The Returns to College Education: A Reassessment of Heterogeneous Treatment Effects*

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Extended Abstract

The basic relationship between college completion and economic success is well established in the empirical literature. College graduates typically earn more across their lifetimes than high school graduates and the differences tend to be substantial. With the continued growth in demand for college-educated labor (Goldin and Katz 2008) and accompanying expansion in the share of students who expect to attend a baccalaureate college (Goyette 2008), we reassess the evidence on the uniformity in returns to college attendance. Neoclassical economic arguments of comparative advantage imply that returns to college vary as a function of the likelihood of successfully completing a degree; those who are better prepared academically to meet the challenges of college are also more likely to enjoy the rewards of completing a degree (Heckman and Li 2003; Heckman, Humphries, Urzua, and Veramendi 2011; Murnane, Willet, Duhaldeborde, and Tyler 2000; Willis and Rosen 1979). In contrast, Brand and Xie (2010) use propensity score matching to show that the returns to a college degree are generally largest among those who are the *least likely* to graduate. Their findings have attracted substantial attention from stratification and education researchers. However, as Brand and Xie acknowledge, their conclusions are based on a model of heterogeneous treatment effects that requires strong (and untested) assumptions about the "ignorability" of various background characteristics and non-cognitive skills.

In this paper, we reassess Brand and Xie's results based on two substantively important alternative specifications. First, we broaden the set of predictors of completing college to include important noncognitive skills such as self-esteem and locus of control. These skills, we argue, are particularly important sources of unobserved heterogeneity among those in the lower propensity strata who do and do not complete college. We expect to find that, among those least likely to complete a degree, completers have a stronger internal locus of control and higher levels of self-esteem than non-completers. Second, we suggest that misspecification in Brand and Xie (2010) is not confined to the right-hand side variables. In fact, the relevant treatment for those interested in understanding the return to college is not college *completion*, but college *attendance*. Only about 6 of 10 students who initially enroll in a baccalaureate college will complete a baccalaureate degree within six year of beginning college (Radford, Berkner, Wheeless, and Shepherd 2010); for those with lower propensities to attend college, we imagine the share completing is lower still. Ignoring the costs of attendance to focus solely on completion likely overstates the relative returns to college and may do so in a way that inflates the returns most for those least likely to complete. Preliminary results (see Figures 1-2) would seem to bear these speculations out.

The importance of non-cognitive skills

Over the past decade, economists and sociologists have become increasingly interested in understanding how 'non-cognitive skills' influence various dimension of status attainment. Non-

cognitive skills include a dizzying array of traits and practices, from Bourdieu's notions of cultural capital and *habitus* (Bourdieu and Passeron 1990) to the Big Five dimensions of personality (Digman 1990) and may influence both educational attainment and earnings. Among the many non-cognitive skills implicated in attainment, past empirical work, some with the NLSY79 data employed by Brand and Xie (2010), show that self-esteem is a strong predictor of earnings (Francesco 2011) and that self-control (also referred to as an internal locus of control) predicts a host of outcomes in adulthood, including health, personal finance and criminal offending (Moffitt, Arseneault, Belsky, Dickson, Hancox, Harrington, Houts, Poulton, Roberts, Ross, Sears, Thomson, and Caspi 2011). Both self-esteem and self-control also predict college completion (Heckman, Stixrud, and Urzua 2006). In fact, other empirical work looking at the average treatment effects of college attendance and completion finds that those effect are substantially overstated in the absence of controls for these dimensions of non-cognitive skills, consistent with our thesis (Heckman, Humphries, Urzua, and Veramendi 2011). Brand and Xie acknowledge the importance of social-psychological mechanisms in their model of the propensity to complete college, but assume that a measure of friends' college plans is an adequate proxy for the nonacademic factors that contribute to college completion and earnings. In our paper, we add measures of locus of control and self-esteem to this predictor of college completion and, as we discuss below, college attendance.

