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The impact of firm participation in R&D programmes on R&D partnerships

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Abstract

R&D subsidies designed to encourage innovation efforts by firms may have intended and unintended effects on the way they organize their innovation process. We present empirical evidence on how R&D subsidies affect firms' R&D cooperation strategies. In particular, we investigate whether receiving public R&D subsidies affect the probability that a firm will set up an R&D partnership with a public research organization (PRO), or with other firms. Our main findings are: (i) public support significantly increases the chances that a firm will cooperate with a PRO, and (ii) public support also increases the likelihood that a firm will establish private partnerships, but to a smaller extent and only when firms have intangible knowledge assets. These results suggest that public R&D programmes trigger a behavioural change in firms' R&D partnerships, alleviating barriers to cooperation.

JEL classification: O31; O38; H32; C25; C35

Keywords: R&D; Vertical cooperation; Public–private partnerships; Innovation policy

1. Introduction

New trends in the way R&D is conducted and organized have emerged over the last 20 years, along with a steady increase in R&D and innovation effort and output. The development of networks or alliances among firms, or between firms and public R&D laboratories or universities, is one of them. Several indicators support this claim. The share of patent co-applications in triad patent families has almost doubled since 1980, and the number of strategic technology alliances has, on average, almost tripled. Over the period 1999–2001, about 7% of patents filed at the European Patent Office were the result of international collaboration (Hagedoorn, 2002; OECD, 2002, 2005). The Community Innovation Survey (CIS), a firm-level survey conducted in European Union (EU) member countries, provides further information on the extent and type of R&D partnerships.[2] On average,

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[2] The Community Innovation Survey is a European-wide firm-level survey focusing on innovation and R&D. It has been conducted four times (in 1992, 1996, 2001 and 2004) in all European Union member countries. The questionnaire has a set of common core questions for all countries. Definitions and survey methodology are based on the OECD's Oslo Manual. For more information about the CIS project see the European Union web page http://cordis.europa.eu/innovation-smes/src/cis.htm.

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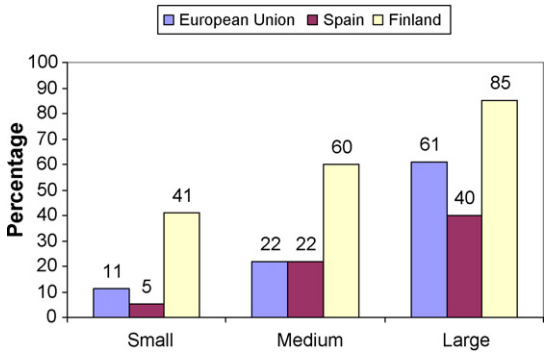

Fig. 1. Innovators in industry that cooperate to innovate, 1998–2000, by firm size. *Note*: Size is measured by the number of employees. Small refers to firms with 10–49 employees; medium to firms with 50–249 employees; large to firms with 250 or more employees. *Source*: European Communities (2004b).

17% of industrial firms with innovative activities in the EU had R&D cooperation agreements with other firms or organizations in 1998–2000; in 2002–2004, 25% of all innovative firms had innovation partnerships.[3] Customers or suppliers were the most frequent partners, followed by firms within the same enterprise group and by universities or other higher education institutions.

Cross-country differences are noticeable, however. In Finland 22% of manufacturing SMEs declared being involved in cooperative agreements related to innovation or R&D projects, while in Spain or Italy barely 3% did. These differences can be partly attributed to a lower overall rate of innovative firms in Southern European countries, but even within the subset of innovative firms differences are quite significant, as shown in Fig. 1.

At the same time, public support programmes to encourage private R&D effort and the development of research partnerships between private firms and PROs have been implemented in the US, Japan and the European Union. Some examples are the Advanced Technology Program in the US and the EU's successive European Framework Programmes.

These facts raise several questions: is there indeed too little collaboration for research and innovation in the private sector, involving firms or firms and PROs? If so, what are the barriers to collaboration? Do existing public support programmes have an effect on R&D and innovation partnerships? In this paper we focus on the last question. We extend existing work by explicitly modelling the participation of firms in R&D programmes, and estimate the effect that participation has on different type of partnerships. We also take into account that some R&D programmes require collaboration as an eligibility condition, while others do not.[4]

While there is an extensive body of empirical research on the determinants of research partnerships, there is limited evidence on the ability of public support to have an effect on them. Most evaluation research based on econometric methods has focused on the impact that public support has on private R&D expenditure, on patenting or on other measures of innovation performance, but not on effects on firm behaviour regarding how these activities are organized. Our contribution to the literature is that we explicitly investigate whether public support for private research and innovation activities changes firms' R&D cooperation strategies and increases the likelihood to cooperate with particular types of partners; that is, whether there is behavioural additionality.

In the evaluation literature additionality refers to the extent that a programme contributes to creating additional welfare or efficiency gains that would not have been obtained otherwise.[5] Obtaining estimates of the long-term effects of a programme on welfare or on aggregate productivity may be difficult, but intermediate indicators can be used. These are input, output and behavioural additionality tests or measures. Input additionality refers to the change in private R&D expenditure triggered by public support, although increases in other innovation inputs could be used. Output additionality is usually measured as the change in patents and new products obtained by supported firms. Behavioural additionality refers to changes in the type of R&D projects, R&D management capabilities or collaboration strategies that firms may experience as a result of receiving public support.[6]

There are some advantages in analysing behavioural relative to input or output additionality. Inferences based on input additionality can be misleading in some cases. For example, when an R&D project involves strong economies of scale or scope and it is carried out in collaboration, it is very likely that each member's private R&D expenditure is smaller than the expenditure required on

[3] See European Communities (2004a,b, 2007) and European Commission (2003).

[4] We do not explore other issues such as differences between social and private returns to cooperation or others, due to data limitations.

[5] See for instance Buisseret et al. (1995) and OECD (2006a,b).

[6] R&D subsidies have usually been evaluated in terms of input or output additionality. Estimates of input additionality are obtained in Wallsten (2000), Busom (2000), Lach (2002), Almus and Czarnitzki (2003). Sakakibara and Branstetter (2003), Feldman and Kelly (2003), Darby et al. (2004) on US programmes, and Czarnitzki et al. (2004) focus on output additionality. These references are a sample of contributions in an expanding research field.