Multi-dimensional contracts with task-specific productivity: an application to universities

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Abstract Academics produce science and teaching which requires specific unobservable characteristics. Applying the multi-dimensional screening methodology of Armstrong and Rochet (European Economic Review, 43, 959–979, 1999), it is shown that universities optimally propose a menu of contracts to academics: high powered incentives for those who are productive and lower ones for other agents. In some cases, the university can write a single contract for both tasks to increase production. An academic is then expected to produce more teaching to show that she likes science, which is an argument to produce science and teaching in a single institution: universities. These results are discussed in light of economic, sociological and educational literature.

Keywords Multi-dimensional screening · Universities · Labor contracts

JEL Classification I23 · J41 · L14

1 Introduction

Universities have two main tasks: to produce science, that is, contribute to the advancement of knowledge and teaching, that is to train students and disseminate knowledge. However, it is not clear that the same institution should do both. There is a vivid debate on the subject.

From a historical perspective, research entered universities only recently (see among others, Goldin and Katz 1999; Hattie and Marsh 2004). Before entering universities, research was produced under aristocratic patronage. Kings and nobility, concerned with the benefits of sponsorship (self-esteem, image, etc.), competed for
the production of novelty by “their” researchers (David 1998). According to many authors, Wilhelm von Humboldt brought research into universities during the nineteenth century (see, for example, Lenoir 1998; Schimank and Winnes 2000). His initial idea was the following: the role of the professor is to introduce students to the techniques of scientific problem solving and this should be done through research-based teaching: doing research with or in front of her students.

This practice proved to be successful, but nowadays most courses in universities, especially those aimed at undergraduates, are no longer directly in touch with recent research. Moreover, since the number of students has increased drastically, teaching tasks require more investment by professors. It is interesting that these complaints appeared just after the universities got their second mission: during the second part of the nineteenth century “the recognition dawned that the fusion of teaching and research providing the rationale for developing these institutions in fact hindered science’s advance, since the bulk of resources had to go into supporting time-consuming low level training” (Lenoir 1998).

Nowadays, the higher education institutions themselves have opposing views as can be seen when surfing their web pages. The main research universities want to build upon their recognized ability to produce science and suggest that research directly benefits the students. This leads to sentences like “Undergraduates, from the very first year, enjoy (...) research opportunities” or “research is to teaching as sin is to confession, one does not go without the other.” But the teaching colleges emphasize the unique devotion of their staff to students.

Besides these actors, the question of the separation of the production of science and teaching has recently received a lot of attention by academics. A stream of papers appeared with the decision by the United Kingdom to reward research excellence. It was then decided to assess the quality of the research output of higher education institutions and to fund these institutions according to their results. This move by the United Kingdom led scientists and governing bodies to attempt to have an educated view on the pros and cons of having a single institution to produce both science and teaching.

Most papers emphasize the ex post, moral hazard problem of multitasking. In a seminal paper, Holmstrom and Milgrom (1991) study contracts that reward efforts as a linear function of the observed outputs. They show that under these conditions, encouraging effort on one task generally crowds out efforts on the other tasks. In our case, this means that putting high powered incentives on research (promotions, opportunity to travel, peer esteem, etc.) reduces the attention on teaching (Dewatripont et al. 2001).²

¹See also Dewatripont et al. (2000) for a discussion.
²Many observers (see Qamar uz Zaman 2004) consider that incentives are too generous on research which leads academics to neglect teaching. Tullock (1993) states: “under present circumstances, academic salaries are determined almost entirely by research and very little by teaching, with the result that little attention is given to teaching”; and later in the same text describing the different types of professors, “one type that most of us have encountered around academic areas is the man who is deeply devoted to teaching and puts a great deal of time and energy into that activity. He normally is making significant financial sacrifice because teaching just does not pay in modern academe”. The evidence is less clear however. Dearden et al. (2001) report that the mean weight given to research is 55% in tenure decisions (they survey