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ABSTRACT

Higher education institutions and disciplines that traditionally did little research now reward faculty largely based on research, both funded and unfunded. Some worry that faculty devoting more time to research harms teaching and thus harms students' human capital accumulation. The economics literature has largely ignored the reasons for and desirability of this trend. We summarize, review, and extend existing economic theories of higher education to explain why incentives for unfunded research have increased. One theory is that researchers more effectively teach higher order skills and therefore increase student human capital more than non-researchers. In contrast, according to signaling theory, education is not intrinsically productive but only a signal that separates high- and low-ability workers. We extend this theory by hypothesizing that researchers make higher education more costly for low-ability students than do non-research faculty, achieving the separation more efficiently. We describe other theories, including research quality as a proxy for hard-to-measure teaching quality and barriers to entry. Virtually no evidence exists to test these theories or establish their relative magnitudes. Research is needed, particularly to address what employers seek from higher education graduates and to assess the validity of current measures of teaching quality.

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I. Introduction

In recent decades institutions of higher education have increasingly emphasized research, with faculty being promoted and rewarded more and more on the basis of research. Once the trademark of prestigious institutions, research emphasis for faculty has now moved down the prestige ladder. It has come to permeate many disciplines and professional schools that traditionally did not emphasize it in the past. Institutions outside the United States have also increased their emphasis on faculty research recently, making it a global phenomenon. For faculty who engage in *funded* research, there is no economic mystery: research is the product being sold and it makes sense to emphasize it. However, the rewards apply to *unfunded* research also. Moreover, the phenomenon of faculty rewards for research is prevalent and growing in the humanities, law schools, and other disciplines with little or no funded research—a trend that has persisted for decades, across schools and across geographical boundaries.

A number of critics, from the popular press to scholars (Bennis and O'Toole 2005, Boyer 1990, Hearn 1992, Huber 1992, Kennedy 1997, Sykes 1988) and including former Harvard University President Derek Bok (1991, 1992) contend that higher education is neglecting teaching in favor of research to the detriment of students' education. Since faculty time is a limited resource, there must be at least some margins on which the incentives for faculty to put time into research become incentives for faculty to reduce time devoted to teaching.

Others argue, however, that research and teaching are mutually sustaining. Goldin and Katz (2008, p.263) state "the modern university is… a production center in which the research of one part enhances the teaching and research of the other parts." The Teagle Working Group (2007) argues that thinking for oneself and other forms of deep-learning are particularly important aspects of education and that researchers are better able to produce such learning.

Some evidence indicates that the market agrees with the view that research aids education—or at least those elements of education valued by employers: Tracey and Waldfogel (1997) find that the research prestige of a business school appears to raise student earnings, using observable characteristics to predict what students would have earned without the degree. Supporters of this view contend that another, much more recent trend of employing more teaching-only, non tenure-track faculty, hurts student learning.

Education is now widely believed to be the foundation of a society's productivity and economic well-being (e.g., Economic Report of the President 2000, chapter 4, Goldin and Katz 2008). It is crucial to know whether the emphasis on faculty research harms, helps, or has no impact on teaching and, therefore, on student learning and human capital accumulation. The answer to this question should shape the role of research in higher education. To assess the claims of harm and claims of support, we need to understand what drives the emphasis on research and use that understanding to see if and how public policy could improve the situation or the public perception of this trend.

Economic theory to date has not addressed this question directly. While a number of theoretical economic models of higher education exist (see Winston 1999, for a summary), their implications for faculty research emphasis, and the ramifications on teaching quality and higher education outcomes, have not been explored. In this paper we review, synthesize, and extend the higher education theoretical literature to extract explanations for the phenomenon of increased faculty incentives for research even when there is no funded research. We also consider the welfare implications of the different theories and the policy implications that follow. Relevant theories range from claims that research improves overall effectiveness of faculty as teachers, to more cynical arguments citing market failures and agency problems as the source of increased

research emphasis. The various theories do not always fit together to provide a cohesive answer to the question at hand. Moreover, some of the theories suggest different and even divergent policy implications, demonstrating the importance of further research in this area.

II. Trends in Higher Education and Economic Puzzles

The rising importance of research and the outcry against it began with the founding of the research university at the end of the 19th century. The story told by non-economists is one of an entrenched ivory tower culture that favors research and ignores students' education (Cuban 1999). To an economist, such a story is implicitly one of market failure due to barriers to entry: those universities that have prestige can choose to emphasize research over teaching because they face a captive market. But this economic explanation suffers under close scrutiny. Using everything from financial aid to amenities, institutions of higher education compete vigorously to get the best students (Frank and Cook 1995). There are many universities at the top, competing with one another, and none enjoy true monopoly power at any given prestige level. At all levels, universities and colleges do move both up and down in rank: consider the rise of both Boston University (BU) and New York University (NYU).

Although higher education is clearly not a perfectly competitive market, we contend that it should nonetheless be fairly competitive. Consider the various factors interfering with competition. First, higher education services are highly heterogeneous. However, heterogeneous goods are consistent with monopolistic competition (e.g., banking services, computers, automobiles). Second, the multi-dimensional nature of higher education creates a bundling problem: people cannot shop separately for the different features of higher education (e.g., social environment, practical training, amenities, intellectual excitement, etc.) and therefore a

competitive market cannot reach equilibrium in each dimension. Nonetheless, since there are so many players, we would expect to see some competition along each valued dimension.

Third, there is imperfect information: students do not have the information to judge quality education. The imperfect information is partially a consequence of the highly complex and multi-dimensional nature of higher education (Clotfelter 1996, chapter 2; McPherson and Winston, 1993). However, we contend that the importance of such imperfect information is exaggerated. Major books and magazines, such as Barron's Guides and US News and World Report, investigate the institutions in general, evaluate them, and frequently describe them in detail. People choosing an institution frequently know other students who have gone there. Certainly most of the evils described by popular critics, like very large classes or teaching assistants with poor English, are generally known or could be learned easily. Moreover, the informational asymmetries of higher education are probably significantly less than those in many professional services, such as psychotherapists or lawyers. While those markets are far from perfectly competitive, competitive forces nonetheless exert considerable influence.

Fourth, there are barriers to entry in higher education. Creating an entirely new institution is very difficult, particularly in light of the role of reputation on the demand for its services.[1] However, the effect of these barriers is probably limited. Many institutions exist now and expansion is common. Modifying one's market niche is certainly possible. Both NYU and BU are examples of universities that have risen dramatically in their prestige and their popularity among students (Kirp 2003).