Choosing the proper treatment

The returns to college, like those of any other investment, must be evaluated relative to the costs. One does not enjoy the economic benefits of college by simply walking through the door; rather, one enjoys the opportunity to accrue credits toward college completion. Although the literature suggests that even a year of college leads to increased lifetime earnings (Baum, Ma, and Payea 2010; Grubb 2002; Kane and Rouse 1995), that literature has typically under-specified the college choice process with respect to prior academic achievement and non-cognitive skills. We contend that the relevant treatment for the marginal college entrant is not college completion, but rather college entry. Entry offers the option of completion, but not the guarantee. Identifying the returns to college attendance based on the propensity to complete a degree risks mischaracterizing the costs and benefit of college attendance, particularly for those most at risk of dropping out. Although our evidence is still tentative, we suspect that it is this group that drives the empirical results in Brand and Xie's analyses.

Analysis plan

Our examination of heterogeneity in the college wage premium begins with a replication of the findings presented in Brand and Xie (2010). For these analyses, we use data from the National Longitudinal Survey of Youth 1979 (NLSY79) and High School and Beyond (HS&B). These data sets contain detailed information on individuals' college attendance and completion; their cognitive and non-cognitive skills (measured prior to college enrollment); their high school achievement (measured

in terms of grade point average and course-taking); their friends' and parents' expectations with respect to college; their socio-demographic and geographic characteristics (again, measured prior to enrollment); and their annual earnings (observed at multiple ages). After this replication exercise is complete, we specify and test a series of alternative models with an expanded set of pre-treatment variables, including the sorts of the personality traits described above. Comparisons across analyses will demonstrate the robustness of Brand and Xie's estimates, as well as the appropriateness of their ignorability assumptions. Preliminary results from the NLSY79 (using our expanded specification) are provided in Figures 1-2; we expect to have similar estimates for HS&B within the next month.[1]

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[1] We have experienced some difficulty replicating Brand and Xie's basic estimates (using NLSY79), and thus we do not provide those results as a part of this abstract. We are confident, however, that the replication portion of our analysis will be complete well in advance of this year's PAA.

