



Cooperation with public research institutions and success in innovation: Evidence from France and Germany[☆]

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ABSTRACT

We evaluate the impact of cooperation with public research on firms' product and process innovations in France and Germany using Community Innovation Survey data from 2004 and 2008. We find that cooperating with public research increases product innovation, but has no effect on process innovation, which depends more on firms' openness. Our benchmark estimates, which are very similar in 2004 and 2008, suggest that the increase in product innovation is much higher in Germany than in France. Endogeneity tests show that the French benchmark estimate may be somewhat biased in 2004 but not in 2008, which hints at a persistent gap in the effect of cooperation between France and Germany. We derive two important policy implications from our results. First, public–private collaborations in research should not be encouraged at all costs, since they may not sustain all forms of innovation. Second, the changes in the institutional context of public–private partnerships in research which have been implemented between 2004 and 2008 have yet to prove effective in sustaining the innovation impact of cooperation.

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1. Introduction

Modern societies supposedly base their wealth on a steadily increasing and widely accessible knowledge base. This implies that new knowledge needs not only to be discovered, but also to be diffused, i.e. it ought to be made readily available to the society, which will then be able to generate value from it. Most lines of research agree on the fact that interactions between industry and science are among the most prominent institutional interfaces for knowledge diffusion. This paper focuses on formal collaborations between firms and public research institutions, and examines their impact on the innovativeness of firms using French and German data from recent Community Innovation Surveys (CIS).

Our paper offers several contributions to the literature. First, we propose a detailed comparison of the institutional contexts of cooperation with science in France and in Germany, taking recent changes into account. Second, using recent data, we develop an empirical analysis that considers both product innovation and process innovation, whereas most previous studies only focus on the former. Moreover, our econometric methodology can address both selection and endogeneity issues, which has not been done in related previous studies. In addition, we will extend our main analysis to examine the specifics of the manufacturing and services industries. We will also, as far as our data sources allow, try to grasp the dynamics of the phenomenon we study and try to assess its impact on productivity, in order to derive more policy implications.

The remainder of the paper is organised as follows. In Section 2, we state the objective of our research, we discuss the interest and feasibility of an institutional comparison between France and Germany and we sketch our conceptual framework. In Section 3, we present our estimation strategy and choice of variables. Section 4 is dedicated to the presentation and discussion of the results. Building on these results, Section 5 proposes further explorations, from which we can derive more policy implications. We conclude in a final section.

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2. Cooperation with science and success in innovation: a comparative approach

2.1. Objective of the research

There is a fairly large consensus on the fact that modern societies base their wealth on the creation and diffusion of new knowledge. Seminal articles in the endogenous growth literature (Romer, 1990; Aghion and Howitt, 1992) focus on the expansion of the knowledge base and show its importance for economic growth. In a similar vein, Grossman and Helpman (1993) have shown that diffusion of new knowledge is a prerequisite for long-term increases in production and wealth. To favour diffusion, the organisational setting should allow knowledge to move freely across institutional borders, and not to be stuck where it was created. Accordingly, the innovation systems approach argues that relationships and linkages between societal actors are central to their innovation behaviour. Extending this approach, the Triple Helix literature highlighted the importance of science–industry–government relations (Etzkowitz and Leydesdorff, 1998, 2000; Leydesdorff, 2000). The interaction between industry and science is one of the most prominent institutional interfaces for knowledge diffusion. Although knowledge transfer can occur through a variety of channels (see Schartinger et al., 2002, for an overview), we will focus in this article on formal collaborations between firms and public research institutions.

There are several reasons for this focus on public research institutions. First of all, these institutions do play a key role in science and technology policy: they are often seen by governments as potent levers to create strong links between industry and public research (Hagedoorn et al., 2000). Thus, public research institutions are not simply shaped by science policy: Since governments have (at least a partial) control over them, they are also used to shape and implement science policy. This leads to a second consideration: the recent evolution of science policy is bringing it to a place where it is likely to meet industrial policy. On the one hand, science policy has become more and more “market oriented”. For instance, it gives a growing importance to contract-based research and to performance indicators, which include the ability to attract funding and the “production” of patents (Schmoch and Schubert, 2009). On the other hand, industrial policy relies more than ever on cooperative agreements with public research institutions to stimulate R&D at the firm level. The Framework Programmes (FP) of the European Union (EU) are a prime example of this situation: Firms wishing to develop their R&D through a FP project generally have to collaborate to some extent with public research institutions.

