



Does government funding complement or substitute private research funding to universities?

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ABSTRACT

There is growing political pressure on universities to intensify their interaction with industry and to enlarge their own research funding options, in a context characterised by increasing constraints on public spending. However, whether the successful achievement of such a political desired outcome is consistent with a restriction of government funding is not clear and requires further investigation. As a matter of fact, there is scant empirical evidence on whether and to what extent government funding affects the external funding options available to universities, in particular those related to research and consulting activities. By using a set of probit and tobit panel data models estimated on financial data for the whole population of Italian university departments engaged in research in the Engineering and Physical Sciences, this paper provides evidence that government funding to universities complements funding from research contracts and consulting, contributing to increasing universities' collaboration with industry and activating knowledge transfer processes.

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1. Introduction

There is increasing awareness in industrialised countries of the importance of scientific research in creating the foundations for technological change and economic competitiveness. Historically, bringing research results to market has not been of prime concern to academic institutions. However, since the late 1970s, a growing pressure has been put on universities to produce research that is valuable for industry³ and to establish closer linkages

with the business community in order to widen the chances of establishing collaborations. Early research has typically focused on technology transfer issues such as patenting, licensing and spin-offs. More recently, greater attention has been paid to other university–industry collaboration channels such as research contracts and consulting activity, characterised by a higher degree of relational linkages, capable of generating strong *learning by interaction* effects (Perkmann and Walsh, 2009).

At the same time, the creation of new channels of university–industry collaboration has gained strategic relevance to universities primarily because of their potential as sources of external funding (Cohen et al., 1998). There is now substantial agreement in the economic literature that university–industry collaboration should be promoted and that governments should put in place all the necessary measures to ease this process, thereby helping to bring the results of academic research to market. Several empirical works, even very recent (Gulbrandsen et al., 2011), have investigated the drivers of university–industry collaborations and business funding to universities. However, a key factor, and one that may have been overlooked, is the existing relationship between government funding and the funding raised by universities through research contracts, consulting and, more generally,

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³ Although the literature on these issues make systematic reference to “industry” (which evokes private manufacturing firms) as the typical recipient of the university knowledge transfer, third stream activities are beneficial also to private firms operating in the tertiary sector as well as to public institutions involved with the supply and deliver of (market and non-market) goods and services. In the view expressed in this paper, “industry”, “businesses” and “university–industry collaboration” are interpreted in a wider sense, which emphasises a stronger market orientation of university research.

scientific activities to order.⁴ There is extensive evidence on the effects of funding on the production of innovations and on the development of university–industry networks. However, further investigation is needed in order to assess whether government funding to universities complements or substitutes funding from these other channels of collaborative interaction.

According to a recent OECD review on university funding (OECD, 2010), European universities are primarily funded by the state. The review estimates that in the large majority of cases the funding proportion lies between 60% and 90% of the total budget. However, during the last two decades, the shortcomings of the traditional ‘input-orientated’ funding system with respect to performance-based management systems of public administrations pushed several European governments to implement numerous reforms of research of university systems (McNab and Melese, 2003). Many developed economies have gradually reduced government funding to research systems. In Italy as well as in the USA, Japan, Germany, France, Canada, and the UK, government intervention has been reduced, thus favouring the action of market forces, which have become more and more important in allocating resources (Steil et al., 2002).

Funding systems and especially resource allocation mechanisms for public funds are an essential element of reforms of university systems in several countries. Despite an international trend towards performance-based funding, the approaches that have been implemented differ significantly across countries. According to the classification of university funding systems presented by Salmi and Hauptman (2006), Italy has a fundamentally traditional funding system similar to that of many other countries in Europe (Strehl et al., 2007): the largest part of university budgets is based on ‘negotiated budgets’ and ‘funding formulas’ (based on size of staff or number of students enrolled), but universities also compete for research funding on the basis of peer-reviewed project proposals against a set of objectives. Like in many other European countries, other sources of university funding such as industry funding is becoming increasingly important for Italian universities’ budgets.