Empirical evidence lends support to the claim that the market for higher education is fairly competitive. Some earlier analyses have used the extent of price competition, largely

[1] Goldin and Katz (2008) report that "few private institutions were founded after the turn of the century, and those that were have not been as prestigious" (p. 256). They contend that this is due to economies of scale and scope which create barriers to entry. We discuss this theory in section V.C.

occurring through financial aid, as a measure of the competitiveness of higher education. Hoxby (1997) offers some empirical evidence that the market structure of higher education used to consist of geographically-based local monopolies but is now an increasingly competitive industry. Rothschild and White (1993) and Zemsky, Shaman, and Shapiro (2001) also suggest that higher education is relatively competitive.

If students prefer that faculty emphasize teaching more and research less, and if higher education is competitive, we would expect to observe competition on the basis of teaching emphasis and quality. However, when seeking to advance their positions as sellers of education services, institutions generally work on their research reputation, and rarely on their teaching reputation. In fact, universities emphasizing research have gotten more and more popular. For example, Berkeley, the flagship campus of the University of California, dramatically increased its share of the best UC students using this strategy (cited in Frank and Cook, 1995). Universities such as BU, NYU, and the University of Texas at Austin, which have moved up in rankings have apparently done so by improving their research status, primarily by attracting established researchers from other universities (Kirp 2003, chapter 4). The universities that put the most emphasis on research are precisely the universities that students make increasing efforts to attend. Even those small liberal arts colleges that emphasize teaching quality have increased their emphasis on their research reputations.

Most strikingly, professional schools, such as business schools, that at one time did not stress research for their faculty, have come to increasingly emphasize research. For example, business schools once promoted faculty primarily on the basis of teaching, consulting, and the writing of cases to be used in teaching at other institutions. However, now business schools emphasize research similar to that done in departments of arts and sciences (Bennis and O'Toole

2005). Law schools were once primarily concerned with law review articles that were similar to judicial decisions. They too have shifted their interest to research.[2] More recently, architecture schools have been changing their faculty research expectations. Empirically, whatever competitive forces are at work in the education services market, they appear to reward the research reputations of institutions of higher education far more than they reward their teaching reputations.

The persistence and growth of the rewards for research in the absence of clear and serious market failures would lead an economist to infer that consumers' revealed preferences document genuine value—at least private value. If we understood which features of faculty incentives for research are genuinely valuable to education and which ones are not, we could devise research incentives that preserve their valuable effects while reducing their detrimental effects. That is essentially the vision of Boyer (1990) and Glassick et al. (1997) who advocate "redefining scholarship" and support the scholarship of teaching and learning (Carnegie Foundation 2009).

The competitiveness of the market for higher education and the pressures of such competition are better understood in the traditional profit maximization setting. However, Rothschild and White (1993) and Feldstein (1993) note that higher education institutions consist almost exclusively of not-for-profit institutions for which the profit maximization objective function is replaced with some less-understood objective function. If the objective functions of higher education institutions favor research, and if the institutions are able to collude to keep out for-profit institutions, they could continue to favor research over teaching without competitive forces disturbing the equilibrium. However, this analysis implies that for-profit institutions of higher education would enjoy a clear competitive advantage, contrary to general perceptions and

[2] The transformation of business schools began in the 1960s, while that of law schools began later, in the late 1970s.

the general lack of for-profit success, even acknowledging the recent success of the University of Phoenix (Breneman, Pusser, and Turner 2006).

What are the economic forces behind the incentives for faculty research even when teaching, not research, is the only product sold? If education quality truly suffers from the emphasis on research, why don't particular institutions increase their student demand by emphasizing faculty teaching relative to research? Is it a market failure? If so, what is the nature of that market failure and could public policy improve the situation? If higher education has a serious principal-agent problem, we should at least be able to specify what it is. Or does faculty research benefit student learning sufficiently to make the growing emphasis on research optimal? Should the growth of teaching-only faculty be opposed?

The driving forces behind faculty research incentives matter a great deal for several reasons. First, education creates human capital, and human capital is increasingly central to the productivity and thus wealth of our society (Economic Report of the President 2000, chapter 4). Anything that harms the accumulation of human capital harms our economic well-being. If faculty research incentives harm education, they are a serious problem.

Second, higher education is costly, costs are rising rapidly, and those rising costs may be driven in significant part by the growth of research (Martin 2002; Ehrenberg, Rizzo, and Jakubson 2003). Certainly every faculty member faces limited time resources and must decide whether to allocate the marginal hour to teaching or research. If the added costs of additional research do not bring sufficient added benefits, a reallocation of resources from research to teaching would improve society.

Third, new information and communication technologies could potentially alter dramatically both the education process and the overall structure of higher education institutions.

For example, much more education could be conducted through software. The merits of such potential changes are controversial. Both the institutions themselves and government, as funder and regulator, must decide how to respond (Levine 1997, Christensen, Horn, and Johnson 2008).

III. Theories of higher education's value and how they could explain the value of researchers in providing education

To understand why we see increased research incentives, and their effects on teaching performance, educational outcomes, and society as a whole, we must construct a comprehensive theoretical framework. Such a framework should explain the sources of demand for education, characterize its production function, and finally describe the market structure under which education is provided. Therefore, we review in turn each of the theories of why higher education is demanded, exploring their implications and extending the theories where possible to explain the emphasis on faculty research. Where possible, we attempt to synthesize the theories and discuss their implications for one another with regard to faculty research incentives.

The theories presented are not mutually exclusive and could all be relevant. Moreover, since both students and employers are heterogeneous, higher education could be valuable to different individuals for different reasons. Since the economic forces driving rewards for funded research are obvious, our focus is on unfunded research. We consider both graduate and undergraduate education.[3] Since the economic motivation for professional education is the most salient, it is of particular interest.

III.A Research aids teaching

How and why does higher education raise the earning power of students? According to human capital theory, education increases general human capital and the productivity of students

[3] Doctoral programs will be excluded from this discussion, because what is demanded from most Ph.D. programs depends on what is demanded from faculty and therefore analysis is circular.

in the labor market. But even in the context of general human capital, there is a range between truly general analytic skills and more specialized general human capital. In fact, one could think of a continuum of human capital ranging from very general to firm specific. The first notch down this continuum would consist of very broad skills, for example, learning how to think for oneself; the second category involves more specific general skills, like, for example, learning algebra; a third might include more industry-specific but yet general skills, like programming in a particular language; and the last category includes firm-specific skills (e.g. knowing a firm's accounting practices). The last category of skills, otherwise known as specific human capital in the literature, is usually obtained through training or learning on the job rather than education, and therefore we exclude it from our discussion. Our point is that even general human capital acquired in school has varying degrees of specificity.

