



Understanding the selection processes of public research projects in agriculture: The role of scientific merit



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ABSTRACT

This paper analyses factors that affect the funding of agricultural research projects by regional governments and other regional public authorities. We study the selection process of agricultural research projects funded by the Emilia Romagna regional government in Italy, which follows funding procedures similar to many other European regional public authorities. Leveraging a unique dataset, a Heckman selection model demonstrates that the scientific merit of proposed projects is the primary selection criterion. Still, factors such as the experience of the proposal's reviewers and the gender composition of the reviewing team also influence whether or not a submitted proposal receives funding as well as the amount allocated to the proposal.

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Introduction

Public expenditure towards agricultural research is one of the main sources of productivity growth and enhances environmental sustainability in both developing as well as developed economies (Hsu et al., 2003; Renkow and Byerlee, 2010; Sparger et al., 2013).¹ Global public research and development (R&D) expenditure towards agriculture grew only modestly in the 1990s, and increased by 22% during the period 2000–2008, with substantial increases in China and India accounting for close to half of this global increase. On the other hand, the growth rate of public agricultural R&D investments slowed down between 2000 and 2008 for high-income countries (Beintema et al., 2012), even though their research intensity ratio (i.e. agricultural spending relative to agricultural gross domestic product) had been increasing steadily since the early 1980s.²

In the European Union (EU) public agricultural research funding has been progressively linked to regional policy, especially via rural

development measures (Labarthe and Laurent, 2013). Therefore, given that the rate of public support for agricultural research in developed countries grows slowly (Alston et al., 1998; Beintema et al., 2012; Pardey et al., 2006; Pardey and Beintema, 2001; Spielman and von Grebmer, 2004), understanding how regional public authorities select and fund agricultural research projects is becoming a key issue for policy-makers and researchers alike (Huffman and Evenson, 2006a, 2006b; Huffman and Just, 1994, 1999a, 2000).

Regional public authorities are increasingly concerned with both determining the optimal amount to allocate to research funds, as well as with designing appropriate mechanisms to select research projects (Huffman and Evenson, 2006b; Huffman and Just, 1994, 1999a; Pardey et al., 2006; Pardey and Beintema, 2001; Spielman and von Grebmer, 2004). To match the increased policy relevance, there is a growing body of academic literature that investigates how to best organize the distribution of public funds in agricultural research (Alston et al., 1995; Huffman and Just, 1994, 1999a, 2000; Just and Huffman, 1992). Indeed, improved understanding of the factors affecting the selection and funding processes applied by regional public authorities to allocate agricultural research funds, will be able to further inform the discussion on policy measures to be implemented in this domain.

A major insight from the abovementioned stream of research is that the effectiveness of the provision of public funds to research activities hinges upon the funding mechanisms employed (Alston

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¹ Whilst in developing economies the majority of R&D expenditure originates from public sources, in developed economies private contributions to agricultural R&D are predominant (Piesse et al., 2010). However, in these economies public funds are still a relevant source of support for agricultural R&D activities, especially towards more fundamental research (Piesse et al., 2010).

² Beintema et al. (2012) present a detailed assessment of public agricultural R&D spending at the global level, suggesting that 2008 is the latest year for which sufficiently reliable data are available.

et al., 1998; Braun, 2003; Huffman and Just, 1999b; Potì and Reale, 2007; Ruttan, 2001; Tabor et al., 1998).³ Most public funding authorities employ a portfolio of funding systems with changing environments and emerging needs, which guides the choice of system per case (Lepori, 2011). Compared to different systems,⁴ the so-called “peer-reviewed competitive grant program”, in which researchers compete with each other to receive funds, is becoming more popular (Hoekman et al., 2012; Huffman and Evenson, 2006a; Huffman and Just, 2000). In principle, competitive grants are: more responsive to current needs; provide increased flexibility; offer increased potential to attract the best talent through open competition; can lead to more efficient use of research resources since they rely on professional and peer review; and can better balance and complement other research resources and programs (Alston and Pardey, 1996).

In reality, though, competing for grants can be time-consuming and expensive, and, perhaps more importantly, it can also suffer from external pressures. Such pressures introduce different forms of favouritism in the decision process, and can eventually lead to suboptimal allocation of funds. As such, peer review tends to rely heavily on “old-boy” networks (Alston and Pardey, 1996; Alston et al., 2010). Moreover, competitive grants are usually oriented towards short term projects (3–5 years) despite the fact that agricultural research often requires long term funding (i.e. longer than 5 years for breeding programs).

In the “peer reviewed” system, the organizer of the grant competition invites interested parties to submit their research proposals through public calls that set the rules of the game. Research project proposals submitted by groups of researchers are then typically selected by a panel of (academic) researchers and/or experts (reviewers), after which they evaluate the proposals and award funding to those that they deem to be the best (Jayasinghe et al., 2001). In the most common setting, panels composed of individuals both external and internal to the funding agency, judge the proposals in different stages of the process. These reviewers are often experts from academia or research institutes, as well as bureaucrats whose main goal tends to be to check the congruency between the proposals and the submission criteria (Jayasinghe et al., 2001).

