

# Are there real effects of licensing on academic research? A life cycle view

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## Abstract

Do financial returns to licensing divert faculty from basic research? In a life cycle model in which faculty can conduct basic and/or applied research (the latter can be licensed) licensing increases applied relative to basic effort. However, leisure falls so basic research need not suffer. If applied effort also leads to publishable output, then research output and stock of knowledge are higher with licensing than without. In a tenure system licensing has a positive effect on research output unless license incentives are high. Overall results suggest a positive impact of tenure on research output over the life cycle.

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The dramatic growth of entrepreneurial activity associated with university licensing in the last few decades has prompted much debate. While universities tout this as evidence of the increasing role of universities in economic growth, others question whether such activity compromises the basic research mission of universities. For example, a provocative *Atlantic Monthly* cover story on the “kept” university suggests the increasing trend of university industry deals (such as the Novartis–Berkeley research agreement in the late 1990s) could seriously compromise research agendas, diverting faculty toward research in corporate interests. The increasing trend of faculty to hold positions in startup and corporate boards further suggests faculty may increasingly face conflicts with the primary responsibilities in research (Boyd et al., 2003; Zerhouni, 2004).

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Scholarly analysis of these issues is limited and provides mixed results. Lach and Schankerman (2003) provide empirical support for the view that university research responds to financial incentives, showing that invention disclosures are positively related to the share of license income accruing to inventors.<sup>1</sup> However, Thursby and Thursby (2002, in press) suggest that increased disclosure activity is more reflective of an increased willingness of faculty to engage in commercial activity than a change in research profile. Their study of faculty in six major research universities shows that over the last two decades, the probability a faculty member will disclose an invention has increased tenfold, while research productivity has remained roughly constant. In essence, despite the importance of the issue, we know little about the effect of faculty involvement in licensing on the nature of research.

In this paper, we construct several life cycle models of faculty behavior that allow us to examine this and related issues. In the models we consider, the faculty member faces a fixed teaching load and chooses the amount of time to devote to research (which can be either basic or applied) and the amount of time to take as leisure. We model both the puzzle solving and financial motives for the faculty member to conduct research, and we consider her behavior with and without the possibility of licensing. This allows us to examine the effect of licensing on the research mix, as well as the total amount of time working, throughout the life cycle. We also examine the effect of the tenure decision on the type of research conducted with and without the possibility of licensing.

We show that, with or without licensing, and with or without a tenure system, the faculty member devotes more time to research early in her career, so that leisure rises over time. In that sense, licensing does not alter the life cycle pattern. We show that there are, nonetheless, real effects of licensing since it yields a higher ratio of applied to basic effort and lower leisure throughout the life cycle. Thus, as suggested by Lach and Schankerman, faculty respond to economic incentives. Importantly, however, this diversion does not mean that research is compromised. In our models, leisure is the activity most compromised, so that total research effort rises, and in most of the models we consider, basic effort rises with the introduction of licensing.

The implications of licensing for research output and the stock of knowledge depend not only on the effect on applied and basic effort, but also on whether applied effort contributes to the stock of knowledge. We show that in the worst case scenario, the applied effort involved with licensing is pure development and adds nothing to the stock of knowledge. If, however, the applied effort involved in licensing leads to publishable output as well as licenses, then the outlook is more favorable. In this case, we show that research output and the stock of knowledge are generally higher with licensing than without. The exception to this is when a tenure system is coupled with very high incentives to license.

In Section 1, we discuss prior work in this area and how this paper contributes. Section 2 presents the basic model. Section 3 presents life cycle behavior for three different scenarios: a development model in which only basic effort contributes to the stock of knowledge, a complements model in which basic and applied efforts are complements in the production of both research and licenses, and a model in which basic and applied effort are substitutes in research production. Section 4 presents results when tenure is introduced to the model, and Section 5 concludes.

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<sup>1</sup> When a faculty member believes she has an invention with commercial potential, she files a formal disclosure of the invention to her university's technology transfer office. This disclosure is the first step in licensing.

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