Faculty research could be critical to the enhancement of all three shades of general human capital identified above. First, researchers may be better at teaching higher order skills, such as the ability to learn for oneself. Engaging in academic research requires complex skills in identifying and making sense of otherwise chaotic information. Research may serve as proof that some faculty have acquired the necessary skills to think and research independently, making them better able to teach such skills to the students. Since research is essentially the act of learning for oneself, there is a certain sense in this argument. However, evidence is needed to back up this claim.

Second, faculty engaging in research may be better at teaching more specialized general human capital. This is especially true for fields undergoing rapid evolution, where perhaps only faculty who do research are capable of possessing and communicating up-to-date content. For example, in biochemistry, there may be recent discoveries that are important to those entering

common careers, such as physicians or drug company sales representatives. Information technology is another area where up-to-date knowledge is critical to mainstream practitioners and knowledge is evolving rapidly. Moreover, the growing complexity of many fields could be making the specific, cutting-edge knowledge of research faculty more relevant in "real world" applications. Examples of this phenomenon include intellectual property issues in law and even statistics and economic models in baseball (Lewis, 2003).[4]

For many subjects, however, the need for up-to-date skills or knowledge hardly seems compelling. For example, how does algebraic topology contribute to the teaching of calculus to future engineers? Typical consumers of writing instruction want to learn how to communicate well in order to be able to write a compelling business plan or office memo. They seem unlikely to feel that content on literary criticism is an important element of the educational service.

Third, research could make faculty better selectors of course content, and also better at conveying knowledge in its appropriate context. Specifically, they could be better at spotting and choosing to teach deeper concepts or more important topics. In this case, the content of the research itself could be important, not for the research *per se*, but for making the professor able to determine what is important in specific subjects.[5] For example, in accounting and financial management, a researcher who focuses on dynamic stochastic calculus may emphasize in his teaching the importance of thinking about and dealing with risk and uncertainty, in addition to presenting the usual financial management and accounting practices. The research itself would only be useful to the extent that it would shape the subject that the researcher chooses to present

[4] We thank Larry Katz for this striking example.

[5] This theory can explain why business school faculty conduct research in subjects relevant to business. Why not just get brilliant mathematicians as faculty for all students? The answer seems to be that part of the role faculty play is in spotting key ideas, trends, or facts related to subject matter. Thus, while the papers that business school faculty produce may not be important for business school students, the ability of those faculty to discern deeper trends that will be relevant to business people could be critical. We thank Dan O'Flaherty for this point.

and the context it is presented. Such teaching may add to industry-specific knowledge in a broader sense than would simply presenting principles of financial management from a practitioner's point of view. Active researchers would also be continuously changing and improving their course content, not simply in response to changes in the subject matter, but also in response to the exchange of ideas with colleagues in conferences. Researchers are continuously testing their knowledge and ideas in a wider forum than the classroom, and are, therefore, less likely to fall into patterns.

Finally, faculty research could provide "motivational quality" to teaching if researchers inspire or intimidate students into providing more effort. Perhaps, students' productivity can be improved by practice in figuring things out for themselves, conditional on any level of innate ability. Researchers could be more demanding that students think for themselves, perhaps due to a distaste for explaining critical but "obvious" concepts or perhaps due to researchers' own taste for thinking things through. In sum, researchers could teach students not to become passive consumers of knowledge. In addition, researchers could serve as role models, because, in a way, they continue to be students themselves (Teagle Working Group, 2007).

Empirically, the link between research and teaching quality has been found to be weak at best. A meta-analysis of 58 studies by Hattie and Marsh (1996) finds that there is no relationship between research and teaching. The studies reviewed were published between 1949 and 1992, included mostly research universities, and were conducted across disciplines and schools. While the overall relationship between research quality and teaching quality appears slightly positive at first, Hattie and Marsh note that the effect has diminished over time. Interestingly, studies focusing on humanities and natural sciences showed that the research-teaching relationship was very similar and close to zero for both. In contrast, social sciences displayed a stronger positive

relationship between research and teaching. Finally, this study cites some evidence that faculty knowledge of the topic, instructor enthusiasm, and organization of subject matter had a positive effect on teaching quality.

III.B Higher Education – A Consumption or an Investment Good?

The discussion in the previous section assumes implicitly that higher education is an investment good. However, higher education can also be viewed as a consumption good. As a consumption good, students enjoy learning or being in an academic environment. Faculty research may play a role in the value of higher education as a consumption good, and through this channel affect the overall quality of education produced. Students could enjoy learning about research or participating in research themselves. This is clearly important to some students (Light, 2001) but is probably not common among large numbers of students. Faculty research could also contribute to higher education as a consumption good if students like to be around "celebrity" researchers, just as people like to be around television personalities (Cowen, 2000). Value as a consumption good depends on individual tastes. If faculty research is particularly valuable to the *best* students, it could attract those very best students.

Education's roles as both consumption and investment good could interact. Consider Rothschild and White's (1995) theory that fellow student quality is an input into the value of education (as an investment good), because students learn from one another. This theory implies that the price of education takes the form of net payments for services provided and rendered. Empirically, the theory is validated by the extensive and rising use of merit-based financial aid (Winston 1999, 2001). Suppose that faculty research enhances the value of higher education as a *consumption* good, particularly for high quality students. In that case, faculty research raises the

consumption good value to those students who raise the investment good quality of education for all students.

It is not clear empirically to what extent education is a consumption good versus an investment good. While higher education is certainly somewhat of a consumption good, it is primarily seen as an investment good whose main purpose is to raise the earning power of students (Freeman, 1986). The large government subsidies for higher education, the willingness of middle- and working-class families to make significant sacrifices, and the stated beliefs of the public about the role of higher education (Chronicle of Higher Education, 2003) provide support for the view that higher education is primarily seen as an investment good.

