



Admission standards, student effort, and the creation of skilled jobs[☆]



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ABSTRACT

We consider the implications of expanding enrollment through lower standards in a model with human capital externalities and a market failure. Workers and firms make uncoordinated investment choices prior to random matching. Investment choices depend on the expected productivity of the counterpart in production. The setting generates a potential human capital externality as a more skilled labor force induces more skilled job openings. Exploiting the externality is complicated by a market failure which may cause some workers to earn a degree but not put forth the effort required to become highly skilled. We show that beyond a threshold, increased enrollment through low standards can be poor policy. Policies which increase returns to agents and firms in best matches can improve outcomes.

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1. Introduction

Workers with college degrees tend to earn more than those without. This notion is a key motivation for many students. Combined with the notion of education externalities, it also motivates much government policy. Governments around the world participate in funding education and anticipate higher enrollment and a higher paid workforce in return. Such responses to the college premium rely on hopeful assumptions regarding education. Under the standard human capital model (Becker (1964), Ben Porath (1967)), education builds human capital. The college premium is a simple reflection of improved productivity from attending college. In this environment, governments are correct to expect higher average income from policies which increase college enrollment. Acemoglu (1996) takes this notion a step further. When workers are more skilled, firms are motivated to create jobs appropriate for skilled workers. When firms create these jobs, workers are motivated to acquire the skills to fill them. This investment complementarity raises the stakes for government as it sets education policy.

This paper shows that even in the presence of such complementarities, there is reason for caution in drawing policy implications from the correlation between schooling and wages. We show that when individuals are heterogeneous in learning potential, increased college enrollment may

not improve output and productivity. We present a model of endogenous human capital accumulation featuring an investment complementarity along the lines of Acemoglu (1996), though simplified. We add to this environment a market failure in the spirit of Blankenau and Camera (2006, 2009). Students may make an effort investment and become high skilled in hope of exploiting the complementarity. They may instead choose a smaller investment and become low skilled in hope of extracting rents. Firms may create skilled jobs, hoping to hire a skilled worker and benefit from the complementarity. They may instead create unskilled jobs at a lower cost, hoping to avoid an uncompensated investment. Government sets enrollment by setting college admissions standards. If standards are high, there are few students and the complementarity is largely unexploited. If standards are low, a moral hazard problem is triggered whereby additional graduates are low skilled. For firms, this creates an adverse selection problem in that they may hire graduates who provide them no value. Effective policy balances the tension arising from the competing effects of the complementarity and the market failure.

In considering the market failure, we contribute to a large literature which challenges the notion that wages correlate to education because education creates skill. When the correlation has different foundations, more students may not result in more skill. Most famously, Spence (1973) and Arrow (1973) show that education can serve simply to signal innate ability. In this case, governments cannot increase skill through expanding enrollment. Nonetheless, individual students expect higher wages through the stratification allowed by schooling.¹ In much of this work, human capital accumulation is not central to the analysis. Furthermore, it does present graduation and skill accumulation as

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¹ The literature on signaling is immense. See Bedard (2001) as an example of recent evidence supporting its empirical relevance.

separate choices. As such this work cannot explore the moral hazard and adverse selection problems central to our analysis.

A related literature considers the effects of education standards on college enrollment and the accumulation of skills by students. Prominent examples include [Costrell \(1994\)](#) and [Betts \(1998\)](#). They consider environments where government or colleges can directly affect enrollment by setting education standards. A key feature of both papers is that firms cannot observe productivity but only credentials. As such, students put forth no effort beyond what is required to earn the degree. [Costrell](#) shows that in this setting increasing enrollment through lower standards can yield lower average output and wages. In [Betts'](#) model, low standards have no effect on the human capital at either end of the ability distribution but at the center force a quality/quantity trade-off. Thus there is again a negative side effect of increasing enrollment.²

Our work also considers the effects of education standards but highlights a distinct peril of setting these standards too high or too low. When standards are high and graduates are few, firms have a low probability of being matched with a graduate and so create few vacancies requiring skilled workers. Skilled workers, as a result, are unlikely to find appropriate work. Relaxing standards benefits all through the complementarity. This holds, however, only if workers are willing to work harder than is required to simply earn a degree. Beyond a cutoff point, the marginal worker finds the cost of skill too high and minimizes effort subject to earning a degree. As an equilibrium outcome, firms no longer increase investment in response to increased enrollment. While graduates continue to earn more than non-graduates in equilibrium, a larger share of graduates are in less productive matches. Our work, then, complements that of [Betts](#) and [Costrell](#) by urging caution in setting academic standards. However, the mechanism through which low standards are detrimental is distinct.