Empirical work on the factors that allow a given proposal to be funded has established that the chances of funding depend, amongst others, on the scientific merit (i.e. academic quality of the proposal), the suitability of the research topic, its societal impact, the proposing team, and the applicant(s)’ attributes such as academic affiliation, gender, and age (Ballesteros and Rico, 2001; Cole et al., 1981; Grimpe, 2012; Hoekman et al., 2012; Rasmussen et al., 2006; Reinhart, 2009; Santamaría et al., 2010; Viner et al., 2004). From these studies, two observations are of particular interest within the present work.

Firstly, limited attention has been given to specific funding systems for agricultural projects (the study by Rasmussen et al. (2006) on organic agriculture funding is an exception to this). Given the high investment returns on agricultural research, this lack of relevant work is surprising (Alston et al., 2000; Huffman and Evenson, 2006b). Along the same lines, the share of public research funds going into agricultural research is generally larger than the share sourced from private funds. This is primarily a response to the fact that the agricultural private sector is unlikely to sustain a flow of funds above the socially optimal level (Alston and Pardey, 1996), which in turn occurs because it consists of a large number of small businesses with limited access to financial means and limited

internal R&D capabilities (Alston et al., 1998; Huffman and Just, 2000; Pardey and Beintema, 2001). Thus, public funds tend to be the primary means to sustain an adequate flow of investments in agricultural research.

Secondly, the focus of research in this domain has mostly been on the demand side for the funds, e.g. on attributes of the proposal and the proposing team, leaving the supply side largely unexamined. In general terms this means that we know relatively little about how attributes of the reviewers (i.e. academic experts and/or bureaucrats) as well as the reviewing team can affect the funding outcome of any given submitted proposal. In similar settings, such as the allocation of research funding to researchers, evidence suggests that the supply side can *also* be influential in shaping the distribution of funds (Alston et al., 1998; Bornmann and Daniel, 2007; Cole et al., 1977; Jayasinghe et al., 2001; Laudel, 2006; Marsh et al., 2009; Rasmussen et al., 2006). Accordingly, several candidate factors can explain the allocation of research funds by regional authorities. For example, the reviewing team’s gender composition, as well as its overall tendency to reject or approve proposals, are relevant factors if we take into account concerns about favouritism and opportunistic behaviour (Sonnert, 1995).

These considerations prompted us to examine how both demand and supply factors can influence the allocation of agricultural funds provided by regional governments. More specifically, we focus on understanding to what extent factors other than scientific quality and merit, influence the outcome of the selection and funding of agricultural research project proposals.

As our case study, we analyse agricultural research funds allocated in the Emilia-Romagna Region (ERR) in Italy. ERR presents an interesting template for our study for a number of reasons. Namely, the “competitive grant” fund allocation procedure followed by the regional authorities at ERR, greatly resembles the procedures followed by many other regional public authorities in Europe (see for instance the cases described in Bornmann and Daniel, 2006; Eickelpasch and Fritsch, 2005; Garcia and Menéndez, 2004; Henningsen et al., 2012), which adds to the generalizability of our results. Furthermore, the large number and diversity of funded projects by ERR (on average, from 2001 to 2006, €12 million was awarded annually, spread over 100 proposals), indicates that a number of factors can play a role in determining which proposal receives funding.

To empirically study the allocation of agricultural research funds of ERR, we were provided with a rich dataset. The dataset not only reports information on both award winners and submitted proposals that did not receive funding, but also reports the amount of funding allocated to each proposal. Drawing from this dataset, we use a Heckman selection model to study the amount received per proposal, whilst accounting for potential selection bias that could result from examining award winners’ submissions only. Furthermore, the dataset reports features of the proposals’ applicants, as well as features of the team that reviewed the proposal. Accordingly, we construct a novel empirical model that simultaneously measures the effects of both supply and demand attributes on the likelihood that a proposal gets funds, as well as on the amount it receives if it is funded.

We proceed with the rest of the paper as follows: in the next section we present our theoretical expectations for the factors that shape the allocation of research funds. In Section ‘The selection process adopted in the Emilia-Romagna Region’ we elucidate the details of the funding procedure in ERR. In Section ‘Methods and procedures’ we present our data and empirical methodology. In Section ‘Data sources and presentation’ we present our results, after which we conclude in Section ‘Results’.

³ Dalrymple (2002) provides a comprehensive review of the historical literature about the social returns to research investments in the public and private domain.

⁴ See Huffman and Just (2000) for a detailed discussion of the different funding allocation mechanisms.

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