Over the last two decades, incomes at the top of the income distribution have grown dramatically, raising demand substantially for everything demanded by high income individuals. If faculty research contributes to the value of education as an investment good or as a consumption good for wealthier individuals, then demand for faculty research could have risen indirectly due to rising demand for education driven by higher incomes (Clotfelter 1996).

IV. Education as a Signal

A more cynical take on the value of higher education is the signaling theory, in which education has no intrinsic value, the opposite of the human capital theory of education. Rather, education serves only to reveal innate ability that is otherwise difficult for employers to detect (Arrow 1973, Spence 1973, Stiglitz 1975, Weiss 1995).[6] Consider the theory in its simplest form. Workers differ in their innate productivity and they know what it is. However, employers cannot observe these productivity differences. The cost of being educated is higher for low productivity workers, for ill-defined reasons that could include both psychic costs and the time it takes to get

[6] Screening and signaling are formally distinguished by which player makes the first move in a game-theoretical sense. In our context, this distinction not important.

a given amount of education. By making salary dependent on education in the appropriate fashion, only the more productive workers select to receive education. In the purest form of the theory, education plays no direct role whatsoever in increasing workers' productivity. Consequently, resources spent on education are wasteful, except that they are needed to reach a separating equilibrium and the separating equilibrium is valuable. A less wasteful way to achieve the same separating equilibrium would be socially beneficial.

We extend the theory to incorporate research. In a nutshell, we claim that research may allow the separating equilibrium to be achieved more efficiently, with fewer resources wasted on education. This occurs if better researchers are "worse teachers", at least to the bottom of the ability distribution—or more specifically if better researchers make education more costly to those at the bottom of the ability distribution. As a result, better researchers can be better screeners of the different worker types. In the spirit of the signaling theory, we assume that education is not intrinsically valuable, but its value lies in achieving a separating equilibrium between low- and high-ability workers. In this setup, research is socially valuable not because of any intrinsic usefulness, but because it achieves the separation between high- and low-ability types more efficiently.

IV.A The Signaling Model Revisited

Generalizing Spence's (1973) model, workers of type H have a lifetime marginal product of w_H and incur a cost c_H per year of education obtained, workers of type L have a lower marginal product of w_L and incur a higher cost of c_L per year of education obtained. (Thus, $w_H > w_L$ and $c_L > c_H$.) If employers set a pay schedule such that anyone with more years of education level greater than a minimum education level, E*, receives the higher wage, w_H, and anyone with less education receives the lower wage, w_L, then workers will self-select appropriately and there

will be a separating equilibrium, provided that E* is chosen so that $w_H/c_L < E^* < w_H/c_H$.[7] Essentially, E* must be chosen so that only H types find it beneficial to get more education, but not the L types.

Consider how this equilibrium is affected by the technological changes of the last 25 years. The return to higher productivity has risen, so that w_H has grown. Lower productivity workers now have a greater incentive to get E* education, despite their higher per-year education costs of c_L. If employers do not raise E*, lower productivity workers will get more education and the separating equilibrium will break down. Therefore, employers need to raise E* accordingly.

Spence's model was designed to be parsimonious to make a point. Consequently, its comparative statistics are not rich enough to accommodate and explain some recent developments. While increasing w_H, technological advances have also made possible the substitution of capital for low-skilled labor, thus resulting in falling w_L. According to the model, this trend should have no effect on E*, since the only wage that matters in the separating equilibrium is w_H. Intuitively, however, declining wages for the less educated w_L should affect how much education low-ability workers choose.

This model is limited by the vagueness and simplicity of the psychic costs. Psychic costs in the model increase linearly with years of education; in reality, they could increase hyperbolically. Would the separating equilibrium break down in the face of ever increasing levels of E* and even higher education costs? In addition, the financial and psychic costs of education could interact in certain predictable ways with each other and with market wages.

[7] Using the simplest, original Spence model, only the high skill wage, w_H, enters the equation. In other formulations, the skill premium, w_H-w_L, enters. The difference could matter because factors driving the decrease in the low-skilled wage are not necessarily the same as those driving the increase in the skill premium (Acemoglu, 2002).

Non-cognitive attributes, such as persistence, motivation, leadership skills, and societal values have been linked to higher returns, net of education (Waddell, 2006, Heckman, Stixrud, and Urzua, 2006, Carneiro, Crawford, Goodman, 2007, Kuhn and Weinberger, 2005). These same non-cognitive attributes may be directly linked to psychic costs of acquiring education, and even financial costs, if people with these skills are more likely to find and obtain financial aid. Without substantial extensions to the model, it is unclear how the interaction between wages and education costs would affect the separating equilibrium.

Despite these limitations, the theory's predictions seem to be empirically confirmed. The last 25 years have seen rising quantities of education throughout society followed by an increase in what is considered the minimum education for various "good jobs". For example, today it is said that a college degree does not get you anywhere and you need a graduate degree (Collins, 2002).

IV.B Are Better Researchers Worse Teachers and Better Screeners?

Suppose, however, that an institution could raise the cost to less productive workers of obtaining education, c_L, then it would be possible to make getting E* years of education not worth it despite the rise in w_H, without raising E*. Since in the purest forms of the signaling theory, education is socially wasteful, raising c_L rather than E* would be good for society: sorting could be done with fewer wasted resources. Raising the cost of education to the less productive implies that institutions of higher education should make education more unpleasant or difficult for the less able! Accordingly, we define the "screening quality" of faculty as the degree to which they make education harder for poorer quality students or raise c_L.

Researchers may be poorer teachers to low-ability students and thus better screeners. Why might this be so? Researchers may be unwilling, or even unable, to "spoon-feed" their

students. Basic concepts may appear so obvious to researchers that it does not occur to them to explain those concepts. Those students who do not find the same ideas intuitively obvious and require explanation will be left behind. Thus, researchers might make it much *harder* for the students to learn the material, ensuring that only the most intrinsically able students are able to acquire the education or acquire it at a reasonable "psychic cost." In this case, research quality would be a proxy for lower teaching quality and consequently a proxy for higher screening quality.

A richer specification of psychic costs suggests other ways in which research could raise the costs of education for low-ability types. For example, psychic costs could be due to the disutility from studying minus the utility derived from learning and being in an educational institution (that is, utility from education as a consumption good). From the discussion in section III.B, it would be reasonable to assume that high-ability students derive more utility from education as a consumption good than low-ability students. This would suggest that the net psychic costs of education would be lower for the high-ability students, even if we were to assume similar disutility from studying for both high- and low-ability types. And if research increases the consumption value of education for high-ability types, this would be yet another way that research would increase the cost gap between high and low ability students and improve upon the separating equilibrium.

