Labor Market Returns to College Enrollment and Degree Attainment: Heterogeneous Effects by Socioeconomic Status

Introduction

The expansion of higher education that began during the late 1960s has increased the needs for young adults to have at least some post secondary education in order to become stably employed (Berlin, Furstenburg, & Waters, 2010). Today, 60-70% of high school graduates choose college as the next step of their career trajectory (U.S. Department of Labor, 2018). However, youth with low economic resources are less likely to enter and persist through college (Kim & Sherraden, 2011). Recent data have shown that fewer youth in low socioeconomic status (SES) families experience some post-secondary education (72%), than those in high SES families (96%). Furthermore, only about 35% of youth in low SES families attained a post-secondary certificate, as opposed to 72% of high-SES youth within 8 years after the time of high school graduation (U.S. Department of Education, 2016). Barriers to higher education are even more daunting given the steady rise in college education costs in the U.S. over the recent decade (U.S. Department of Education, 2016). In light of this, it is important to understand the benefits youth receive when they make investments in post-secondary education. This is especially important for those who are under financial restraints, and face more barriers to college completion.

There is a long tradition of research in understanding the economic returns to post-secondary education (Hout, 2012). However, most research focuses primarily on a single indicator of either college attendance or completion, when the returns to the college experience may differ by whether one attained a degree. This is likely due in part to the compelling arguments that gains in earnings derive primarily from certain educational thresholds (e.g., diploma receipt), as opposed to the linear function of years of education (Hungerford & Solon, 1987). One notable exception is the work of Kane and Rouse (1995). They used the total number of two- and four-year college credits to predict future earnings, and compared between those who received a degree and those took the equivalent amount of credits needed for graduation, but did not attain a degree. Their results showed that an Associates degree had a higher effect on future earnings over and above the two years of two-year college credits, but only for women. Earning a Bachelors degree yielded similar results for men.

While Kane and Rouse (1995) used an OLS approach, we expand this idea by using propensity score matching (PSM) to examine how the college enrollment, compared to non-enrollment and also degree attainment, predicts career outcomes. PSM can provide a better causal treatment effect for the treated, as it reduces the self-selection bias by comparing the treated with the untreated who are similar to them in other characteristics (Morgan, 2001). This will provide important information about the ways in which college education provides advantages throughout the life course.

Importantly, recent research has documented that the returns to education vary across individuals. Numerous studies have tested how the effects of college may vary by different

individual and family backgrounds, using methodological attempts to overcome omitted variable bias (e.g., Brand & Xie, 2010; Carneiro, Heckman, & Vytlacil, 2011). However, there is still no clear consensus as to which youth benefit more (Hout, 2012). The current study attempts to add to this literature by focusing on the returns to college attendance, and importantly making comparisons based on whether a degree is attained. We followed Brand & Xie's (2010) approach and used PSM to match individuals who attended or graduated college to those who did not but shared similar characteristics based on other observed variables. PSM also allows us to easily compare the effects by different individual and family backgrounds by providing a unidimensional measure of these background information: the propensity score.

Lastly, in addition to the traditional objective career attainment outcomes (e.g. wages), we also examined subjective indicators of career success. The subjective meaning of individuals' career may also have important implications to one's perception on their career or life achievement. For instance, career satisfaction is shown to be associated with individuals' general life satisfaction (Lounsbury, Park, Sundstrom, Williamson, & Pemberton, 2004). As an underexplored aspect of career success, we expect to provide insights on how college education, including the experience and degree attainment, play into the subjective feelings or beliefs about careers. Each of these effects will be tested across different SES backgrounds.

Data/Method

We used the National Longitudinal Survey of Youth–1997 (NLSY97), a large cohort based panel dataset on American youth born between 1980-1985. The NLSY97 is a nationally representative sample of 8,984 individuals who were followed since 1997, when they were 12 to 18 years old. They were followed across 17 rounds: annually until 2010 and biennially thereafter until 2015, when they were 30 to 36 years old. We restricted our sample to those who were enrolled in grades 1-12 at the baseline survey and has graduated high school or attained a GED by the most recent survey round used in this study. As a result, a total of 7,822 youth were used for the final analyses.

To estimate the effects of college, we set different groups of *college statuses* as treatments. This consists of three categories: *a) degree attainment b) no degree but enrolled at least once c) no enrollment*. This was coded based on youths' report of the highest degree of education and history of college enrollment across all survey rounds. The college degree could be an Associate's, Bachelor's degree, or higher. We utilized a wide range of *observed precollege characteristics* to construct the propensity scores associated with selection into different college statuses described above. These observed variables included the birth year, gender, race, intact family, rural residence, household income and net-worth, mother's and father's education, the expected % of peers who plan to go to college, and high school GPA. All the measures except for high school GPA were collected from the baseline survey conducted in 1997. We used two indicators of *career outcomes* both collected through the latest wave: a) *past year's income* and b) *job satisfaction.* Income was confined to those from wages and salary, and job satisfaction was the extent they liked their main job on a 5-point scale.

