Labour Economics xxx (2016) xxx–xxx

Contents lists available at ScienceDirect

Labour Economics

journal homepage: www.elsevier.com/locate/labeco

The dual avenues of labor market signaling☆

Michael Waldman

Johnson Graduate School of Management, Cornell University, 323 Sage Hall, Ithaca, NY 14853, United States

HIGHLIGHTS

- Education and promotion signaling can co-exist.
- A new return to education signaling is increased promotion probabilities.
- Education signaling has both positive and negative welfare effects.
- There can be important education signaling returns late in careers.

ARTICLE INFO

Article history:
Received 20 August 2015
Received in revised form 30 April 2016
Accepted 1 May 2016
Available online xxxx

Keywords:
Education signaling
Promotion signaling
Asymmetric information
Returns to education

ABSTRACT

This paper explores interactions between the two main avenues through which worker ability is signaled in the labor market — education signaling and promotion signaling. The framework assumes that workers are endowed with values for both academic ability and productive ability, where these abilities are positively correlated but are not identical. Workers use education to signal academic ability but firms care about productive ability which is signaled through promotion decisions. The main analysis yields three returns to education signaling: i) a higher starting wage; ii) higher wages for non-promoted workers late in careers; and iii) a higher probability of promotion. The paper shows that when education and promotion signaling co-exist education signaling fares better from a social welfare standpoint than in models characterized by education signaling only. Also, in contrast to standard models of education signaling, in this analysis there are important education signaling returns late in workers' careers.

1. Introduction

Starting with Spence's (1973) seminal contribution, it is well understood that one way that signaling affects labor market outcomes is through the schooling decision. Also, starting with Waldman (1984), it is understood that a second way that signaling affects labor market outcomes is through the promotion decision. But there has been little research analyzing how these dual avenues through which signaling affects labor market outcomes are related. This paper investigates this relationship.

The basic education signaling argument is well known.[1] In models that capture the basic argument workers have private information about their own abilities and firms infer worker ability levels from publicly observable schooling decisions. The result is that schooling serves as a signal of ability and workers overinvest in education, i.e., many workers invest in education beyond the level at which the marginal social return to investing equals the marginal social cost. Further, starting with Altonji and Pierret (1997) a number of papers extend this argument by allowing firms to learn about workers' abilities directly after labor market entry. The idea is that the signaling role of education should become less important as workers gain labor market experience. An important result in these papers is that the returns to education signaling should be concentrated early in workers' careers. Empirical papers such as Lange (2007) that take this into account find a limited role for signaling in real world education decisions.

In the basic promotion signaling argument it is firms that acquire private information about their own employees and prospective employers infer information about a worker's ability by observing the current employer's decision concerning whether or not to promote the worker.[2] The direct result is that prospective employers bid more for a

☆ I would like to thank the editor. Rafael Lalive, two anonymous referees, Oliver Gurtler, Fabian Lange, Hodaka Morita, Jan Zabojnik, seminar and conference participants at Cornell University, Drexel University, MIT, RPI, the University of Rochester, the University of South Florida, the 2014 Personnel Economics Conference at the University of Cologne, the 2014 Trans Pacific Labor Economics Conference at the University of New South Wales, the 2015 SOLE/EALE World Conference, and the 2015 CIREQ-McConnell Conference on Information Frictions in the Labor Market for helpful comments.

E-mail address: mw46@cornell.edu.

[1] In addition to Spence (1973), papers that investigate theoretical aspects of the education signaling argument include Riley (1975, 1979a) and Cho and Kreps (1987). See Riley (2001) and Spence (2002) for surveys that discuss the theoretical and empirical literatures on this topic.

[2] In addition to Waldman (1984), papers that investigate theoretical aspects of the promotion signaling argument include MacLeod and Malcomson (1988), Ricart i Costa (1988), Waldman (1990), and Bernhardt (1995). See Waldman (2012) for a survey that discusses the theoretical and empirical literatures on this topic.

http://dx.doi.org/10.1016/j.labeco.2016.05.001
0927-5371/

worker when they observe a promotion. Further, in response firms pair large wage increases with promotions in order to stop promoted workers from being bid away and also promote fewer workers than is efficient in order to reduce compensation costs. A number of papers such as Bernhardt (1995) and DeVaro and Waldman (2012) build on this basic argument to show that workers with higher levels of education will be favored in the promotion process. The logic is that the signaling role of promotion is less important for more highly educated workers so there is less incentive to distort the promotion decision for such workers.[3]

In this paper I construct and analyze a model that combines these two ideas. One innovation in the model is that workers are characterized by values for both "academic" ability and "productive" ability. Academic ability captures an individual's ability to do well in school, while productive ability captures an individual's ability to be productive in employment. In previous theoretical models no distinction is made between these two concepts. But clearly from a real world standpoint a worker's ability to do well in school is related to but not exactly the same as the worker's ability to do well in a work setting. I assume that academic ability and productive ability are positively correlated but that they are not identical. Further, an individual knows her own academic ability while a worker's current employer privately observes output which allows the firm to infer productive ability.