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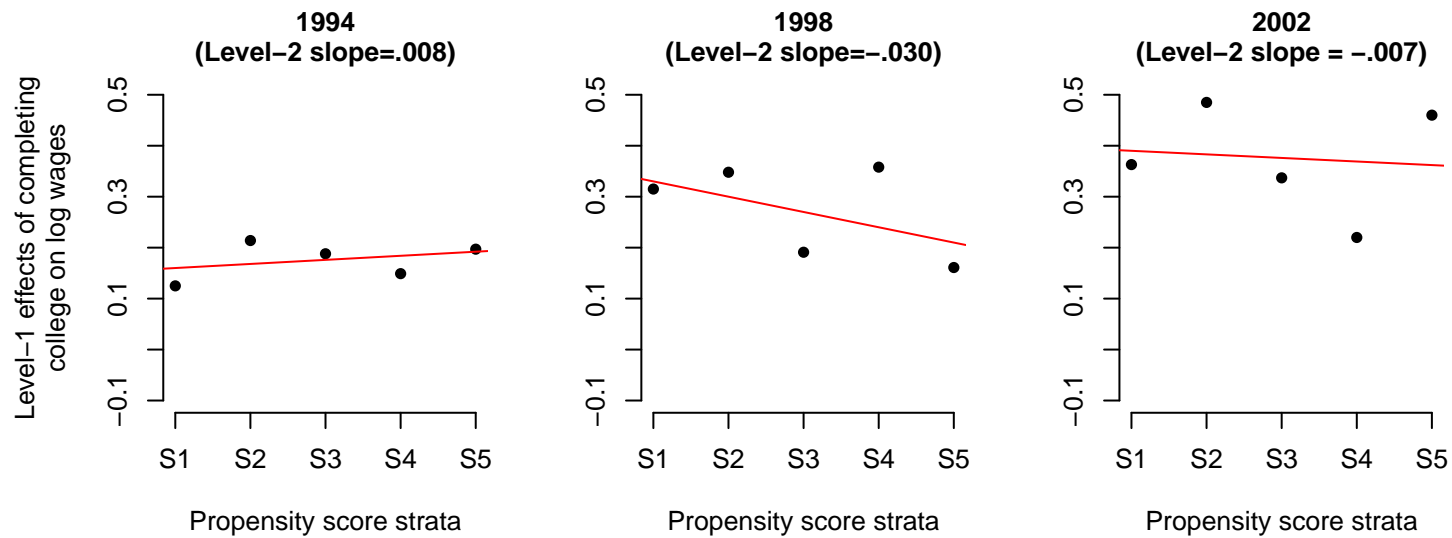
Figure 1: Estimated treatment effect of completing college on log hourly wages, by propensity score strata and year of earnings report (NLSY97). Black circles indicate point estimates by strata, and red lines give the estimated trend across strata. All models include controls for cognitive (mental ability) and non-cognitive skills (locus of control and self-esteem), sociodemographic characteristics, geographic characteristics, friends' and parents' expectations concerning college, and high school track. Stratum 1 includes individuals with a low propensity to complete college and stratum 5 includes individuals with a high propensity. The sample is restricted to employed men only; subsequent drafts will provide estimates for women as well.
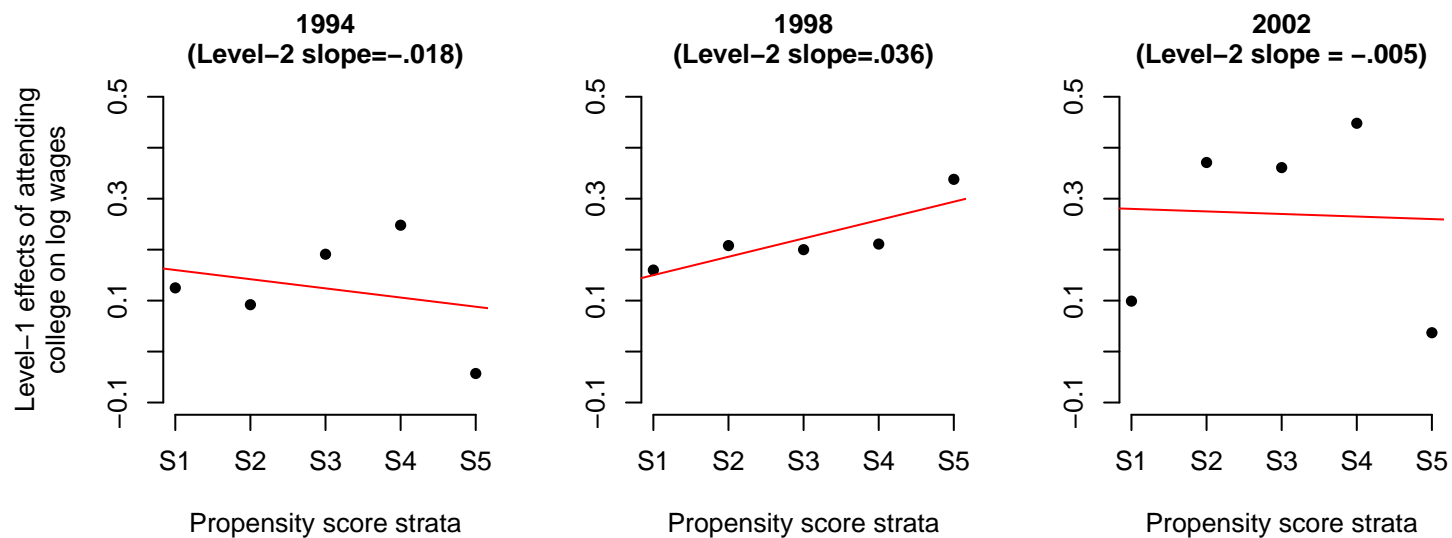
Figure 2: Estimated treatment effect of attending college on log hourly wages, by propensity score strata and year of earnings report (NLSY97). All models include controls for cognitive (mental ability) and non-cognitive skills (locus of control and self-esteem), sociodemographic characteristics, geographic characteristics, friends' and parents' expectations concerning college, and high school track. Black circles indicate point estimates by strata, and red lines give the estimated trend across strata. Stratum 1 includes individuals with a low propensity to attend college and stratum 5 includes individuals with a high propensity. The sample is restricted to employed men only; subsequent drafts will provide estimates for women as well.