While these stories are essentially speculative, they have some face validity, being consistent with popular accounts of academia. They are also consistent with all of the empirical phenomena noted, including the growing popularity of research institutions and the spread of faculty incentives for research down the prestige ladder and into new disciplines. On the other hand, grade inflation and the small numbers of students who flunk out are empirical phenomena

at odds with this theory. Therefore, for the theory to be true, the process must be subtler. For example, it could work by making the educational process unpleasant for some students causing them to leave or not apply in the first place. Evidence that rising research prestige has driven out lower ability students would provide further empirical evidence.

The human capital theory and the screening theory could both apply simultaneously to various extents. Education may both increase the productivity of the students, and also serve as a signal to separate types, who differ in qualities such as persistence and motivation, not observable to employers. In the context of the above extension to the screening theory, better researchers could be better screeners because they would raise the psychic (or other) costs to the bottom of the distribution. However, if the human capital theory also applies, the bottom of the ability distribution would then accumulate less human capital and be less productive. If both theories apply to a certain extent, the benefits of faculty research for enhancing screening must be weighed against its harm in reducing human capital. From a policy perspective, the relative magnitude of the effects is critical, but determining them empirically is very difficult.

V. Market Failures as Drivers of Research's Role in Higher Education

In this section we consider several theories that would explain increased research incentives as the outcome of various other market failures. We illustrate how agency theory, public goods provision, barriers to entry, non-economic factors and tournaments may give rise to increased emphasis for research.

V.A Research Quality as a Proxy for Teaching Quality

We return to human capital theory and assume again that education raises human capital. We define teaching quality as the extent to which faculty increase the human capital of their students. The usual economic forces would then cause students to seek high-quality teaching

when choosing universities. Consequently, institutions would provide incentives for faculty to provide high-quality teaching. Such incentives would require *measures* of teaching performance.

Student evaluations are the most commonly used methods of evaluating teaching. Their use and importance have been growing since the 1970s (Theall, Abrami, and Mets, 2001). However, studies show that student evaluations may be an imperfect way of measuring teaching quality for a number of reasons outlined below. First, teaching quality is highly multi-dimensional. Certain components of teaching quality, such as liveliness and organization, are relatively easy for students to observe and, therefore, reward in evaluations. Other components of quality, such as depth of ideas or training people to think in new and abstract ways, may be much harder to detect and evaluate. These dimensions of teaching quality will be particularly hard to detect if the difference between more and less valuable ideas and skills only becomes apparent to students over many years of use.

Second, while the dimensions of teaching quality more easily observed by students are genuinely valuable (Theall, Abrami, and Mets, 2001), they may not be as important to employers as other dimensions. Rapid technological change is thought to frequently erode the value of specific knowledge and skills and to reward more general skills. Therefore, employers are thought to place a premium on people who can continually learn and think things through for themselves (U.S. Department of Labor, 1991). In that case, the most important features of higher education to employers will be the teaching of higher order skills and screening for such innate ability. Moreover, such abilities may be those for which employer information *ex ante* is poorest, and, therefore, the role of education to employers most important.[8]

[8] Hannaway (1992) points out that currently the assessment of teaching outcomes is better at measuring basic skills, rather than higher order skills. As a result, higher order skills, which may be equally, if not more important, may be

The problems associated with imperfect measures of teaching are exacerbated by a time inconsistency problem. Once students have entered a university with a given degree of teaching quality, their goals are different. Students would like to receive grades that are as high as possible while incurring the smallest psychic and/or time costs. Of course, students may also want to learn more in the belief that this knowledge will be valuable, at least eventually. However, for a given level of skills and knowledge obtained, students would prefer to obtain them at the lowest psychic cost. Moreover, to the extent that the value of education to employers lies in signaling or in the skill level of the average person with that education, rather than the actual skill level of the particular individual, students may not value the actual learning.

Consequently, a student will choose a university with high teaching quality *ex ante*. *Ex post*, the student takes the teaching quality as given, and minimizes his effort.[9] This conflict creates difficulties in using student evaluations of teaching to measure faculty performance. Empirical evidence suggests that faculty can raise their student evaluations by giving higher grades (Krautmann and Sander, 1999). Because students are already in the university and take its teaching quality as given, students will reward easiness by faculty. That is precisely the opposite of what the university wants to reward in order to improve its value in the market, because it was assumed that *prospective* students will choose universities largely on the basis of quality.

In sum, student evaluations appear to be plagued by two main problems. First, they most likely do not capture the more ephemeral dimensions of teaching quality, such as increasing the ability of students to learn for themselves. Consequently, there could be an asymmetric information problem in which students want to have faculty who are good at teaching these

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underprovided, due to both lack of appropriate measures, and distortions induced by the focus on basic skill measures.

[9] In fact, the Japanese system of higher education works this way. Entry is extremely competitive, but higher education itself is comparatively easy. We thank Claudia Goldin for making this point.

ephemeral skills, but lack effective means of measuring and contracting on teaching quality. Second, there could be an ex-ante/ex-post conflict, in which students would like to attend institutions with high teaching quality, but once enrolled, would prefer to spend less effort learning. Teaching evaluations, in this case, would reward faculty who demand less time and effort in their courses. Because of these problems with teaching evaluations, it is commonly perceived that it is easier to objectively evaluate research than teaching, and, therefore, research quality could be used as a proxy for teaching quality (Bok 1991, Siow 1997).

However, research may not be intrinsically easier to evaluate than teaching. After all, what is ground-breaking and really important in the creation of new knowledge is frequently unclear. In contrast, teaching is a more uniform product. Moreover, those who have the knowledge to understand cutting-edge research are often few in numbers and may be prone to their own biases and agendas. Those with the knowledge to evaluate good teaching are more numerous. Thus, the comparative ease of measuring research quality may not be intrinsic to the natures of research and education.