I construct and analyze a model in which individuals choose education levels at the beginning of their careers and then work in the labor market for two periods. I assume that schooling makes workers more productive, that the labor market is competitive, and that there are two job levels. One main result is that the model exhibits both education signaling as in Spence (1973) and promotion signaling as in Waldman (1984). Education signaling means that the private returns to higher levels of education exceed the direct extra productivity associated with higher education. As a result, workers invest more in education than in the first best. Promotion signaling means there is a wage increase associated with promotion because of the higher wage bids prospective employers make to promoted workers. The result is that firms promote fewer workers than in the first best.

In addition, consistent with the earlier literature on promotion signaling, I also find that workers with higher levels of education are favored in the promotion process. That is, there can be pairs of workers where only one is promoted and this worker has a higher education level but lower productive ability. The result is that there are three returns to education signaling in this model. First, there is a higher starting wage as in standard models of education signaling. Second, there is a higher wage for non-promoted old workers. Third, workers with more education are favored in the promotion process beyond the amount that is justified by the higher productive abilities of these workers.

The most important result here is that education signaling does not just increase a worker's wages early in the worker's career, but can also increase wages late in careers. In particular, one reason this can occur is that the education signal increases the probability of promotion. This result follows from well known arguments in the promotion signaling literature discussed above. As mentioned, in that literature firms reduce promotion probabilities below efficient levels in order to avoid paying the wage premium associated with the promotion signal. Further, the incentive to reduce the promotion probability is smaller for more highly educated workers because the wage premium due to promotion signaling is smaller for more highly educated workers. So promotion signaling results in more highly educated workers being favored in promotion decisions. What I show is that when promotion signaling is preceded by an education decision this result translates into one of the returns to education signaling being higher promotion probabilities.[4]

To better understand the basic argument, consider a firm that hires two workers for the same entry level managerial job where one worker has an MBA and the other a bachelors degree. Because firms in general expect workers with an MBA to have more training associated with success in managerial jobs, alternative employers will not be surprised if the worker with the MBA is promoted. As a result, the wage offers of prospective employers go up less when the worker with the MBA is promoted which translates into the initial employer offering a smaller wage increase to the MBA when a promotion occurs. Because the wage increase associated with promotion is smaller for the MBA, the result is that the initial employer will favor the worker with the MBA in promotion decisions beyond the amount justified by the higher productivity associated with an MBA degree. In turn, because employers favor workers with MBAs in promotion decisions, part of the signaling returns to receiving an MBA is the resulting higher promotion probabilities.

These results have two important implications concerning how one should think about education signaling. The first concerns whether education signaling is good or bad from the standpoint of social welfare. In a standard education signaling model the increase in education levels due to signaling unambiguously reduces social welfare. In contrast, in this model characterized by both education and promotion signaling, the increase in education levels due to education signaling has both positive and negative effects on social welfare. On the one hand, the direct productivity increases due to the higher education levels is less than the increase in costs due to these higher levels. Taken in isolation this reduces social welfare as in the standard argument. On the other hand, the increase in education levels due to the third signaling return which is a higher probability of promotion can increase social welfare because it reduces the distortion in the promotion decision due to promotion signaling.

The other important implication concerns studies focused on measuring the returns to education signaling. Recent papers that measure this return such as Lange (2007) typically assume a single job and that after workers enter the labor market firms learn about worker abilities in a symmetric fashion, i.e., any information generated about a worker's ability is publicly known. In such a world the signaling role of education becomes less important for compensation as a worker gains labor market experience. The reason is that as experience increases less and less weight is placed on the education signal in the formation of beliefs about the worker's ability level. This is the fundamental insight driving the limited returns to education signaling in Lange's empirical analysis. But if there are important returns to education signaling that occur late in careers, as is true in the model investigated here, then the type of approach employed by Lange and others which implicitly assumes that returns are concentrated early in careers may understate the returns to education signaling. I provide a detailed discussion of these issues in Section 6.

This paper builds on an analysis in Ishida (2004). That paper shows how a non-productive signal of worker ability can reduce the promotion signaling distortion. I instead focus on a productive signal which allows me to better connect the results to the education signaling literature. In addition, Ishida considers a model with a single type of worker ability

[3] Note that it is standard in this literature to refer to this mechanism as promotion signaling. But this mechanism is in fact different than standard signaling arguments such as initially modeled in Spence (1973). In a standard signaling model an individual has private information about herself and has an incentive to choose actions that "signal" positive information about herself to the market. In the promotion signaling argument current employers have private information about the workers they employ. In turn, an employer has an incentive to choose actions that "signal" negative information about each of its current employees in order to reduce compensation costs.

[4] One interesting question is, do the results in Kahn and Lange (2014) provide an alternative reason for some education signaling returns to occur late rather than early in careers? I think the answer is no. In Kahn and Lange's analysis there is symmetric learning but worker productivity changes over time because, for example, there are exogenous changes to worker health. This means there is learning about a worker's ability throughout the worker's career. That analysis does not include education signaling. My conjecture, however, is that if education signaling were added to that model, it would still be the case that education signaling returns would be concentrated early in careers as long as the stochastic process through which productivity changes occur during careers was independent of the schooling level.

Please cite this article as: Waldman, M., The dual avenues of labor market signaling, Labour Econ. (2016), http://dx.doi.org/10.1016/j.labeco.2016.05.001