Of the 7,822 youth, only 2,527 (32.31%) were fully observed in terms of the precollege variables used to conduct PSM. To handle missing data, we conducted multiple-imputation by chained equations to impute missing data based on the distribution of other observed covariate data. We generated five complete data sets, and then estimated the propensity score and treatment effects for each dataset. We used the average results across five datasets to estimate the treatment effects. All analyses were conducted through Stata14, using the methods demonstrated by Eulenburg and colleagues (2016).

Results

As a preliminary analysis, we examined the association between college status and future career outcomes by conducting linear regression analyses predicting the future wage and job satisfaction from the college status and all observed pre-college characteristics (Table 1). The results showed that those who attained a college degree were more likely to have a higher wage compared to those who did not receive a college degree. However, those who had some college experience without attaining a degree also had significantly higher wage than those who have never enrolled in college. Only those who attained a degree had higher levels of job satisfaction, compared to other groups. In other words, college enrollment without attainment did not provide an advantage as compared to non-attenders in terms of job satisfaction.

Next, we computed the average propensity score across each dataset based on the observed pre-college covariates. To rotate the treatment group, we conducted three separate models predicting a) degree attained vs. never enrolled b) degree attained vs. enrolled with no degree c) enrolled with no degree vs. never enrolled. The first model (a) failed to attain a good balance in covariates within each propensity stratum. However, for the remaining two models (b, c), each stratum achieved balanced covariate characteristics. In other words, the individual characteristics were similar between the treatment and control statuses within each propensity score stratum. Then, we estimated the treatment effect based on PSM, and the college effects were generally similar to the linear regression model (Table 2). In future analyses, we will test if there is a heterogeneous effect of college enrollment and degree attainment by different propensity score groups. We will also examine how they may vary by degree type.

Our preliminary findings suggest that both the college degree and experience matter for future earnings. While the college degree may provide youth with the highest economic market returns, some college experience still benefited youth in terms of earnings, compared to no experience at all. However, in terms of career satisfaction, it was the college degree that mattered the most. Through future analyses, we expect to see if and how the returns of college enrollment and degree attainment on career outcomes vary by individual and family backgrounds based on propensity scores.

Table 1

Regression Predicting Future Wage and Job Satisfaction

	Log wage		Job satisfaction	
Focal predictor	*B*	*SE B*	*B*	*SE B*
Degree attained vs. Never enrolled	0.574***	(0.044)	0.106**	(0.038)
Degree attained vs. Enrolled with no degree	0.384***	(0.040)	0.088*	(0.036)
Enrolled with no degree vs. Never enrolled	0.190***	(0.044)	0.018	(0.038)
Covariates				
Year of birth	-0.035**	(0.012)	-0.026*	(0.010)
Male	0.400***	(0.033)	-0.020	(0.029)
Black	-0.201***	(0.043)	-0.209***	(0.038)
Hispanic	-0.056	(0.049)	0.055	(0.043)
Other race	0.098	(0.164)	0.065	(0.146)
Intact family	0.102**	(0.038)	0.107**	(0.033)
Rural residence	-0.117**	(0.041)	0.007	(0.035)
Household income	0.000	(0.000)	0.000	(0.000)
Household net-worth	0.000	(0.000)	0.000	(0.000)
Mother's education	0.008	(0.008)	0.001	(0.007)
Father's education	-0.002	(0.007)	-0.003	(0.006)
GPA	0.001	(0.001)	-0.001	(0.001)
Peers with college plans (expected %)	0.019	(0.017)	0.042**	(0.014)

Table 2

Matching Estimates of College Status on Future Wage and Job Satisfaction

Outcome	Log wage		Job satisfaction	
Treatment	Degree attained Vs. Enrolled with no degree	Enrolled with no degree Vs. Never enrolled	Degree attained Vs. Enrolled with no degree	Enrolled with no degree Vs. Never enrolled
Unmatched differences	.379*** (.037)	.197*** (.048)	.092* (.036)	-.012 (.040)
Interval matching	.409*** (.049)	.208*** (.055)	.101* (.043)	-.012 (.042)
Nearest neighbor matching	.378*** (.059)	.226** (.086)	.079 (.061)	-.025 (.060)

Notes: The estimates are unstandardized coefficients. Numbers in parentheses are standard errors.

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