In fact, the relative easiness of evaluating research performance could be due to the relatively large resources devoted to evaluating research. Specifically, there is an extensive *existing* system of peer-review for research, including journal rankings, academic presses and grant review agencies. They also be used for education. So, *given* that we have available all these ranking systems for research work, and that we lack similar systems for evaluating teaching, it *is* easier to evaluate research. More resources are devoted to the evaluation of research: consider the time and effort that academics put into refereeing papers and reviewing grants. In contrast, few resources have gone into the evaluation of teaching (Langemann 2000), although this has recently begun to change. The only tool in general use is the student evaluation, with its widely

recognized limitations. However, the movement to measure educational outcomes in other ways is now gaining ground (Banta and Associates, 2002).[10]

If teaching evaluation received resources similar to those received by research evaluation, evaluating teaching might be easier than evaluating research. Perhaps it is the high *demand* for methods of evaluating research that drives the high quantity of such measures. Once the measures of research quality exist, they are non-rivalrous and can be cheaply used for the evaluation of teachers. Thus, rather than being based on differences in the costs of *supplying* valid measures of research and teaching quality, the relative ease of research evaluation could be due to differences in *demand* for methods of evaluating teaching and research.[11]

The measurement problem theory posits that students and universities value teaching but cannot measure its quality directly and therefore use research as a proxy. This theory lacks face validity, because it is inconsistent with the culture within universities, which truly values research. Research is prestigious—an issue discussed in section V.D. Moreover, whether research quality and teaching quality are even related is disputed (Feldman 1987, Hattie and Marsh, 1996). Even if research quality serves as a valid proxy for teaching quality, we have little understanding of why this is so. Nor do we know what aspects of research quality are relevant and what aspects of teaching quality they are proxying for—something that could vary by discipline. Such information would enable the use research as a proxy more effectively. Finally, measuring teaching quality directly, by developing and employing valid measures of teaching quality, would be better than using research as a proxy.

V.B Research as a Public Good

[10] The assessment movement took off with the First Conference on Assessment in Higher Education held in 1985. By the mid-90s, most states had adopted assessment mandates for public colleges and universities (Ewell, 2002).
[11] There is an issue of path-dependence here. Systems of peer-review for research evolved first, particularly in the physical sciences, for reasons to do with demand for (often funded) research itself.

Knowledge is a classic public good— truly non-rivalrous and generally not excludable. To the extent that research produces socially valuable knowledge, it too is a public good.[12] Being a public good might persuade school administrators, donors, government and others to support research, including support for cross-subsidies from education to research, implemented through both social norms and government policy. If the value of research as a public good has been rising, perhaps support for cross-subsidies has risen also. However, if it were possible to identify what unfunded research is desired and in what quantity, it would be more efficient to fund it directly, rather than through cross-subsidies between teaching and research that raise costs and lower quality of higher education services. On the other hand, the transaction costs of identifying valuable research projects could make the cross-subsidy of unfunded research by education a second-best solution.

Donors support higher education presumably because they believe the institutions' products are underprovided public goods or goods with positive externalities. Education is believed to have positive externalities and therefore is also worthy of donations. When donations are made in an unrestricted way to the institution, it is unclear whether donors wish to support teaching, research, or both. Donors may believe that the institutions are better at identifying which goods should be subsidized and in which quantities. Or if donors are too small to acquire the necessary information for earmarking contributions, they may resort to institutional endowments for lack of better alternatives. In reality, private donors are increasingly contributing their funds for specific uses. Brewer, Gates, and Goldman (2001) estimate that 70% of private donations are made in the form of restricted donations, rather than blanket contributions to the university's endowment. Therefore, it becomes less clear why research

[12] Some argue that research has positive externalities. The implications of positive externalities are the same as the implications we describe for public goods.

would have to be funded via cross-subsidies from teaching, since, if the intention of philanthropists is to subsidize it, they could do so in a more explicit way.

It could be argued that unfunded research has more pronounced public good attributes than funded research. In particular, unfunded research cannot be patented, restricted in circulation, or influenced by the agendas of the donors (Weisbrod, Ballou, and Asch 2008). Perhaps consumers of unfunded research do not have financial means to fund it directly. Or perhaps government is not as good as universities at discerning which unfunded research projects will result in valuable knowledge — public goods. Subsidizing unfunded research, therefore, would be socially beneficial.

V.C Barriers to Entry

Faculty control both the issuing of PhD-s and the hiring and promotion of their colleagues. This could be because administrators lack the necessary information to evaluate faculty performance and decide on hiring, promotions, and granting of PhDs. Alternatively, this control could be due to governance rules that serve no legitimate purpose but reflect regulatory capture by faculty.[13] Regardless of the reason, this control enables faculty to ensure that only research-oriented people enter and stay in the profession, erecting a barrier to entry. Barriers to entry in the profession may then result in rents for employed faculty.

Research could be a consumption good for faculty. If faculty enjoy engaging in research, then, faculty could be paid partially 'in kind' with research opportunities. Such in kind payments are consistent with the observed compensating differential—lower pay in academia compared to the private sector for similar skills. Combining this theory with barriers to entry suggests that

[13] In its traditional sense, regulatory capture would involve the capture of regulators (such as accrediting organizations) by the university, whereby the regulators set rules that are in the interest of universities, rather than social interest. However, increased research incentives are not being generated solely or even mostly by accrediting agencies. This version of regulatory capture involves the capture of university administrators by the faculty.

faculty might consume at least part of their rents in the form of engaging in research. Faced with the growing demand for higher education described earlier, and the resulting growth in rents available, faculty as a profession may have spent more of their increased rents on research.[14] This theory would then explain the observed pattern of research growth.

The industry of higher education, rather than (or in addition to) the professorate itself, could have barriers to entry. Higher education could be a natural monopoly for a number of reasons. First, faculty could do better research (funded and unfunded) in the presence of like-minded people with whom they exchange ideas and cooperate on research projects. These could be described as 'peer effects', resulting in economies of scale in the production of research, be it funded or unfunded (Laband and Tollison, 2000, 2003). Second, funded and unfunded research could exhibit economies of scope, if, unfunded research is an input in the production of funded research. Unfunded research can be undertaken in the expectation of future funding. Third, teaching and research could exhibit economies of scope. A good researcher may be a better teacher for reasons discussed in Section III.A; at the same time, by teaching a subject a researcher may gain new insights into the subject matter. Economies of scope between teaching and funded research imply that faculty who do both provide the institution with a cost advantage (Goldin and Katz 1999, 2008). Under these three assumptions, the production of teaching and research (both funded and unfunded) would give rise to a natural monopoly, and consequently, to entry barriers.

This theory would explain why we see all three products produced together, instead of separately. However, in Continental Europe, teaching and research take place in largely separate institutions by separate individuals (Owen-Smith et al. 2002, Enders and Teichler 1997, McCain,

[14] We thank Michael Kremer for this insight.