In the light of these arguments, the purpose of this paper is to investigate the effects that government funding for academic research activity has on the external funding to universities raised through research contracts and consultancies. The rationale of our empirical exercise is straightforward in terms of policy implications: we are interested in investigating whether the financial pressure that universities have been subjected to in recent years – that in the specific case of Italy has been amply reported by the media (Gandolfi, 2009; Intravaia, 2011; Magrini, 2011; Tucci, 2010) – is driving these academic institutions to look for alternative sources of funding, stimulating university–industry interactions and collaborations (substitution effect), or, conversely, it is hampering their capability to collect external funding (complementarity effect) and to activate important knowledge transfer channels.

Our research differs from previous studies in several respects. We carry out an econometric analysis based on highly disaggregated data on university departments; we discriminate between different sources of public funding ranging from EU funding to national and regional sources; we use disaggregated data on private

⁴ In this paper the terms “industry”, “business”, “private” and “market” funding must be understood as synonymous locutions referring to funding that universities raise from *scientific activities to order* – i.e. the research activities, consultancies and services sold on the market, carried on in response to an exclusive interest of the commissioning entity independently from its public or private legal nature – which can be regarded as an effective proxy of collaborations capable of activating knowledge transfer processes based on high relationality. By contrast, “government funding” (or “public funding”) is related to European Commission, national or local governments funding for research programs on topics defined as of public interest.

funding, testing our hypothesis concerning the nature of the relationship between public research funding and research contracts and consulting activity (thus excluding other sources of private funding to universities not related to knowledge transfer processes, such as donations).

The paper is organised as follows. Section 2 sets the theoretical background to university funding and university–industry interactions. Section 3 presents our empirical results for the determinants of industry funding to universities. Section 4 discusses the results and their implications for policy.

2. Theoretical background

2.1. University funding and university–industry interaction

Knowledge is considered to be a primary resource for wealth creation and economic growth (Drucker, 1993; Nonaka and Takeuchi, 1995; Florida, 1995; Romer, 1993, 1995; Leonard-Barton, 1995) and intellectual capital a crucial resource of economic advantage in the knowledge economy (Stewart, 1997; Edvinsson and Malone, 1997). The role of the university as an economic and social institution has become increasingly important (Florida and Cohen, 1999). Universities have long been involved in so-called ‘third-stream’ activities (Geuna and Muscio, 2009), and there is evidence that they have significantly contributed to economic development and firm competitiveness. However, a deeper connection between university and industry is being seen as essential, and this requires a structural change in the role of universities within the national innovation system as well as a modernisation of their managerial and organisational skills (European Commission, 2009). The expectation is that universities not only produce new knowledge, but that this knowledge be related to established social and economic targets (Laredo, 2007). In this view, universities should (a) intensify their involvement in the economic and social development; (b) increase the commercialisation of research results, patenting and licensing activities; (c) institutionalise spin off activities; (d) introduce managerial and attitudinal changes among academics with respect to collaborative projects with industry (Van Looy et al., 2004).

Since the 1980s, many policy makers have been pushing for this ‘second revolution’ in academia, above all having in mind the possible enlargement of external funding options for universities and the consequent relief for government budget. Now, while some countries are in the process of rethinking the role (and funding) of research institutions within their national innovation systems (Arnold et al., 2006), several European country governments are applying increasing pressure for universities to raise research funding from industry and to contribute actively to industrial innovation. As Geuna (1999) notes, since the early 1980s European governments have been intervening more directly in terms of guiding national research systems. This intervention has taken different forms in different countries, but is being driven by similar overall targets, which are promoting a contractual-oriented approach to university research funding, aimed at indirect control of the behaviour of universities through the introduction of (quasi-market) financial incentive schemes. These policies are meant to improve the efficiency of research funds and increase the accountability of universities as well as the pressure to reduce their costs, this latter objective being crucial as a consequence of the constraints on public budgets resulting from the enforcement of the Maastricht criteria (Sörlin, 2007). Confirming this, Auranen and Nieminen (2010) compare the funding environments of university research in eight countries, investigating whether more competitive funding schemes result in a more efficient production of scientific publication. The authors find that the idea of output

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