As mentioned above, the market failure in our model derives from [Blankenau and Camera \(2006, 2009\)](#). They include student effort as an input into the production of skill. Subsequent to an enrollment decision, students decide whether to make an imperfectly observable effort investment in human capital. Some students earn a degree but avoid effort. These students earn a degree only as a means of mimicking highly skilled agents. This allows them to appropriate some of the returns intended for the more skilled through an information asymmetry. While the market failure is similar, these models differ substantially from ours. These models consider ex-ante homogenous agents who decide on both college attendance and skill accumulation. In contrast, our model features heterogeneous workers and heterogeneous firms with enrollment set exogenously by government through standards. As such, we consider a separate set of questions. Moreover, our results do not rely on an information asymmetry. We demonstrate that our results could arise under such circumstances but also show that this is not required.

An empirically testable implication of our work is that lowering standards results in less average effort by students. While this empirical investigation is beyond the scope of our work, anecdotal evidence is supportive. In particular, our finding provides insights into the relatedness of two trends in higher education in the United States. [Hoxby \(2009\)](#) shows that overall selectivity of U.S. colleges has fallen since the 1950s. This is due to a large decrease in selectivity among the initially less selective colleges. In essence, lower ability students have a much greater access to college. [Babcock and Marks \(2010\)](#) document a sharp decrease over recent decades in the average number of hours students spend studying outside the classroom.

If the mechanism in our model is a contributor to the trend toward less effort, several policy prescriptions are immediate. Further increased enrollment through low standards may be ineffective. We show instead that the key to increased productivity is to increase the returns to investment for skilled workers and the firms who hire them. This suggests

policies such as targeted subsidies or tax cuts for the most productive firms and workers.

In [Section 2](#) we present and solve a simple model to illustrate the implications of the market failure. In [Section 3](#) we consider a generalization which shows that our results apply in a more robust set of circumstances. [Section 4](#) provides a summary and conclusion.

2. A simple model

We present a stylized model with several key features. A one-period economy is populated by a mass of workers, a mass of firms, and a government. Workers are heterogeneous in the effort cost of learning and firms are heterogeneous in the cost of creating a skilled vacancy. Creating a skilled vacancy is equivalent to creating a skilled job. Government funds college for those who gain admission. Admission is based on entrance exam scores and enrollment is regulated through the choice of the cutoff score. Those who go to college face a discrete choice regarding effort and skill. They have the opportunity to become highly skilled by incurring an effort cost. They also have an opportunity to earn a degree but less skill at a lower effort cost. Firms can create unskilled or skilled vacancies. Skilled vacancies are more costly to create and pay off only if the firm hires a highly skilled worker. Firms that create skilled vacancies are referred to as skilled firms and others are unskilled firms. College graduates who invest in effort and become highly skilled are referred to as skilled workers. Other graduates are schooled workers. Those who do not have a degree are unskilled workers.

Several features are essential to the economic mechanism explored by this model. To allow the [Acemoglu \(1996\)](#) externality, there must be a production complementarity between skilled firms and skilled workers. The possibility of exploiting this complementarity motivates the firms and workers who become skilled. To allow the moral hazard problem along the lines of [Blankenau and Camera \(2006, 2009\)](#), there must be some means for schooled worker to extract rent from skilled workers or firms. This market failure motivates the workers who become schooled. Another way of stating this is that we must allow for three types of agents. Some will be unskilled. This is exogenous. Others will be schooled as the result of the moral hazard problem and the final group will be skilled despite the moral hazard problem.

In [Section 2.1](#) below we assume that these features hold and derive optimal choices for agents and firms under these circumstances. There are many settings that could give rise to these relationships. We sketch several examples in [Section 2.2](#). In the first setting schooled agents produce a surplus when working with skilled firms. However, contracting imperfections allow the schooled worker to capture the entire surplus, leaving the skilled firm uncompensated for the cost of creating the vacancy. In this sense, the schooled worker collects rents from firm's investment in a skilled vacancy. In the second setting, a market failure arises from private information regarding the productivity of a graduate. In some cases, a firm does not know whether its production partner is schooled or skilled. Again there is a contracting imperfection. In this case, the firm offers the worker some share of the expected surplus. Unrecognized schooled and skilled workers are equally compensated, but the compensation is positive only because some of the unrecognized graduates have skill. Schooled workers in this case are capturing some of the surplus generated by skilled workers. The third setting is a relabeling of the second. In this case, the skill level of a graduate is known, but is not always used to write contracts.

Each of these settings maps precisely into the result from [Section 2.1](#). Given this, we provide equilibrium outcomes in [Section 2.3](#) which apply to each. The case of private information allows more depth of analysis so we then present some additional results specific to this setting. There are two advantages to presenting the general model in [Section 2.1](#) and exploring examples in [Section 2.2](#). First, it highlights that our results hold in a variety of plausible situations. Second, it allows us to isolate some of the complexities of the model in order to focus on the implications of our general structure.

² Other recent theoretical work on standards includes [Gary-Bobo and Trannoy \(2008\)](#) and [Epple et al. \(2006\)](#). However, they are primarily interested optimization of objective functions of the university, an issue not considered here.

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