1960).[15] That practice does not contradict this theory, because European research and teaching are generally both considered worse than those in the US (Goldin and Katz 2008 p. 258, Institute of Higher Education, Shanghai Jiao Tong University 2007). On the other hand, the poorer performance of European higher education could be due to public sector work rules or other differences. European universities are now starting to emphasize research, just as in the US.

Other evidence, however, contradicts this hypothesis. First, the theory only explains why teaching and research (funded and unfunded) should be provided together in some disciplines rather than the entire institution. Since most of the humanities and much of the social sciences, mathematics, and professional school disciplines are largely without funded research, this theory does not explain why research is the primary criterion for faculty promotion and hiring in virtually all disciplines at more prestigious institutions and increasingly at other institutions (Wilson, 2001). Finally, the theory does not explain the recent increase in the use of teaching-only, non-tenure track, and frequently non-PhD faculty (Bettinger and Long, 2004). That increase has occurred at the same time as the increased emphasis on research for traditional tenure-track faculty, although it is far more recent.

The policy conclusions depend on which of the entry barrier theories are correct. If unfunded research is not intrinsically valuable and if professors are simply collecting rents in the form of research, higher education policy should try to reduce the barriers to entry. For example, accreditation and funding should not depend on having PhDs or researchers as faculty. On the

[15] Research in Europe occurs mostly in research institutes and not in universities because of legal prohibitions in some countries against faculty collaboration with commercial entities (Owen-Smith, Riccaboni, Pammolli, and Powell, 2002). Additionally, the culture in European universities is such that it considers research collaboration of faculty with private industries offensive and jeopardizing academic dignity and freedom (McCain, 1960). Enders and Teichler (1997) also find that the division between teaching and research duties varies substantially across European countries.

other hand, if there are really economies of scope and scale, then the barrier should persist but be focused on those areas with funded research.

V.D Non-economic theories: Fairness, imitation and prestige

We have described some theories that explain why unfunded research should be rewarded, such as economies of scope and scale and inputs to teaching, which make sense for some disciplines, particularly those with funded research. But these theories do not explain the value of unfunded research for other disciplines. We now turn to non-economic theories to see if they can explain the spread to other disciplines or the increased emphasis on research in general.

The first theory is fairness, or more precisely social norms of fairness (Elster 1988). Both funded and unfunded research are central to the natural sciences, the latter for reasons described earlier. Consequently, natural science professors are rewarded for their research. Notions of fairness—treating all faculty equally—may imply that all faculty, regardless of discipline, should be promoted and rewarded using the same criteria. Such fairness norms could work, even against forces of competition or efficiency. Faculty governance structures could further reinforce norms of fairness. If the fairness theory is true, policy could be improved by allowing faculty rewards for research to vary by field when the intrinsic value of unfunded research varies by field.

The second theory is that institutions imitate or model themselves on successful fields and institutions, a sociological theory called *institutional isomorphism* (DiMaggio and Powell, 1983). The isomorphic change has several possible causes, two of which seem relevant to the spread of research in higher education: pure imitation based on prestige, and socialization of those who work in the organization. More specifically, if natural sciences were considered successful, based on outcomes like major discoveries it could be that other fields imitated the organizational model of the successful natural science fields. The other fields might do this even

if it is in fact inefficient. At the university level, a similar process could be responsible for universities previously not emphasizing research to follow in the footsteps of prestigious research universities. Moreover, for a university, becoming similar to other universities makes it easier to establish reputation, interact with other universities, and fit in categories required to attract public and private grants. In competing for faculty, universities are driven toward homogenization, in part to ensure that they can provide the same professional environment and resources as other schools. This would explain the spread of research emphasis down the prestige ladder. According to the institutional isomorphism theory, homogenization is more intense under certain conditions, including an unclear technology of production or ambiguous goals, which clearly fits higher education.

Institutional isomorphism relies on the notion that research drives prestige. Why would this be true? The third theory suggests that research increases the visibility of the institution and through that its prestige, much like advertising (Kirp 2003). Once it is accepted that research drives prestige, many of our earlier theories about the importance of research, such as signaling, proxies for quality teaching, or consumption goods, follow easily. Some empirical evidence favors the theory that prestige may be more of a signal than a truly human-capital enhancing mechanism. Brewer, Eide and Ehrenberg (1999), find that substantial cross-sectional returns to institutional prestige are largely reduced by partially correcting for selection effects, resulting in statistically significant but practically only moderate rewards for institution prestige. Dale and Krueger (2002), correcting for unobservable differences in student quality, do not find any institutional prestige rewards.[16] On the other hand, Tracey and Waldfogel (1997) find that the research prestige of a business school is correlated with how much it appears to raise student

[16] Some object to Dale and Krueger's conclusion because they include resources as a control variable and resources could be considered a possible mechanism through which prestige works.

earnings, using observable characteristics to predict what students would have earned without the degree. This theory corresponds with the widely-held belief that research is a critical component of general prestige, whether this link originates from imitation, visibility, signaling, or reasons as yet unknown. General prestige, in turn, raises student demand for institutions of higher education (Kirp 2003).

V.E Rank Tournaments and Positional Arms Races

Accepting that research is prestigious opens the door for another economic theory, which suggests that the recent research emphasis is due to the pursuit of prestige. Frank and Cook (1995) suggest that competition in higher education may take the form of prestige-based rank tournaments which result in wasteful arms races. If an established system of rankings is accepted by everyone (notably prospective students and employers), then that ranking system will be a self-fulfilling prophecy. Even if a lesser-ranked institution is genuinely better at directly increasing students' human capital, attending the lesser-ranked university will be too costly a choice for students (Cook and Frank 1993, Frank and Cook 1995). Therefore, any accepted criteria for determining rank – research, athletic prowess, school colors and/or any other arbitrary characteristic – will determine what an institution needs to do to climb in rank. Once research determines rank, increasing the quality and quantity of research will be the best way to attract better students, even if research were entirely irrelevant to anything employers or students intrinsically valued.