Thus, studying the impact of public–private partnerships (PPP) in research on firms’ innovative activities is vital for science and research policy today, especially in the EU. PPP in research deserve to be studied apart from other collaborative agreements in R&D, because of the specific nature of public research institutions. Indeed, the primary goal of public research institutions is the production of new knowledge through “open science” (i.e. research leading to results that are publicly disclosed in scientific journals). This new knowledge may or may not have direct industrial applications. However, scientific objectives may diverge from those of private firms, in terms of time horizon (long-term versus short-term), knowledge dissemination (public disclosure in peer-reviewed journals versus non-disclosure), and so on. Firms are aware of this, and although they may benefit from PPP in research, they may also experience (un)expected costs arising from these divergences and may be reluctant to engage in such partnerships.

In this context, getting a good measure of the impact of PPP in research on firms’ innovation output is an important issue. If this measure suggests that PPP are effective in promoting innovation at the firm level, then it is indeed legitimate to base science and research policies on such partnerships. Failing that, PPP in would

appear a costly policy instruments of little utility. In this paper, we focus on the evaluation of the impact of collaborations with public research institutions on firms’ innovation capacity. Our focus is therefore clearly on the effectiveness issue. We leave the prospect of a full cost/benefit analysis (including expected and unexpected costs) to further research.

Despite large differences in issues and methodological approaches, several studies show that collaboration with public research entails positive outcomes for firms. Monjon and Walbroeck (2003) find that highly innovative firms benefit from official collaboration projects with universities, whereas imitating firms benefit from spillovers. Lööf and Brostrom (2008) find positive impacts for large manufacturing firms. Similarly, Miozzo and Dewick (2004) focus on the question of whether inter-organisational cooperation enhances firm performance in the construction industry and find that, in some European countries, there are positive effects from collaboration with universities. In the case of US-firms, Darby et al. (2004) find that firms participating in the Advanced Technology Program of the Commerce Department patent more frequently when a university also participates.

In an effort to estimate the so-called ‘innovation function’ across seven European countries, Mohnen et al. (2006) observe that the effect of “proximity to basic research [is] quite sizeable in the high-tech sectors, much less so in the low-tech sectors” (Mohnen et al., 2006, p. 31). Although this observation is not their main result, it seems nevertheless to be consistent across countries and period, and other studies tend to corroborate it. Using data from the Dutch component of the CIS2 and CIS3, Belderbos et al. (2004) provide evidence that cooperation with universities boosts the sales of new or significantly improved products. In line with this, Nieto and Santamaria (2007) find that technological cooperation networks are crucial in achieving a higher degree of novelty in product development.

Our goal is to provide more in-depth knowledge about the relationship between cooperation with public research and firms’ success in innovation in the recent period. To do so, we first engage in a systematic comparison of the institutional settings for PPP in research in France and Germany, encompassing the institutional changes that were implemented in the mid-2000s. We then perform an empirical analysis comparing: (1) product innovation and process innovation, (2) different periods of time (2002–2004 and 2006–2008) and (3) the manufacturing and services industries. This is done using an econometric methodology that allows for both selectivity and endogeneity corrections. We also try to derive some of the economy-wide implications of the aforementioned relationship.

2.2. Institutional context: the French and German technology transfer systems

A comparison between France and Germany is definitely relevant to any study of the science–industry relationships in the European context. Historically, both countries are among the founding members of the European Union (EU). As far as European countries are concerned, France and Germany are large-scale economies, which have kept for many years a leading position but have also, to differing degrees, been facing similar difficulties (e.g., relative slowdown in economic growth, lingering unemployment, etc.). They are also (together with Italy and the U.K.) among the four European countries whose investments in R&D are the highest in absolute terms (Hagedoorn et al., 2000).

France and Germany also share similarities in their intellectual tradition, which has been instrumental in shaping their academic systems. Even today the French and German academic systems still differ in a number of ways from the international standards set by the New Public Management paradigm, as applied in North

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