved products or processes innovations, between 2002 and 2004: 53% of the firms in the representative sample indicate to innovate. Clearly the two measures may be correlated, and represent different aspects of the firm's innovation process. Taking them together should therefore capture overall success of the firm. For the empirical study, the whole sample of firms, whether innovative or not, is used.

Different series of determinants of firm innovation capacity will be considered. We make distinction between exogenous and endogenous variables. The first group of exogenous variables includes some internal characteristics of the firms (foreign ownership, firm size, activities sectors, internal R&D expenditures, etc.) which have been found to be determinants of firm's innovativeness in previous empirical studies. The second group of exogenous variables reflects different public innovation measures such as regulation of intellectual property and availability of public funding.

In order to assess the impact of complementary innovative activities on the innovation capacity of firms, we include firstly the firm cooperative strategy with scientific partners (public research institutes or universities) and cooperative strategy with clients and customers (vertical cooperation). Secondly, the survey data also allows consideration of the technological opportunities open to the firms by using two types of information sources: scientific and technological information sourced from scientific institutions and technological information sourced from suppliers, customers and competitors. These variables can be considered as endogenously linked with the firm's innovativeness as far as they can be explained by exogenous variables in the model. In order to take into account the endogeneity, an instrumental variables estimation procedure will be adopted. The survey data provides variables that will be included as instruments: importance of different obstacles to innovation, appropriation measures and internal R&D activity.

The dependent variable is the firm innovativeness that takes the value of one if firm reports an introduction of product innovation or process innovation. It is equal to zero otherwise. Our empirical specification is a probit model.

Results

The aim of this study is to examine to which extent public measures for innovation contribute to better innovative capacities among Luxembourgish firms. The survey data shows that there are some clear differences in the public funding across sectors and firm size. Innovative firms in industrial manufacturing sectors receive more often public funding than those of the service sector. Whatever the sector, large firms seem to benefit more frequently subsidies from public authorities. On the institutional features of the

innovation system, the survey shows that external information sourcing from these research institutions seems to be important for only a relative small number of innovative firms. In contrast, once firms decide to cooperate in R&D, public partnership appears to be an important cooperative strategy.

About the factors hampering innovation, the results suggest that the lack of competencies, qualified personnel or difficulty to find cooperation partners is negatively correlated with the innovation capacities of the firm. In line with previous studies, we find some evidence that firm's capacity to protect the results from innovations emerges as a significant predictor of firm propensity to innovate.

When assessing the impact of complementary innovative strategies on firm innovativeness, we find that cooperative arrangements with clients and customers are significant determinant of innovative capacities of firms. The results also show that the availability of public research actors and of scientific cooperation partners lead to strong incentives toward innovative activities, but this effect also varies considerably according to the different internal characteristics of the firms. Large firms in all sectors seem to engage more frequently in cooperative arrangements with scientific partners which emerge as strong predictor of firm innovativeness. This result corroborates the hypothesis on a positive link between market structure and firm innovativeness. Cooperation with public research organizations emerges however as a predictor of firm performance only for some specific science-based industries or service sectors (computer activities, R&D-Engineering activities-Consultancy). Otherwise, we find evidence of positive correlation between firm innovativeness and technological information sourced from suppliers, customers and competitors. These results suggest that the process of innovation creation is complex and implemented by combination of public innovation policies, internal investment in competencies/know-how and various complementary innovative strategies.

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