Game-theoretical models tend to rely on intuitive and well-defined payoff matrices, such as profits, income, or avoiding death. However, the payoff in the race for prestige is anything but well-defined, since prestige itself and its relationship to research are not pinned down with any accuracy. Nonetheless, if position in the research rankings is important, institutions will be

driven to spend resources on research, including resources to attract top research faculty. Rank is, by definition, a positional good – what matters is where one institution stands relative to others. Although each institution's dominant strategy is to devote more and more resources to improve its relative rank, on average, little or nothing can improve from the additional resources if all institutions follow the same strategy. Prestige goods, therefore, are as wasteful as a genuine arms race. If research is simply a driver of prestige and provides no real value, policy could clearly be improved by strategies to reduce the role of research and the positional arms race.[17]

VII. Conclusions and Policy Implications

The writing of this paper would have been much easier if one of the theories described, existing or proposed, had emerged as the most relevant. Unfortunately for intellectual clarity, this is not the case: the theories described and extended in this paper *all* have some relevance. Each theory has found substantial support from some knowledgeable and intelligent readers. Each theory has also been dismissed by some of those readers. More theoretical and empirical evidence is needed to explain current trends and evaluate their impact on education outcomes and ultimately on human capital accumulation in the society.[18]

This paper has considered the various reasons why faculty research could hinder or help the accumulation of human capital. While we cannot determine the truth or relative quantitative magnitudes of the various theories, we can point out the policy implications of each of them. We started with the standard assumption that education enhances human capital. Then we posited that faculty who engage in research may also be better teachers since they may be better able to (a) teach students higher order skills, (b) possess up-to-date knowledge in rapidly evolving

[17] This race for prestige may also result in other negative consequences, such as increased inequality due to the increased cost of attending prestigious schools (Frank and Cook, 1995).
[18] The authors acknowledge the irony in proposing further (unfunded) research as one of the potential solutions to the problem.

fields, (c) select relevant course content, and (d) motivate students. If we consider education an investment good, and assume that research enhances the quality of teaching, then more research is better for student learning. When assuming that education is in part a consumption good, we also considered the hypothesis that faculty who engage in research may increase the consumption good value of education to, at least, the better students. If we add peer effects to the model, whereby better students contribute positively to the human capital accumulation of all others, then more research, again, appears to be socially desirable. In either of these cases, policies that undermine faculty incentives for research would be damaging to education and, therefore, to human capital accumulation. Caution is warranted before reducing incentives for research in hopes of supporting teaching.

Then we took the diametrically opposing view and assumed that education has no intrinsic value, but that it serves as a credible signal that sorts workers according to ability. In this context, we proposed a new theory claiming that faculty who engage in research make better screeners because they make learning harder for low-ability students. According to this theory, the emphasis on faculty research is effectively a second-best response to an existing market failure. In the purest form of the signaling/screening theory, education itself is a socially wasteful activity. In our extension of that theory, while faculty research itself is also intrinsically wasteful, it is socially beneficial, because it reduces the quantity of wasteful education needed to maintain the socially valuable sorting. Unfortunately, it does so through the perverse mechanism of worse teaching for less able students. For professors who do research, including the authors and many of our readers, this theory is highly ironic and even painful. If education is simply a signal, then resources should be directly allocated to providing information about potential employees that is valuable to employers, thus improving sorting directly.

Next, we looked at other market failures as potential explanations. First, we considered the extent to which information problems make it hard to evaluate teaching. The existing teaching measures – student evaluations – have been shown to have several shortcomings. They convey limited information that may not capture the more ephemeral (and perhaps more valuable) aspects of teaching. They may also be prone to a time inconsistency problem. Although ex-ante students may prefer schools with higher standards and, thus, a better reputation, ex-post, for any given ability level, students may try to minimize the psychic costs of education. Therefore, student evaluations may reward faculty who are less demanding. Because non-rivalrous research evaluation methods already exist, we considered whether research quality is being used as a proxy for teaching quality. The recent increase in the returns to education, and the lack of appropriate teaching measures to contract on, may be responsible for the increased emphasis on research. However, developing good teaching quality measures would be a more direct (and perhaps less costly) solution than using research quality as a proxy.

We next considered the implications of unfunded research as a public good. In this case, reallocating resources from teaching to research might be in the public interest, but public finance theory suggests that direct subsidies of research would be better than obscure cross-subsidies from teaching that distort the education services market. Of course, direct financing of many small research projects might bring large transactions costs that outweigh the distortions of cross-subsidies from education. The next market failure theory we considered was that the professorate has market power and chooses to "spend their rents" on research. In that case, breaking up the cartel would benefit society. The increased use of faculty without Ph.D-s, centrally developed distance learning tools, non-researcher teacher labor, and institutions such as the University of Phoenix, could all reduce the rents increasingly spent on more research,

benefiting society. Such a view suggests that regulatory changes for higher education would be socially beneficial. More research should investigate the value of the traditional research-performing Ph.D. as a teacher of higher education. Since the value could vary by discipline, it must be assessed on a subject-by-subject basis.

Next, we considered various non-economic theories. We first suggested that norms of fairness within the university may have resulted in the use of the same research standards as a way to evaluate all faculty, not only those in fields characterized by intensive research. Alternatively, institutions and fields may be trying to copy prestigious fields and institutions, which tend to engage in more research (institutional isomorphism). Finally, it could be that research drives prestige because it provides prominence, thus driving both imitation and a potentially destructive positional arms race. All these theories would explain the increased emphasis on research and its spread across disciplines. However, they all raise efficiency questions about this trend.

Because the various theories are not mutually exclusive and because both teaching and research are highly multi-dimensional in nature, drawing unambiguous policy conclusions is difficult. Ultimately, we would like to answer questions such as: Should accrediting organizations and the government oppose the increased use of teaching-only faculty on the grounds that research faculty make better teachers? Should legislatures reduce unfunded research release for faculty at public universities? Before such questions can be answered, research is needed to develop and test a coherent model that incorporates features of the existing theories. More specifically, research is needed to address: Which aspects of education are valued in the labor market, particularly those most difficult to measure, such as analytical thinking? Can valid measures of those abilities be developed? How costly would they be to implement? How valid

are current measures of higher education teaching quality and can further valid and cost-effective measures be developed? How does faculty research affect student learning? Does this vary by discipline, and, if so, how? To what extent does unfunded research provide valuable public goods? If such research were funded directly would the transactions cost be prohibitively large?

Higher education is very costly and the costs have been rising rapidly. Higher education is also widely believed to be highly beneficial to our economy. Both private willingness to pay for higher education and public support for public financing are certainly substantial. With stakes so high, the question of the impact of faculty research on education is not one that we can afford to ignore.

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